

# Aviation Week

*Including Space Technology*

September 7, 1959

SPECIAL REPORT:

**International  
Astronautical  
Meeting**

75 Cents

A McGraw-Hill Publication

United Air Lines Douglas DC-8



**Pilot Report on Convair F-106 Intercept**



# GSE

## by AEROJET

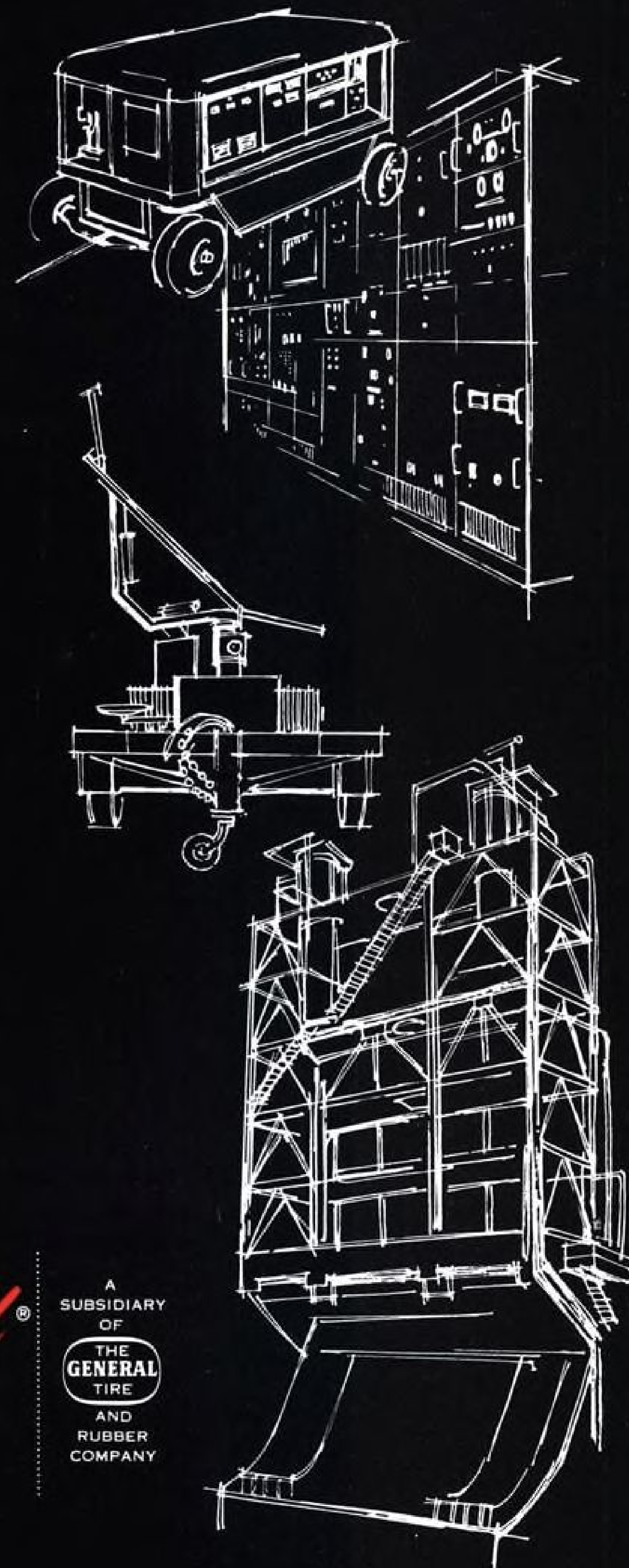
Success in the air depends on support from the ground. Aerojet-General designs and manufactures all types of missile, surveillance drone, and space system ground support equipment.

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- Instrumentation and Control
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- Space Position Instrumentation
- Miss - Distance Measuring Sets

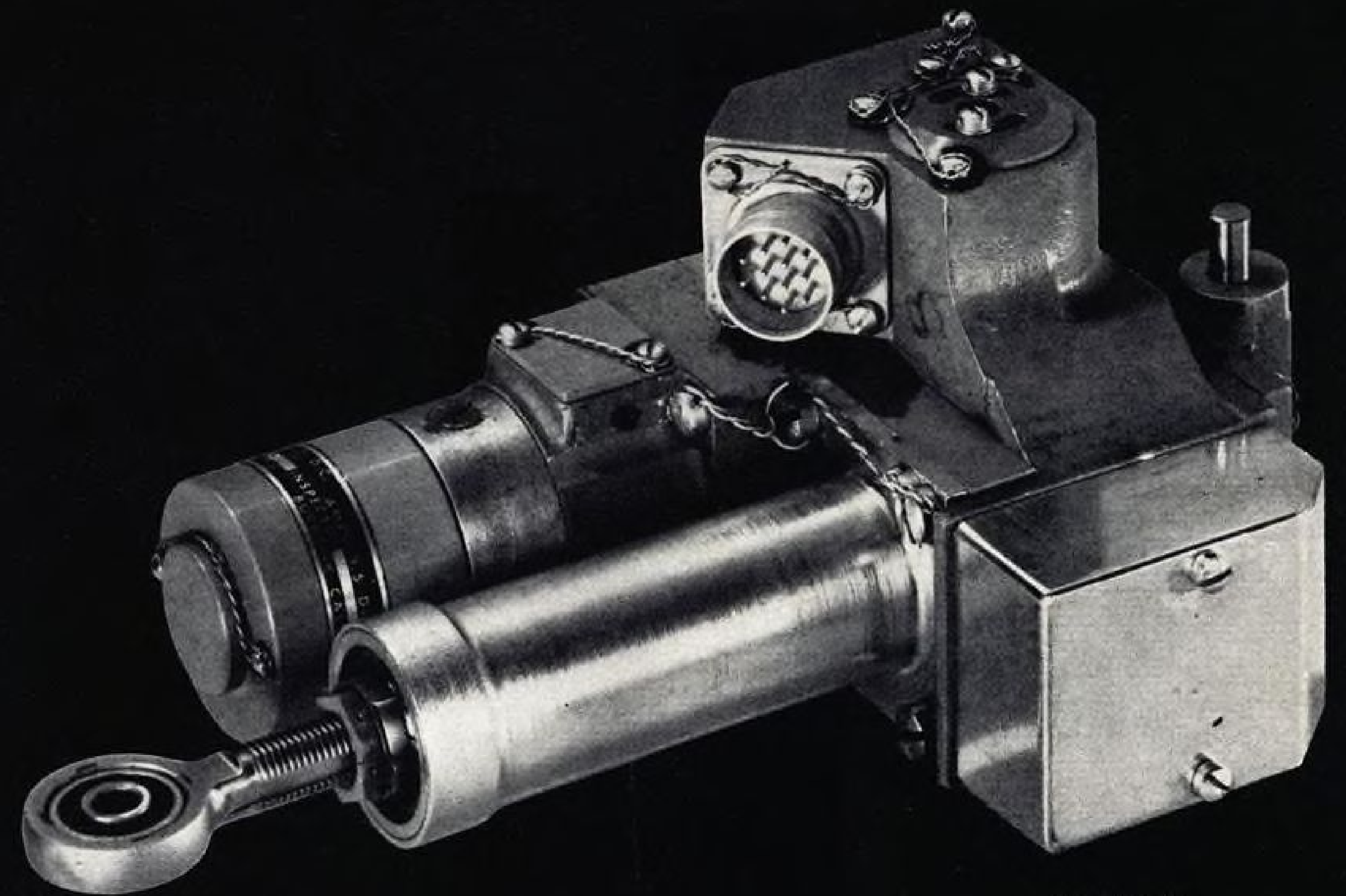
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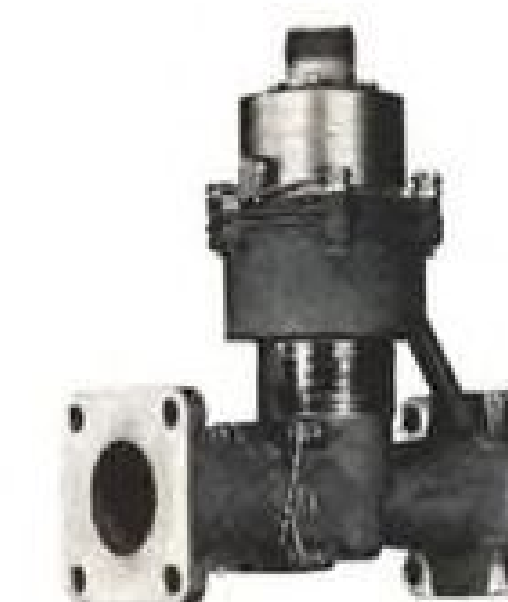


Linear Actuator

## A reliable performer in Hydro-Aire's moving story



Hydraulic Valve



Pneumatic Operated Gate Valve



High Temperature Regulator  
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Fuel Booster Pump

Featured above is Hydro-Aire's recent linear actuator design (P/N 20-011) powered by 24 volts D.C. A position-indicating potentiometer transmits ram position signals accurate to  $\pm .001$  inches. Actuator travel speed is closely controlled under the range of voltages and loads. Non-jamming mechanical stops limit travel of the ram in the event of switch failure. Write for further details on this and other dependable products illustrated to:

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### AVIATION CALENDAR

Sept. 14-15—Display of USAF Ground Support Equipment for Manned and Unmanned Aerospace Vehicles, Society of Automotive Engineers, Milwaukee Arena, Milwaukee, Wis.

Sept. 16-17—Western Regional Meeting on Frontiers of Science and Engineering, Institute of the Aeronautical Sciences, Los Angeles, Calif.

Sept. 17-18—Conference on Effects of Nuclear Radiation on Semiconductors, Western Union Auditorium, New York, N. Y. Sponsor: Army Signal Corps.

Sept. 17-18—Dual National Engineering Communications Symposia, Institute of Radio Engineers' Professional Group on Engineering Writing and Speech, Boston, Mass., and Los Angeles, Calif.

Sept. 19-20—National Air Races (190 cu. in. airplanes), Baer Field, Ft. Wayne, Ind.

Sept. 21-22—Conference on Planning and Designing of Urban Helicopter Facilities, Institute of Aeronautical Sciences Bldg., Los Angeles, Calif. Sponsor: Los Angeles Chamber of Commerce.

Sept. 21-22—Eighth Annual Meeting, Standards Engineering Society, on Investment in Survival, Somerset Hotel, Boston, Mass.

Sept. 21-25—14th Annual Instrument-Automation Conference and Exhibit, Instrument Society of America, Chicago, Ill.

Sept. 23—Second Semi-Annual Area Meeting, Washington Air Route Traffic Control Center, Marriott Motor Hotel, Washington, D. C.

Sept. 23-24—Engine and Operations Symposium, Airwork Corp., Millville, N. J.

Sept. 24-25—Ninth General Assembly, Advisory Group for Aeronautical Research and Development, NATO, Aachen, Germany. Subject: Space Research Techniques and Recent Experimental Data.

Sept. 28-30—1959 National Symposium on Telemetry, Civic Auditorium and Whitcomb Hotel, San Francisco, Calif. Sponsor: Institute of Radio Engineers' (Continued on page 6)

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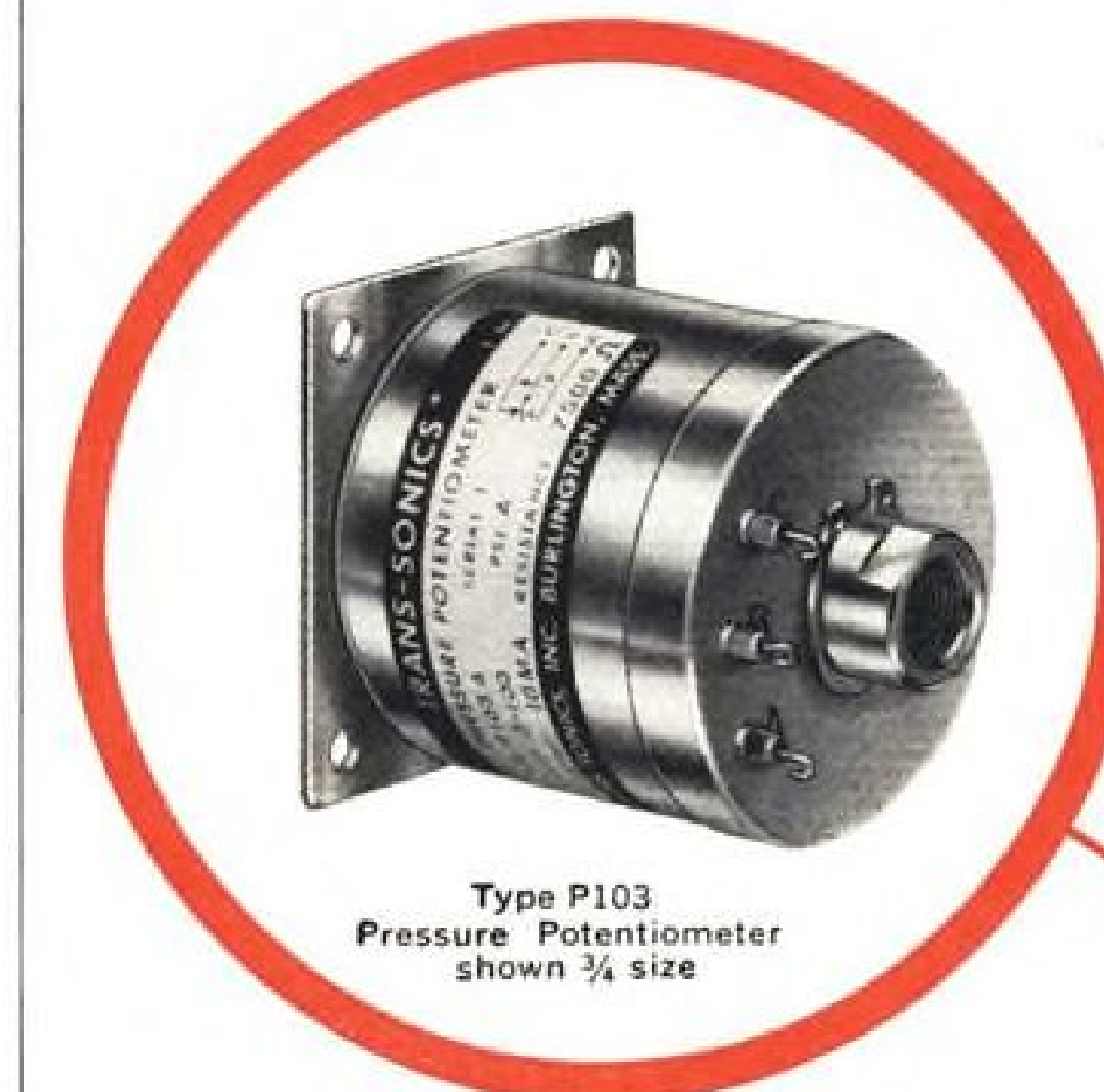
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AVIATION WEEK, September 7, 1959

Pressure Potentiometers for...

## HIGH TEMPERATURES and CORROSIVE FLUIDS



Type P103  
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New Trans-Sonics® Pressure Potentiometers, Type P103, measure pressures of corrosive fluids such as red fuming nitric acid (RFNA) and unsymmetrical dimethylhydrazine (UDMH) for telemetry and control applications at ambient temperatures up to 600F.

Corrosive fluids are contained by a welded Inconel-X bellows which actuates a dynamically balanced mechanism. This mechanism is hermetically sealed in a stainless steel case for protection against corrosion and other environmental hazards.

Accurate and reliable performance has been proven under the following conditions typical of missile environments: *Random Gaussian Vibration* 0.1g<sup>2</sup>/cps, 15 to 2,000 cps; *Acceleration* 75g; *Shock* 75g.

Flexibility of installation is assured by small size and light weight. Dimensions are 1 7/8" diameter by 1 3/8" long. Weight is only 6 ounces. Standard ranges are 0-100 and 0-150 psia . . . other ranges to special order. Write for Technical Bulletin P103 to Trans-Sonics, Inc., Dept. 7, Burlington, Mass.

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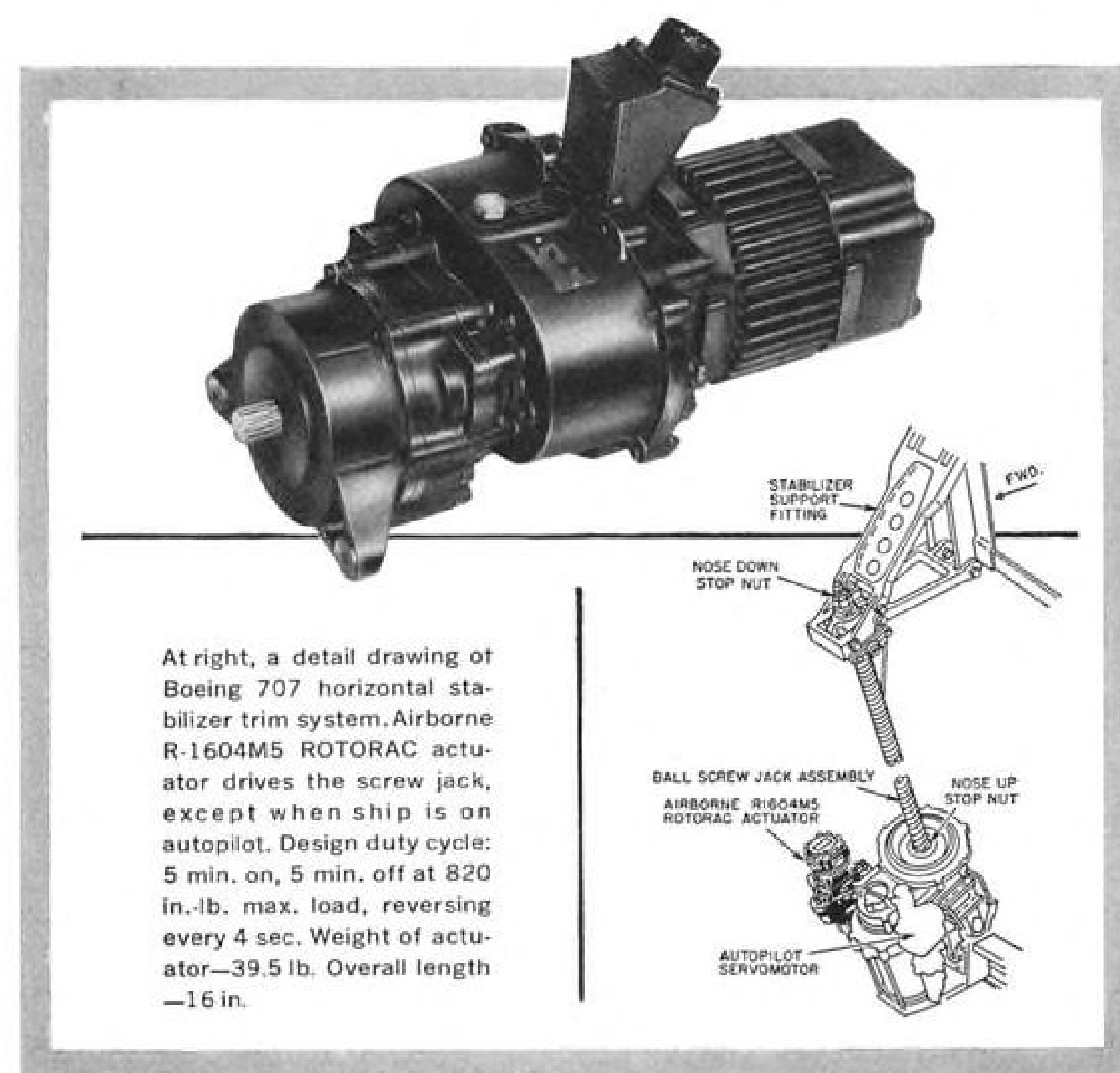
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## AIRBORNE SPECIAL ACTUATOR POWERS 707 TRIM SYSTEM



At right, a detail drawing of Boeing 707 horizontal stabilizer trim system. Airborne R-1604M5 ROTORAC actuator drives the screw jack, except when ship is on autopilot. Design duty cycle: 5 min. on, 5 min. off at 820 in.-lb. max. load, reversing every 4 sec. Weight of actuator—39.5 lb. Overall length—16 in.

Because of its function—operation of a primary flight control on Boeing's 707—this Airborne ROTORAC large special actuator must provide the utmost reliability under almost continuous off-on-reverse type operation. And its response must be quick, even though maximum torque and acceleration are limited by specification—to avoid inadvertent structural overloads.

To control torque, Airborne developed a special friction clutch which limits output to 1500 in.-lb. maximum and yet will transmit 1200 in.-lb. under any condition. Controlled accelerations were achieved by balancing the inertia characteristics of all rotating parts

and of the external load against the carefully tailored performances of the motor and servo clutches. Result: smooth acceleration from 0 to 180 rpm in 0.4 second and shock-free reversal in 0.1 second, both at full load.

Airborne offers you engineering of this caliber to meet needs for almost any special rotary or linear electromechanical actuator—large or small. And where requirements are not unique, we provide a line of modular-type actuators, developed by Airborne to simplify design and specification. Just give us the facts on your application and we will be happy to make a proposal. Contact any of our offices for further information.



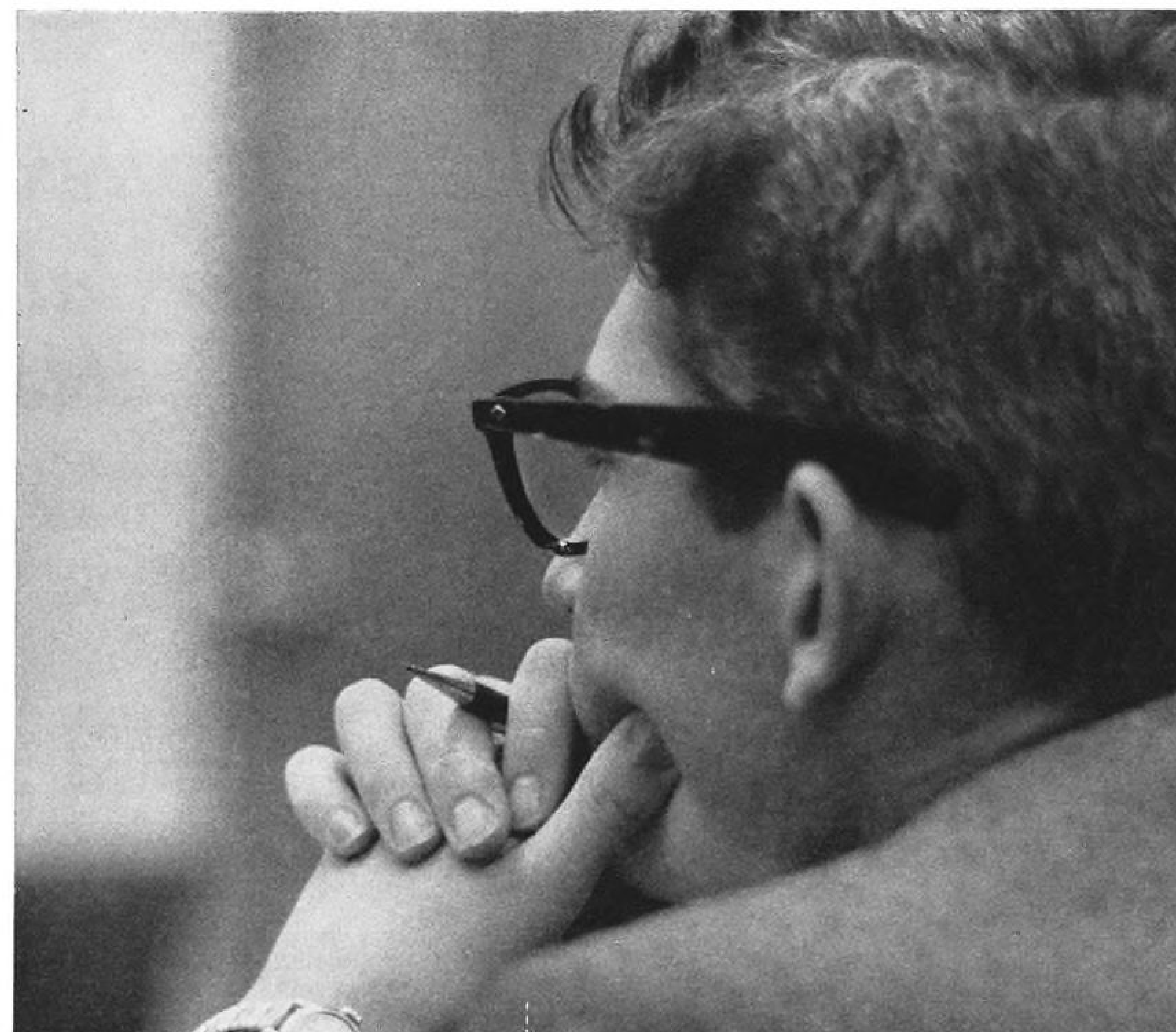
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## AVIATION CALENDAR

(Continued from page 5)

- Professional Group on Space Electronics & Telemetry.
- Sept. 30-Oct. 2—13th Annual Meeting, Southeastern Airport Managers' Assn., Washington Duke Hotel, Durham, N. C.
- Oct. 1-3—23rd Annual Convention, International Northwest Aviation Council, Multnomah Hotel, Portland, Ore.
- Oct. 5-7—Seventh Anglo-American Aeronautics Conference, Institute of the Aeronautical Sciences, Hotel Astor, New York.
- Oct. 5-7—Fifth National Communications Symposium, Hotel Utica, Utica, N. Y. Sponsor: Institute of Radio Engineers' Professional Group on Communications Systems.
- Oct. 5-9—National Aeronautic Meeting, Society of Automotive Engineers, the Ambassador, Los Angeles, Calif.
- Oct. 6-12th Annual Airport Development & Operations Conference, Hotel Onondaga, Syracuse, N. Y. Sponsor: Bureau of Aviation, New York State Department of Commerce.
- Oct. 6-8—12th Annual Meeting, National Business Aircraft Assn., Hotel Leanington, Minneapolis, Minn.
- Oct. 6-8—Radio Interference Reduction and Electronic Compatibility Conference, Museum of Science and Industry, Chicago, Ill. Conducted by Armour Research Foundation in cooperation with Institute of Radio Engineers' Professional Group on Radio Frequency Interference. (Classified session on Oct. 8.)
- Oct. 6-8—National Airports Conference, Norman, Okla. Sponsors: American Assn. of Airport Executives and the University of Oklahoma, in cooperation with FAA.
- Oct. 6-8—Industry-Military Quality Control Management Symposium, Oklahoma City Air Materiel Area, Tinker AFB, Oklahoma City, Okla.
- Oct. 6-9—International Symposium on High-Temperature Technology, Asilomar Conference Grounds, Monterey Peninsula, Calif. Sponsor: Stanford Research Institute.
- Oct. 7-8—Second Advanced Propulsion Systems Symposium, New England Mutual Hall, Boston, Mass. Sponsors: Air Force Office of Scientific Research; Avco-Everett Research Laboratory.
- Oct. 7-9—Sixth National Symposium on Vacuum Technology, American Vacuum Society, Sheraton Hotel, Philadelphia, Pa.
- Oct. 7-10—Fourth Annual National Meeting, Air Traffic Control Assn., Biltmore Hotel, Oklahoma City, Okla.
- Oct. 8-10—Society of Experimental Test Pilots' Symposium on Pilot's Role in Space Exploration, Beverly Hilton Hotel, Beverly Hills, Calif. Third Annual Awards Banquet, Oct. 10.
- Oct. 12-14—15th National Electronics Conference, Hotel Sherman, Chicago, Ill.
- Oct. 12-16—15th Annual General Meeting of the International Air Transport Assn., Imperial Hotel, Tokyo, Japan.
- Oct. 12-16—NASA's 1959 Inspection, Langley Research Center, Hampton, Va.
- Oct. 14-23—"William Tell II" Seventh World-Wide Interceptor Weapons Meet, Tyndall AFB, Panama City, Fla. Host: Air Defense Command.



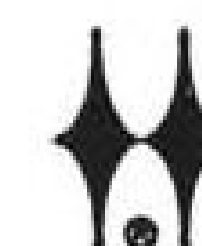
## THE HUMAN FACTOR in today's technology

Scientists have long been preoccupied with the technological problems of Man and the Machine. The increasingly complex nature of advanced systems has created an urgent need to enhance man's contribution to effective systems performance. The complicated nature of this relationship requires the skills of psychologists, social scientists, mathematicians, and engineers.

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*is a vital part of  
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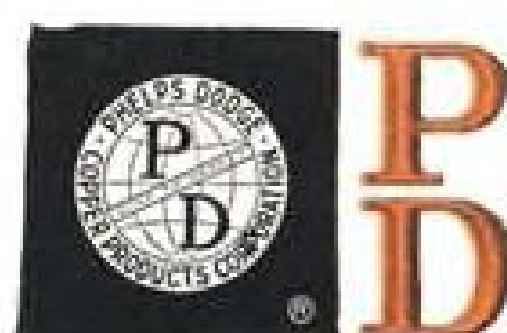
One of the key parts of this highly sensitive device is the  $\frac{3}{8}$ " 50 ohm, aluminum sheathed Styroflex<sup>®</sup> coaxial cable that links the 60-foot parabolic reflector to the receivers. The task of carrying missile-to-earth signals from the antenna to the control building demands a low-loss, high frequency cable with a high signal to noise ratio.

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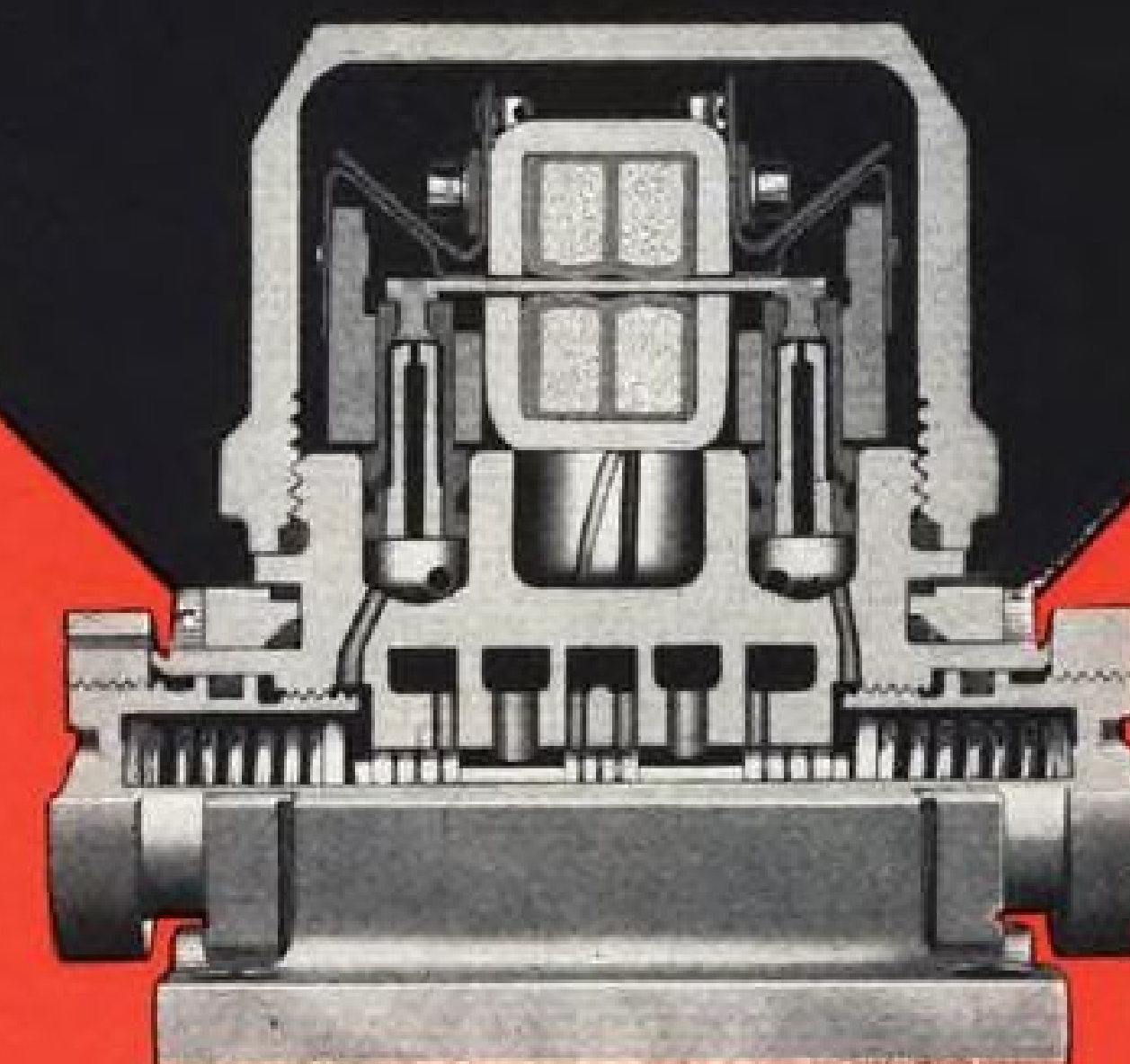
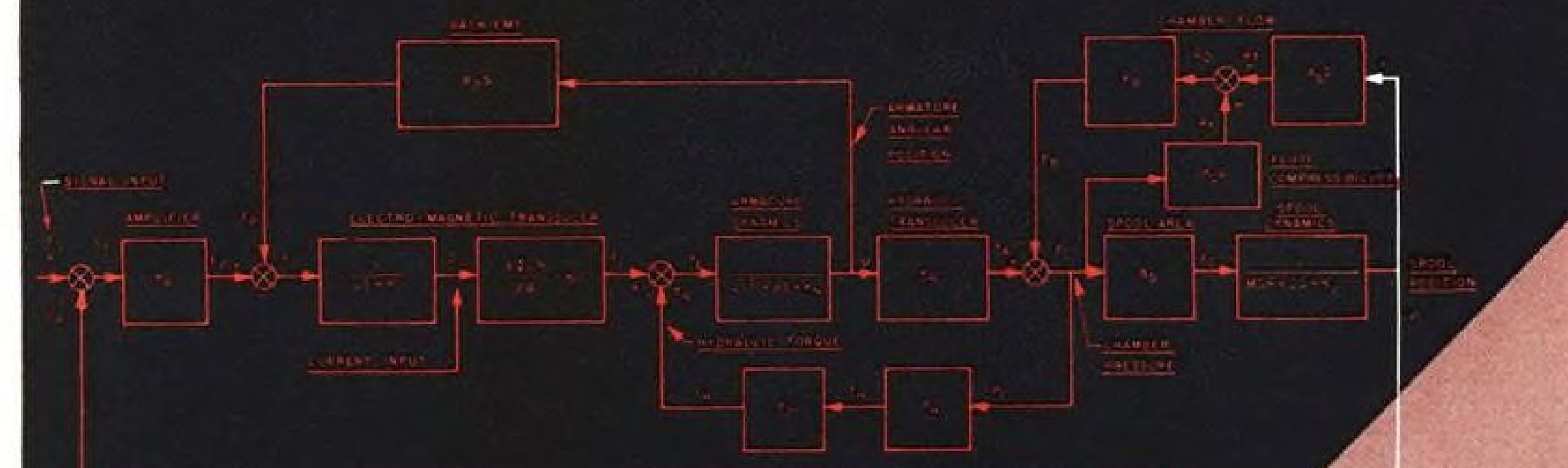
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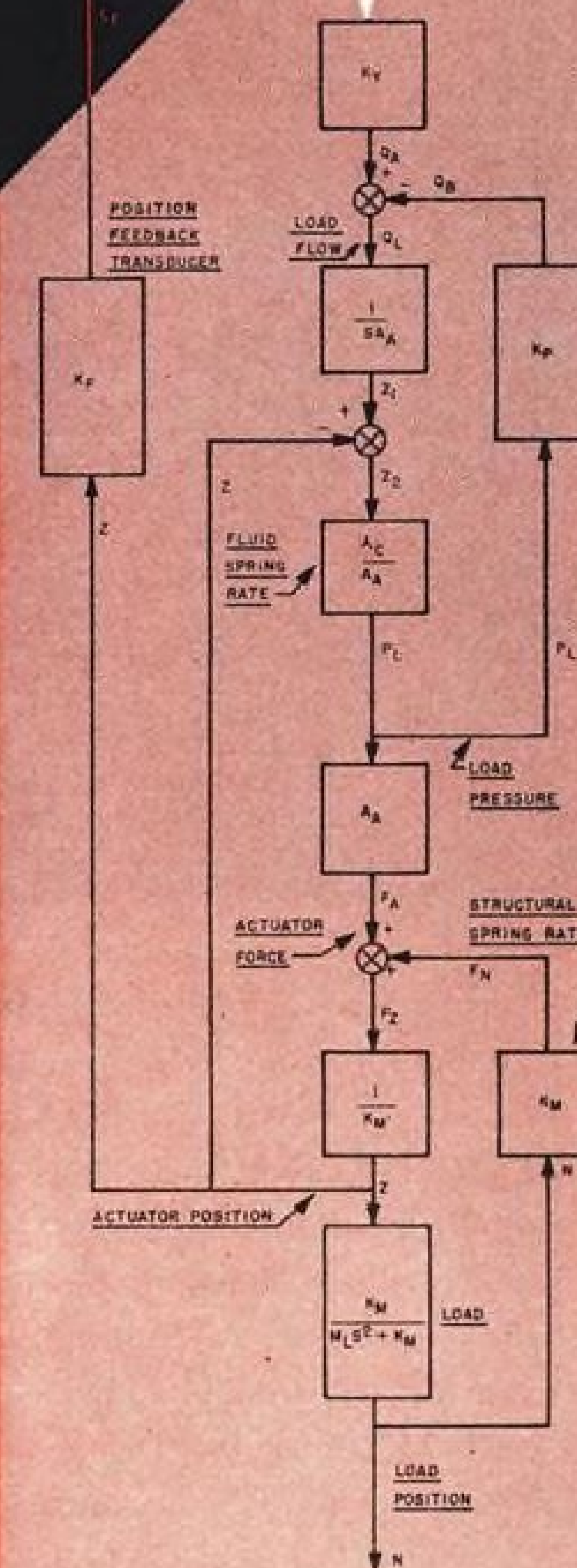
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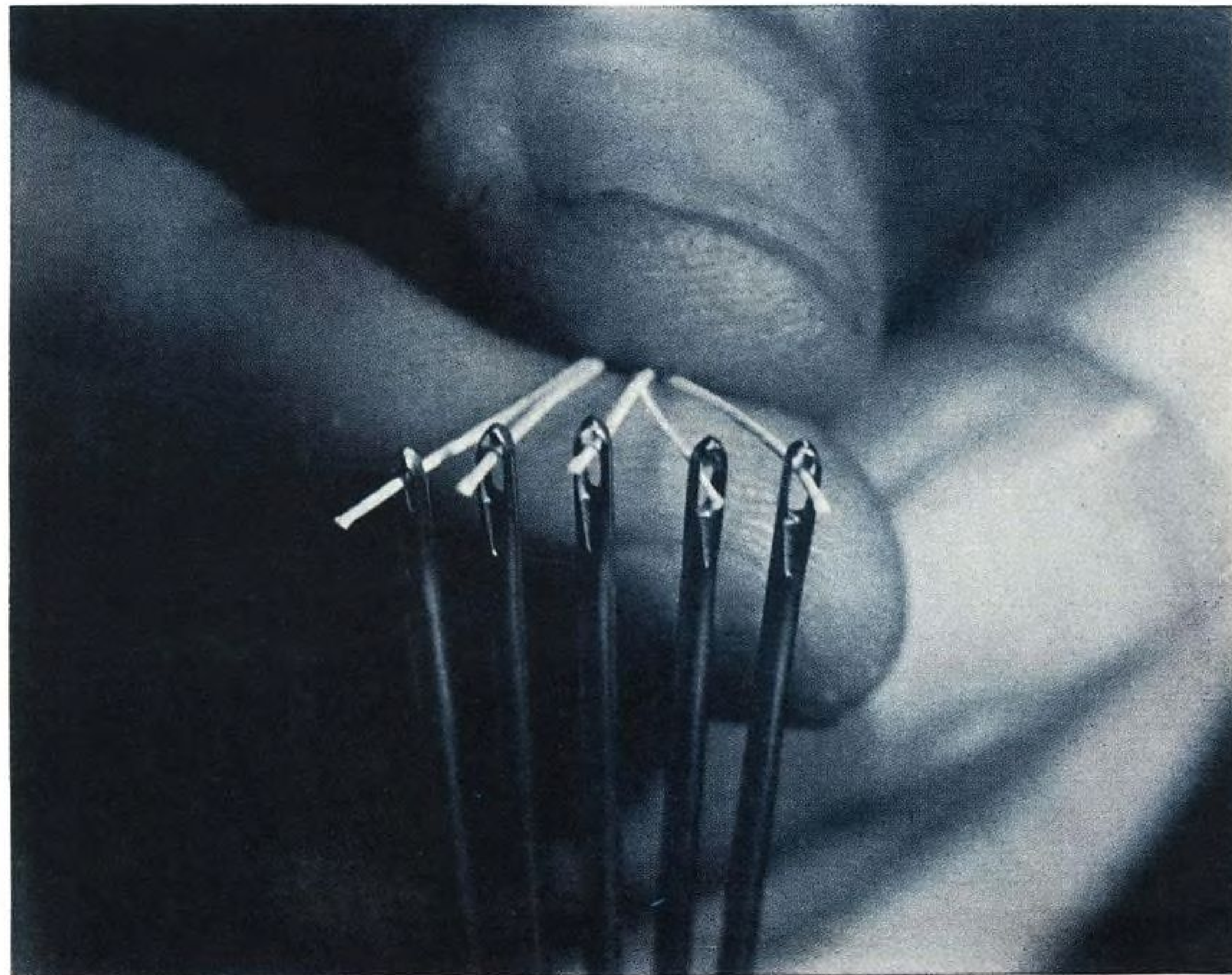
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accuracy. The FAA installation will monitor other systems in tests at the new National Aviation Facilities Experimental Center near Atlantic City. It's a new use for Cubic's Space Age tracking systems developed under the forward-looking sponsorship of the United States Air Force. Now MOPTAR finds a non-military application in helping solve the problems of air navigation, an application that will lead to greater safety in the traffic lanes of the sky.

### MOPTAR



*Tracking systems by Cubic . . . reliable precision systems with Space Age capability . . . find application in air traffic control and, through the multiple-target potential of MOPTAR, in increasing the fire-power of America's guided missiles.*

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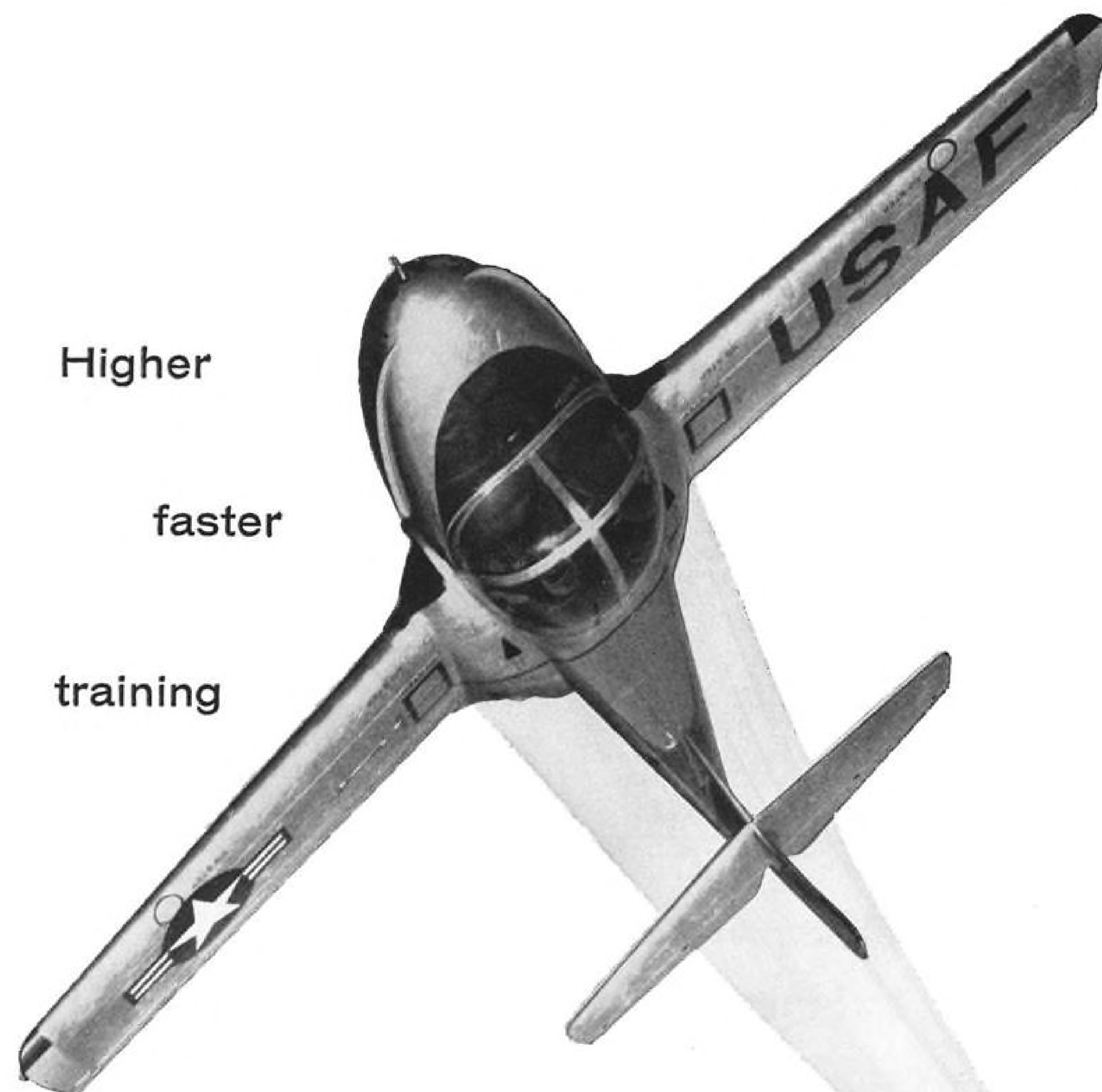
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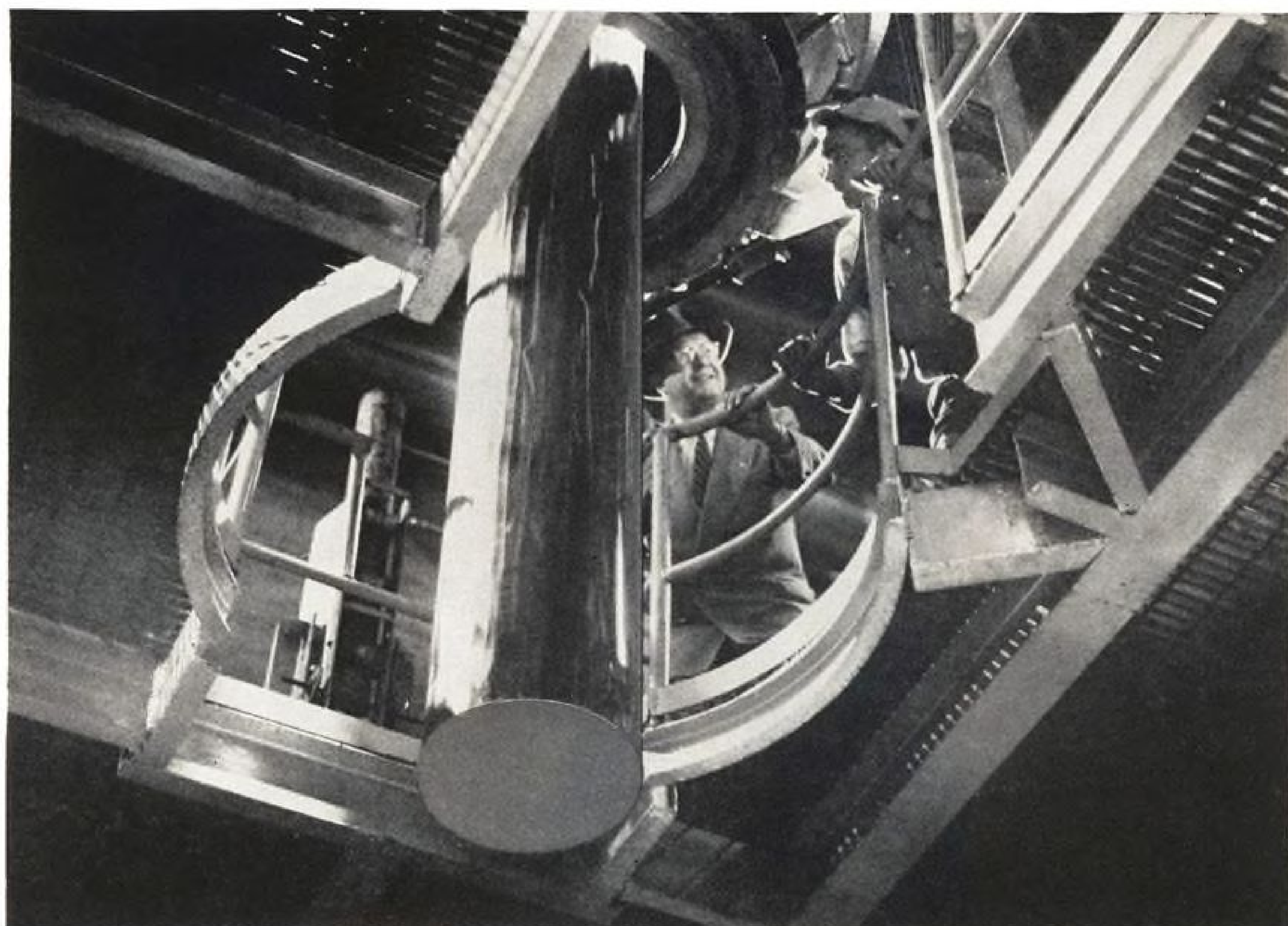


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Cadets in the U. S. Air Force now get a faster introduction to jet flying. Sitting side by side with their instructors, they're quickly learning to handle Cessna's T-37—a new, high-flying trainer with the characteristics of a combat jet. As a result, cadets are trained faster and easier (at substantial savings) to assure America's future in the air. Cessna Aircraft Company, Wichita, Kansas.







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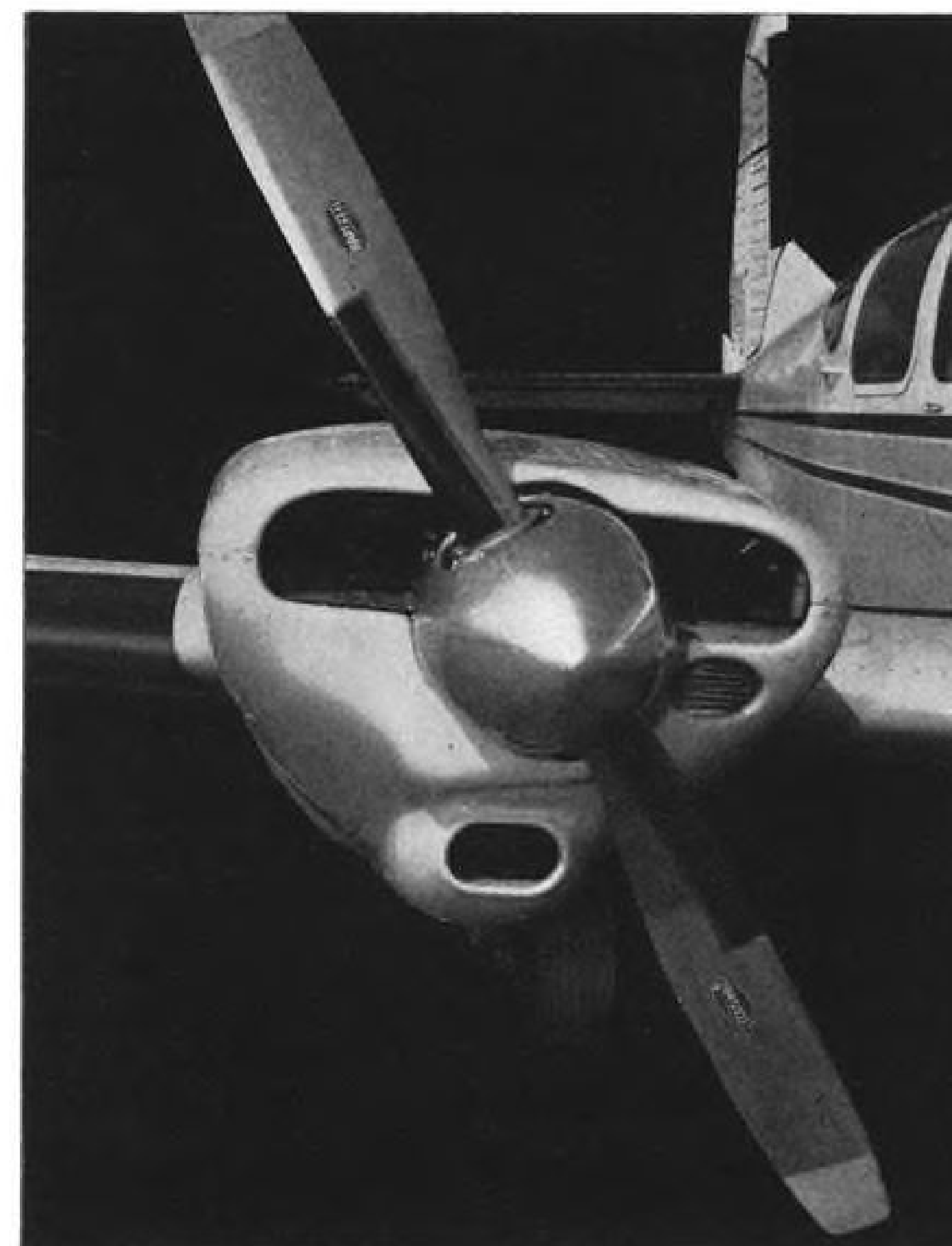
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A new B.F. Goodrich Electrical Propeller De-Icer system will soon be available for the Aero Commander, Cessna 310, Piper Apache, and Beechcraft D&E-18, Twin Bonanza and Model 95. FAA certification is now pending.

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The complete kit costs less than most alcohol de-icing systems, and installation cost is comparable. So contact your nearest B.F. Goodrich Aviation Products Distributor. Ask him for information on complete ice protection—new B.F. Goodrich Electrical Propeller De-Icers and new Lightweight Pneumatic De-Icers for light twins. *B.F. Goodrich Aviation Products, a division of The B.F. Goodrich Company, Dept. AW-99A, Akron, Ohio.*

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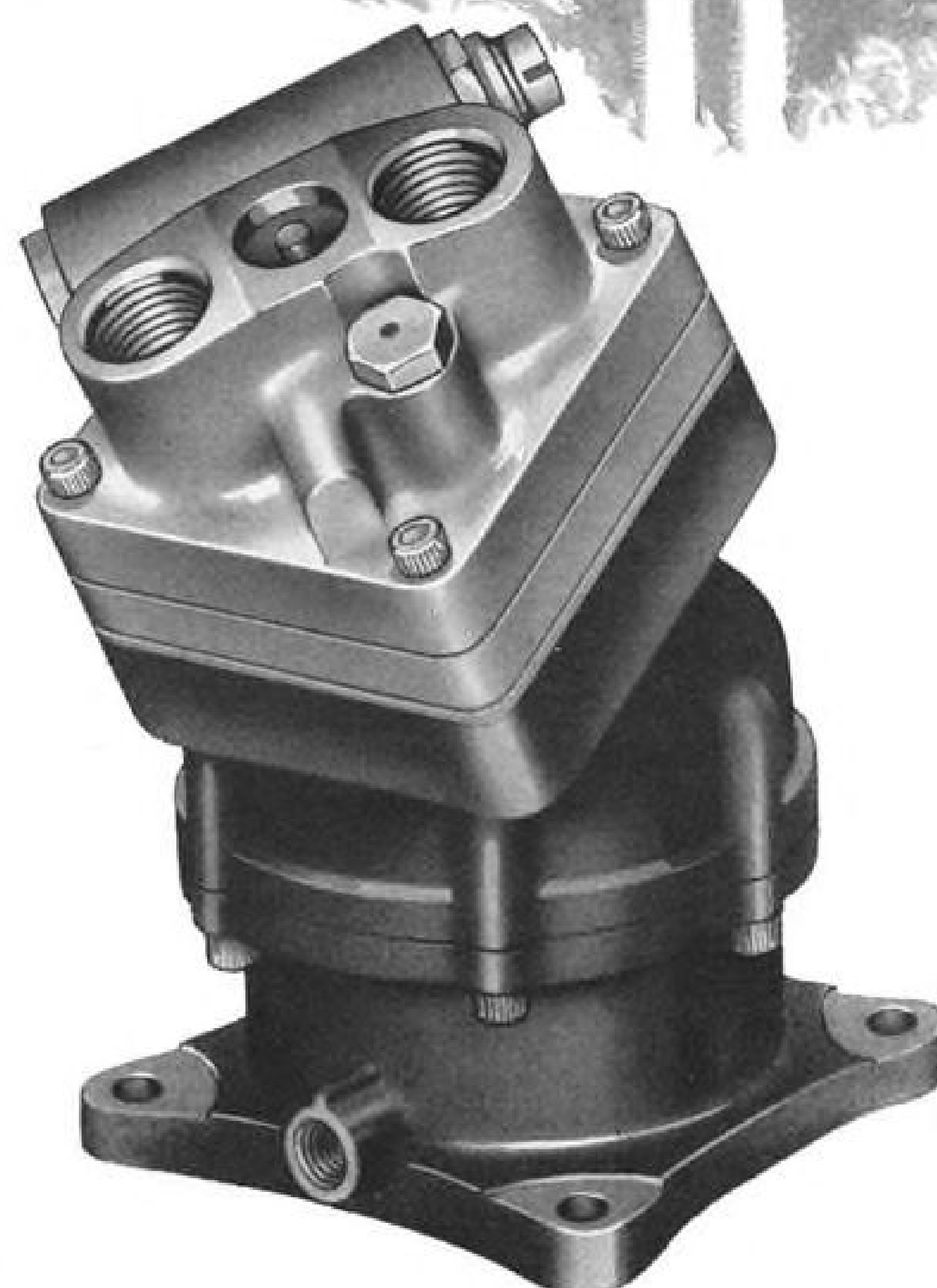
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Including Space Technology

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## Dryden Foresees World Cooperation on Space Efforts 26

► Space research needs world's ideas, NASA deputy administrator tells International Astronautical Congress.

## FAA Presents DC-8 Type Certificate. 36

► United, Delta plan to begin service on Sept. 18; model with JT4 engines scheduled for December approval.

## F-106 Hits Mach 2 on Radar Intercept. 126

► Close ground cooperation results in near-automatic intercepts from wheels up to flareout on landing.

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#### EDITORIAL

More Pentagon Censorship..... 21

**COVER:** United Air Lines Douglas DC-8 jet transport, which enters scheduled service Sept. 18, flies over San Francisco Bay. The aircraft was certificated by Federal Aviation Agency last week. United will use the DC-8 on its New York-San Francisco run; Delta Air Lines will start DC-8 service between New York and Atlanta, also on Sept. 18. For further details, see p. 36.

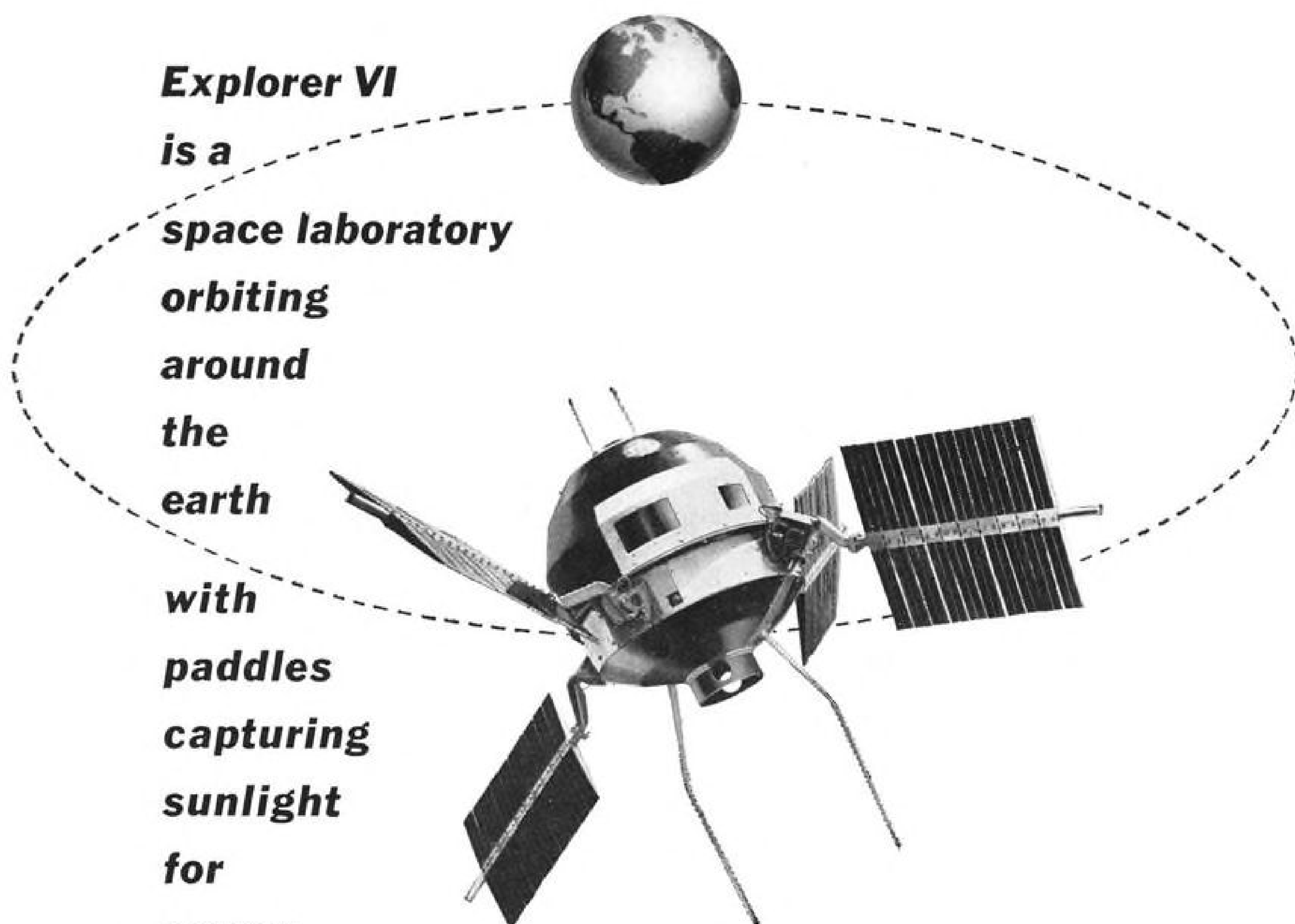
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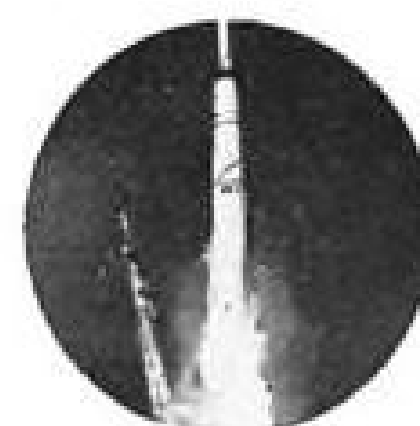
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## EDITORIAL

### More Pentagon Censorship

The attempt to ban publication of the book "Design for Survival" by Gen. Thomas S. Power, chief of Strategic Air Command, adds another chapter to the already infamous record of censorship imposed by politically appointed civilians in the Defense Department.

This censorship campaign of manipulation of military news to present a consistently distorted and overly optimistic view of the defense posture to the American public is directed by the Department's office of public information headed by Murray Snyder. Its activities range from the ridiculous, as covered in our dissertation on "More Monkey Business" (AW July 13, p. 21), to really serious matters such as the suppression of Gen. Power's book. While the secrecy hocus-pocus over use of Indian rhesus monkeys in space research illuminated the timorous ignorance that stimulates some of these alleged security regulations, the case of Gen. Power's book reveals how these security policies are employed to ruthlessly suppress any opinions that might conflict with the present program of drastically weakening our defense forces for purely budgetary considerations.

It also puts a pitiless spotlight of publicity on the vague, shadowy and undemocratic methods of these censors who even extend the cloak of administrative secrecy to themselves in an attempt to conceal their activities from public scrutiny. Rep. Moss (D.-Calif.) and the congressional subcommittee on freedom of information certainly have ample reason to make formal investigation of this case. We await with interest the reply from the Secretary of Defense to the questions raised by Rep. Moss (see p. 34).

The suppression of Gen. Power's book provides a typical case history of how this censorship process now works in the Pentagon. Before writing the book, Gen. Power obtained permission to do so from James Douglas, Secretary of the Air Force, and had the manuscript cleared for military security by Air Force headquarters. The book manuscript was officially transmitted to Murray Snyder's office on April 21, 1959, but, as of this writing, neither Gen. Power nor the Air Force officials who submitted the manuscript through regular channels to the Defense Department have received any official notice of Snyder's refusal to allow the book to be published.

The only communication on the subject emanating from Snyder's shop has been an informal announcement in response to published rumors of the suppression that: "Approval to publish at this time was denied on the grounds that it was inappropriate for a commander of a major command to author a book concerning his area of responsibility while on active duty in that command."

The flimsiness of this excuse was quickly revealed by a list compiled from official Defense Department sources by Sen. Stuart Symington (D.-Mo.) of more than 15 general officers who have recently written and published

books on their areas of military responsibility while on active duty. This list includes President Eisenhower, who published his "Crusade in Europe" while on active duty as the Army's Chief of Staff and who, according to his own figures, profited by over \$500,000 through a special tax ruling on his book. In contrast, Gen. Power has proposed that all royalties from his book be devoted to military charities.

Just a few weeks ago, the Defense Department concurred in NASA's decision to allow the seven astronauts (all military officers) to sell their space flight stories exclusively to Life magazine for a sum reported in excess of \$500,000. Similarly, the Navy permitted the commander of the Nautilus submarine to write his story in book form while still retaining that command.

A second flaw in the Snyder statement is that Gen. Power's book, as reported by those who have reviewed the manuscript, is not a book exclusively about Strategic Air Command but rather a much broader discussion of this country's military problems for the future. Few people, military or civilian, in this country are better qualified than Gen. Power to discuss this subject. He has served in strategic airpower in combat and has been one of the principal architects of the strategic deterrent force that forms the keystone of U.S. military policy. He has commanded the vast USAF research and development program in the key era when ballistic missiles appeared on the horizon and today holds the most critical and responsible combat command job in the entire Defense Department.

The real reason Gen. Power's book is being suppressed by the civilian leaders of the Defense Department is that they fear its impact on the program of drastic cuts in U.S. military strength they are planning and will soon announce. These cuts are based solely on fiscal considerations and will slice U.S. military power to the bone in a manner not seen in the Pentagon since the regime of Louis Johnson as Defense Secretary. These cuts and stretches will affect the Atlas ICBM, the B-58 Mach 2 bomber, the B-70 and F-108 Mach 3 generation of aircraft, the hypersonic Dyna-Soar program and even the B-52 and KC-135 production programs.

While these cuts are being plotted in the Pentagon, their advocates are afraid to allow the American people to read the thoughts of the man who is charged with maintaining the strategic deterrent force that they rely on to preserve the peace.

We urge the American people through their press and Congress to bend every effort to smash this medieval chain of censorship that now binds Gen. Power's book and to demand access to his thoughts on an effective design for our country's survival. Whether the American people agree with Gen. Power's ideas or not, it is part of their birthright as citizens of a republic founded on the principles of democracy to have access to them.

—Robert Hotz



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### In the Front Office

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N. Clarkson Earl, Jr., board chairman, Doman Helicopters, Inc., Danbury, Conn., succeeding Glidden S. Doman, who will continue as president.

Geophysics Corp. of America, Boston, Mass., has elected the following as directors: James McCormack, vice president of Massachusetts Institute of Technology; James T. Hill, Jr., general partner of William A. M. Burden & Co.; Harper Woodward, associate of Laurance S. Rockefeller; Bayard Walker, vice president and director of Long Island Co., Ltd.; Vernon Crudge, aviation consultant.

H. Chapman Rose, acting board chairman, and Chester A. Thompson, acting president, Jack & Heintz, Inc., Cleveland, Ohio, succeeding Frank R. Kohnstamm, deceased.

R. Carter Dye, president, and Fred H. Edgar, executive vice president, Rolle Mfg. Co., Lansdale, Pa., now a subsidiary of DEK Industries, Inc. Also: William E. Nolan, vice president and general manager, and Douglas D. Lawson, vice president-sales.

David M. Checkley, president, Vitro Engineering Co., New York, N. Y., a division of Vitro Corp. of America.

W. Paul Smith, a vice president, American Bosch Arma Corp., Hempstead, N. Y.

C. Thorpe Thompson, director, vice president and general manager, the Sheffield Corp., Dayton, Ohio, a subsidiary of Bendix Aviation Corp. Also: W. Fay Aller, a director and vice president-engineering.

Walter C. Williams, an associate director of the National Aeronautics and Space Administration's Project Mercury, Langley Research Center, Hampton, Va. Mr. Williams will be responsible for launching command, range, data acquisition, and recovery operations. Also: Charles J. Donlan, an associate director responsible for the technical development aspects of the project. Paul F. Bikle succeeds Mr. Williams as chief of NASA's High-Speed Flight Station, Edwards AFB, Calif.

A. L. Shef, chief of space technology for the Advanced Research Projects Agency, Washington, D. C. Mr. Shef is on leave of absence as chief of the advanced design section in the Douglas Santa Monica missiles and space systems engineering department.

### Honors and Elections

Dr. W. Crawford Dunlap, director of semiconductor research for the Research Division of Raytheon Co., has been named editor-in-chief of "Solid State Electronics," a new international publication.

The Franklin Institute has named David M. Potter, president of Potter Aeronautical Corp., recipient of an Edward Longstreth Medal. The medal citation reads in part: "In consideration of the increased sensitivity and greater accuracy of an improved type of rotary flow meter (Pottermeter) . . ."

(Continued on page 103)

## INDUSTRY OBSERVER

► McDonnell F4H all-weather fighter will attempt to break the world altitude record of 94,360 ft. set by Russia in July (AW Aug. 3, p. 32). Navy and McDonnell Aircraft Corp. have Department of Defense approval and are now preparing for the attempt. F4H will have to reach approximately 97,000 ft. to break the Russian record, but observers say the Navy fighter can top 100,000 ft. in a zoom. Defense Department has refused a request by Air Force and Lockheed Aircraft Corp. to make an altitude record attempt.

► Underwater detonation tests are being conducted by Douglas' El Segundo Division in connection with a Navy contract to develop a detection system for use by small aircraft such as the A4D to use in anti-submarine warfare.

► Initial Hound Dog production order is for 200 of the North American Aviation air-to-ground missiles, which will be carried by the Boeing B-52G and B-52H.

► First powered flight of the North American X-15 research aircraft will be limited to a speed of Mach 2 (1,325 mph.) and an altitude of 50,000 ft. As the flight program develops at Edwards AFB, Calif., the X-15 may exceed Mach 6 (approximately 4,000 mph.) and 100 mi. in altitude.

► Air Force is developing a General Operational Requirement for a turbine cargo transport to replace the Douglas C-124. Powered by turboprop engines, the transport would be smaller and have shorter range than the DC-8 and 707, but its fuselage would have a bigger cross section to provide greater capacity.

► Nearly all major airframe, engine and avionic manufacturers have constructed or are planning facilities for the study of magnetohydrodynamics, indicating that future competition will be intense for contracts to build ion and plasma engines. Study and test facilities for this work are inexpensive by current standards.

► Use of guided microwaves to accelerate plasma for satellite orientation and other very low thrust requirements is being studied by the National Aeronautics and Space Administration.

► In line with the over-all reinforcement program for the Japan Air Self Defense Force, Japan's Air Staff Office is considering adoption of turbine-powered helicopters to go into service after Fiscal 1961. Among helicopters under study are the Sikorsky S-61, S-62, S-63, Bell HU-1A and Vertol V-107.

► East German design team headed by Brunolf Baade is developing a twin-jet transport for short and medium range operations that will be slower but more economical than the four-jet Baade-152 developed by the same team. New transport will be designed to operate from grass fields.

► Low residue diet for National Aeronautics and Space Administration's Mercury space pilots is expected to eliminate the need for a solid waste disposal system, although the pilots also may have drugs aboard to curb waste elimination. Pressure suit will have provisions for moving urine, storing it in the suit and moving it out of the suit for storage and examination after landing.

► Sikorsky HSS-2 No. 2 has been extensively damaged during a preflight check of control servos at high rpm. Servo failure caused the machine to nose over, striking the rotors on the ground. It then fell back on the tail rotor. Subsequent damage included a small fire started by a ruptured fuel line. Impact damage made the helicopter virtually a total loss, but the loss is not expected to delay the Navy program since at least two other HSS-2s are now flying.

► Avco Corp. Research and Advanced Development Division has a \$36,655,000 contract to develop a nose cone for the Minuteman ICBM. Contract includes ablation studies and development of ablative material for the re-entry vehicle. Avco also is developing the Titan nose cone, and similarities between the two re-entry vehicles is expected to permit joint research and design in some areas.





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## Washington Roundup

### USAF Missile Management

Members of Congress are predicting that General Accounting Office's coming report on Air Force management of its ballistic missile programs will reveal widespread cases of mismanagement and overcharges to the government. The report is scheduled for submission to Congress when the new session convenes in January. GAO undertook the investigation because USAF declined to make available to it the full report of an investigation by the USAF Inspector General (AW Nov. 17, p. 34).

House Government Operations Committee commented in a report last week:

"Judging from the rather frequent reports of excess payments made by the government on contracts in less urgent military programs, the ballistic missile area undoubtedly will turn up many cases of this kind. When urgency is great . . . costs are of lesser concern."

### New ARPA Projects

House Government Operations Committee disclosed last week that these new projects have been assigned to Advanced Research Projects Agency:

- **Tribe**, a continuing family of advanced military space vehicles capable of satisfying designated military space missions, including guidance, stabilization, and control components.
- **Suzano**, a space platform to provide an orbital base for advanced space missions.
- **Principia**, involving solid propellants with higher specific impulses than now under development.
- **Pontus**, a major improvement in structural and power conversion materials to satisfy certain missile and other programs.
- **Longsight**, continuous studies and systems analyses in the space vehicle and missile fields to provide the basis for recommendations on projects to satisfy future military requirements.

### Anast Joins FAA

Top post in the Federal Aviation Agency's Bureau of Research and Development was filled last week with the appointment of James L. Anast, former technical director of the Airways Modernization Board. This leaves only top positions in the agency's Bureau of Facilities and Office of Public Affairs as the major slots in the agency's organizational structure yet to be filled. Indications are now strong that the latter position will go to Jack Gertz, presently associated with the Mutual Broadcasting Company's public affairs office here.

Anast left the Airways Modernization Board last year to join Lear, Inc. He later was named president, a position he held for a brief time prior to his return to government service.

### Delta Pilot Protest Rejected

Reluctance to become involved in labor-management disputes was a major reason cited by the Civil Aeronautics Board last week in rejecting the protest of a group of Delta Air Lines pilots against the seniority listing used since the airline merged with Chicago and Southern Airlines in 1953. Declaring that the petitioners had failed to charge either Delta or the Air Line Pilots Assn. local chapter with acting in bad faith in drawing up the

seniority list which has been in effect for nearly nine years, the Board said it dismissed the petition for lack of evidence. CAB said it has always followed the policy of expecting the remaining company in any merger to carry out seniority integration in an equitable manner.

### Translation Research

Continued research in the use of high-speed electronic computers for translation of foreign language scientific articles was urged in a House Science and Astronautics Committee report. The report said it is doubtful that fully automatic, high-quality machine translation can ever be attained, but the machines can certainly be used in the future to reduce the human work load greatly.

### Equal Wage Bid Lost

Aircraft industry has lost an important round in its campaign to equalize avionics industry Walsh-Healey minimum wages with its own. Walsh-Healey Act requires Labor Department to survey an industry to determine the prevailing minimum wage, and that prevailing wage is set as the minimum in government contracts. Aircraft industry wanted aircraft and missile electronics companies included in the aircraft classification so they would have to pay the same minimum wage, arguing that it is unfair to allow the electronics firms to compete with a lower minimum wage. Labor Department refused to include them.

Some new companies may be included in the aircraft industry category under a new study Labor Department will conduct to determine whether the present definition should be expanded to include certain phases of missile production. These phases include nose cones, propulsion systems and assembly and structures, but manufacturers of electronic equipment for aircraft and missiles are specifically excluded. Labor Department said data compiled by the Defense Department on major companies making electronic gear for aircraft leads to the conclusion that they should be excluded from the survey of aircraft and missile plants.

Some change in the Walsh-Healey minimum wage gap between the aircraft and electronics industries could rest from a survey of the electronics industry the Labor Department will conduct later. This survey, which will include manufacturers of aircraft and missile electronic equipment, will determine whether a new minimum should be set for the industry.

### New Express Pact

Agreement on a new contract between the scheduled airlines and Railway Express Agency covering air express activities was expected by the end of last week. The new contract, which will replace a contract that expired July 31, will run for five years and will establish a regular working partnership between the carriers and the agency for the first time. In the past, the agency has conducted its pickup and delivery service on a cost-plus basis. Under the terms of the new contract, the two groups will share in revenues after deduction of expenses. In addition, a joint committee, comprised of airline and agency representatives, will be organized to handle all operating problems, including air carrier scheduling and truck pickup times.

—Washington staff



# Dryden Foresees World Cooperation on

Space research needs world's ideas, NASA deputy administrator tells Astronautical Congress.

By Evert Clark

London—There is "every indication that space exploration may soon develop beyond the resources of a single nation" to carry it out, demanding an unprecedented degree of international cooperation, Dr. Hugh L. Dryden, deputy administrator of National Aeronautics and Space Administration, told the 10th International Astronautical Congress last week.

"Space research needs to draw upon a whole world for its ideas," Dr. Dryden said. "So vast is the challenge and so vast is the promise to mankind that the world cannot afford to neglect it."

Recognition that even more international cooperation is rapidly becoming an essential of space flight, and not just a desirable supplement, dominated the Congress, attended by some 700 delegates from more than 30 nations.

Dr. Dryden delivered the inaugural speech.

Both the Congress, sponsored by the International Astronautical Federation, and the first Commonwealth Spaceflight Symposium which preceded it, were marked by a strong feeling that the United Kingdom no longer can afford to be just an observer of the space race between the United States and the Soviet Union.

General attitude in Britain previously has been that the great head start and

greater financial resources of both larger countries left Britain hopelessly behind, and that perhaps Britain should not be involved in such a race, anyway.

But a feeling that the United Kingdom must advance in space exploration if it is to maintain its position politically and scientifically apparently is crystallizing rapidly with the recently concluded U.S.-U.K. satellite launching agreement behind and the availability of the Saunders-Roe Black Knight and de Havilland Blue Streak rockets not too far in the future.

Dr. R. N. Quirk, secretary in the Lord President's office, said the United Kingdom is "tremendously indebted" to the U.S. for this cooperation and said it is "quite extraordinarily moving" that "such enlightening people as Dr.

Dryden" in the U.S. government had made such a contribution.

To increase such cooperation, IAF President Andrew G. Haley proposed not only a permanent secretariat for the IAF but also an International Academy of Astronautics. Ideas on such an academy vary widely among the delegates and by late last week there was more agreement that such an organization should be created than there was on how it should be constituted.

The joint program calls for the U.S. to launch three British scientific satellites, 20 in. in diameter and 20 in. long and weighing about 150 lb., by mid-1961, using the four-stage Scout solid rocket now being developed by the U.S. (see p. 64). Payload work will be handled by 10 British teams and experiments will investigate several important physical characteristics in space at about 300 mi. altitude.

One estimate is that the program will last about four years and cost about \$2.8 million.

Both de Havilland and Saunders-Roe have design studies calling for the launching of satellites and probes using combinations and modifications of Blue Streak, which is to be a 1,500-mi. ballistic missile powered by a Rolls-Royce version of the Rocketdyne Thor engine; and Black Knight, a research rocket which has just appeared in a new configuration with a solid stage added to give it the ability to push payloads to satellite velocity.

G. K. C. Pardoe, chief coordinator of ballistic missiles for de Havilland Propellers, Ltd., proposed several missions for these combinations of the two rockets in a report to the Commonwealth Symposium. His proposed follow-up report for the IAF Congress, titled "The Potentiality of Blue Streak in a British Space Flight Program," was withdrawn for security reasons.

Pardoe's suggestions for space vehicles included:

- Blue Streak plus a dual solid propellant engine now under development to put some 1,000 lb. in a 300-mi. circular earth orbit.
- Blue Streak plus Black Knight, which has a four-chamber, 16,000-lb. thrust Armstrong-Siddeley engine, to carry 1,000 lb. of payload. Black Knight, which has been fired at least four times, "is demonstrating a remarkably high state of reliability," Pardoe said.
- Blue Streak plus the Black Knight engine, but with tankage enlarged and modified into a "doughnut" configuration to give the upper stage the same maximum diameter as the first stage and to avoid problems presented by a long, thin second stage. This could double the payload capacity over the

# Space Efforts

previous vehicle, putting 2,000 lb. into a 300-mi. orbit.

- Addition of a simple single solid stage on top of the doughnut tankage to put a smaller payload deeper into space.

All proposals depend only on equipment already in existence or being developed here, and obvious improvements could be made if special stages were developed or higher energy fuels used.

John E. Allen, head of Aerodynamics, Projects and Assessment Department of A. V. Roe and Co., Ltd., proposed similar combinations in a thorough survey of British scientific organizations and research facilities. He advised against an expensive space program for the moment but recommended a "pilot experiment" approach to spaceflight, including creation of a spaceflight research association, relatively inexpensive hypersonic flight experiments, etc., for the present; and creation of an earth satellite experimental laboratory for physical, astronautical and medical work and development of a hypersonic long range aircraft for the future that would be able to launch satellites.

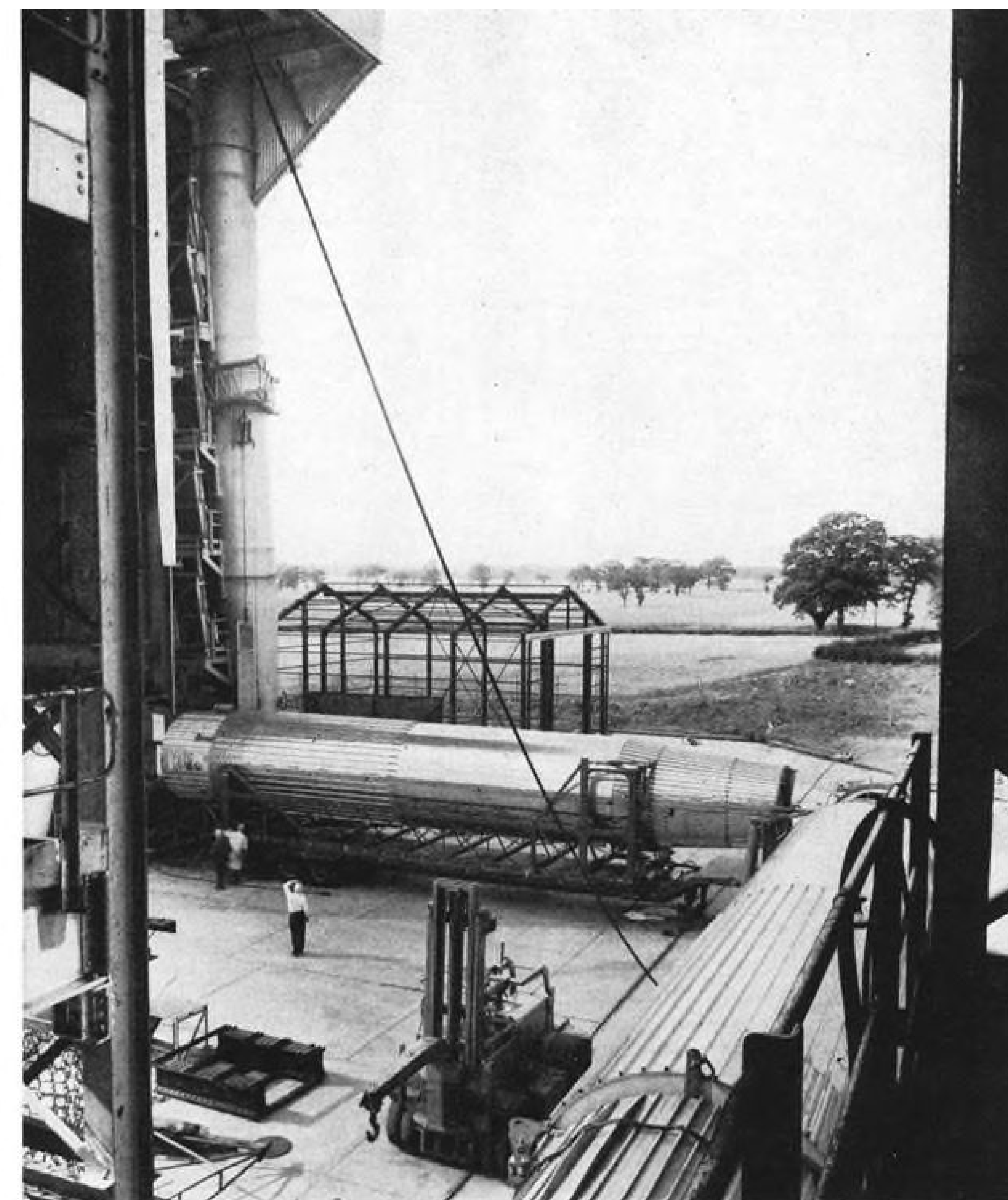
## Test Shape

Allen also proposed development of a high drag, high lift re-entry test shape to be launched by a Douglas Thor booster for flight to about Mach 20; and a Mach 15 cruise shape for controlled re-entry, skip or long range ramjet transport, to be air-launched from an Avro Vulcan by a two-stage solid rocket.

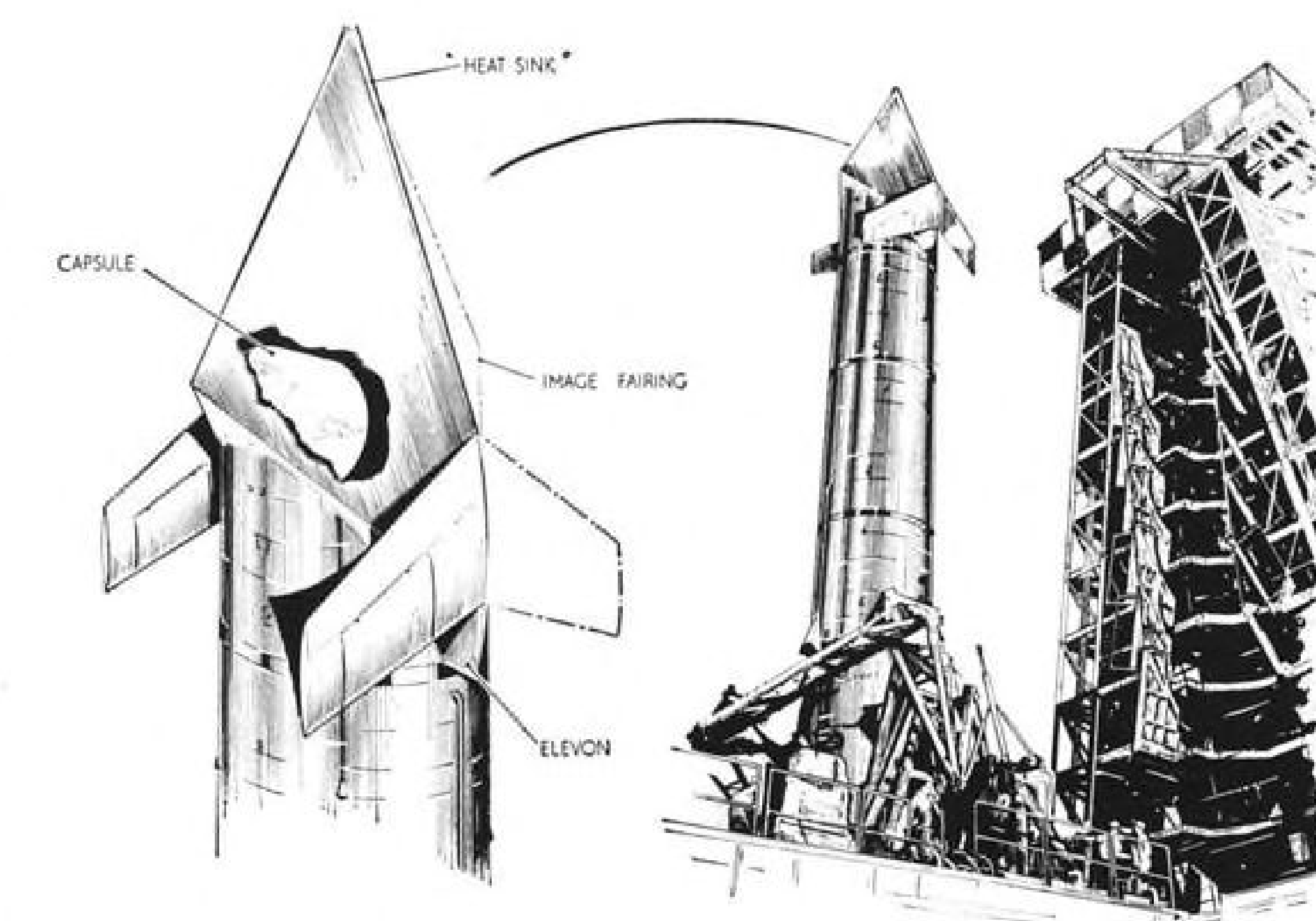
Dr. W. F. Hilton of Hawker Siddeley Aviation's Advanced Projects Group described a wedge-shaped, high lift, high drag "flying pyramid" that could be used as a two-man earth satellite. Hilton believes that some type of high lift, high drag shape will be used for all manned space flight requiring earth re-entry beyond the first steps, and that the high drag shape such as the U. S. Mercury capsule will quickly be abandoned. Models of the pyramid have been catapulted into free flight and tested in wind tunnels at Armstrong Whitworth Aircraft, Ltd.

Soviet delegation caused a minor stir when one member, Prof. V. I. Krasovsky, was quoted in a London newspaper as saying that the U.S. carried out nuclear tests in the upper atmosphere after the beginning of cessation of atomic tests last fall.

At a press conference later, Prof. Leonid Sedov, chairman of the USSR Academy of Sciences Space Flight Commission, said that Krasovsky had been misunderstood, and that what Krasovsky had said was that lithium content in the upper atmosphere was high



**BRITISH** Blue Streak missile, designed by a team headed by de Havilland Propellers, Ltd., is readied for erection in a test tower at Hatfield, England. Missile will be fired from underground launch sites, will have nuclear warhead. Trials will be at Woomera, Australia.



**WEDGE-SHAPED**, high lift, high drag "flying pyramid" model has been tested in Armstrong-Whitworth wind tunnel. Configuration was described by Dr. W. F. Hilton, of Hawker-Siddeley (which controls Armstrong-Whitworth); note capsule for two space astronauts.

## British Seek Active Space Role

London—Britain's desire to play a far more active role in the exploration of space is expected to receive the much needed boost of stronger government support if the present government is returned to office in general elections expected next month.

Spurred by strong industry participation in the first Commonwealth Spaceflight Symposium, and the 10th International Astronautical Congress here last week, the government is believed to be ready at last to begin making Britain a space power, once the elections are out of the way.

Because tax cuts are far more popular with the British voter than spaceflight, government support of an enlarged space program is not being discussed as an election issue. But private talks between advocates of a stronger program and government officials have left the advocates with the definite impression Britain no longer feels it can afford not to develop its space capabilities.

Minister of Supply Aubrey Jones, whose agency would direct most of the government's participation in a space program, officially opened the Astronautical Congress.

"Many in Galileo's generation scoffed at his telescope," Jones said. "We should be chary in our own generation and in relation to the satellite of repeating that inglorious episode of history. In short, it is much easier for modern states to decide that space research is worthy of their support than it was for the Grand Duke of Florence to decide whether or not Galileo should not be supported.

"What the total resources are out of which this support can be given, what the diversion from these resources is to non-scientific purposes—to discuss these would be to admit you into the arcana of politics, and before this audience I think I should remain on strictly scientific terrain.

"Scientifically, there is surely no doubt at all but that every state which claims to bear the banner of civilization should do everything it can to encourage advances in the knowledge of the physics, chemistry and even the biology of space."



last January and must therefore have been considerably higher immediately after the bomb tests. Third Soviet delegate was Prof. Kyril Ogorodnikov, astronomer, of Leningrad.

Sedov was asked about another newspaper statement attributed to the delegation to the effect that Russia might try to put a man in orbit within two years.

"This conversation was in the form of a joke and the correspondent took it as a reality," Sedov said.

He also said Russia has not yet fired a man along a ballistic trajectory. Some U.S. observers believe Russia tried this last May 1 and lost one of their space pilot trainees when the launching rocket exploded on the pad. Soviets have said they lost one of four trainees in "an accident," (AW June 22, p. 79).

#### Pioneer IV Comment

Sedov said it was his personal opinion that the U.S. solar satellite Pioneer IV was a "great achievement" both in rocketry and in research, but he refused to compare U.S. and Soviet rockets on the grounds that this went beyond the limits of a technical discussion. Asked if the West could expect details of Soviet satellite launchers since the U.S. had provided launcher information, Sedov said details are always published along with announcements of satellite launchings.

Soviet space flight goals include "new Sputniks, space flights in the region of and on the moon and interplanetary flights," he said. He refused to give timetables, suggesting that the delegates "read the papers." Asked when announcement of another achievement could be expected, he said: "anytime."

Prof. S. Fred Singer of the University of Maryland, who at last year's Congress proposed a sweeper satellite for cleaning out the radiation belt (AW Sept. 1, 1958, p. 21), this year reversed his field. Now he wants to create an artificial belt of radiation for study of the earth's atmosphere.

#### Electron Accelerator

Singer suggested using a satellite or rocket to carry a 500-lb. electron accelerator to an orbital altitude between 600 and 1,000 mi. near the equator. The accelerator would be operable for about 100 sec. and would inject a stream of electrons of about two million electron volts (mev) energy into the upper atmosphere. These would develop rapidly and tend to stay trapped in the earth's magnetic field. Losses would occur primarily through collisions with the very rarefied atmosphere.

Sounding rockets could be used to study the remaining number of electrons on a daily basis, and the data from the firings would produce an

#### Soviet Space Safety

London—Adverse propaganda effect of reports that Soviet Russia may take greater risks in manned space flight because it has less regard for human life than the Western world apparently is causing great concern to Soviet space scientists.

A three-man delegation to the 10th International Astronautical Congress here last week emphasized the importance of "safe cosmic flight" and safe recovery and said it is the main problem to be solved before a man is put into orbit.

Recent visitors to the Soviet Union who have talked with space scientists there say the Soviets frequently brought up the subject of safety themselves in an apparent attempt to counter the impression that their first space pilots will face greater risks than U.S. space pilots.

This emphasis on safety has led some U.S. observers to speculate that Russia will not attempt to put a man into orbit until it can launch a two-man capsule, so that even if one pilot should die, it can be pointed out that every precaution was taken, even to sending a companion with him for safety purposes. Since Russia already is known to have the booster power to launch a two-man capsule, one estimate is that the two-man flight might take place sometime next summer.

electron density profile. This could be related to atmospheric density at the altitude of the belt.

Sweeper theory now has been substantiated by available data, Singer added, and the scheme is still interesting in theory, if not necessarily in practice. Reason is that the actual number of high-energy particles in the lower Van Allen belt—particles with energies as high as 700 mev—is very low, on the order of one particle in every 10 million cubic centimeters. Space travelers would have to stay in the belt for about one hour to pick up the maximum permissible yearly dosage in roentgens, and unless orbiting in a satellite, they would not be exposed for this time.

Four Soviet scientists—Prof. Krasovskiy, Prof. I. S. Shklovsky, Dr. G. I. Galperin and Dr. E. M. Svetlitsky—presented some data on the upper atmosphere and specifically on the outer radiation belt, complementing in some ways Singer's preceding report.

For the first time, they said, soft electrons of 10 kev energy had been discovered in the upper atmosphere by Sputnik III. Soft electrons were found at altitudes between 291 and 1,167 mi., with minimum intensity at about 800 mi. above the geomagnetic equator.

Milton W. Rosen and F. C.

Schwenk of National Aeronautics and Space Administration, presented a discussion of the NASA's Nova space vehicle which had a configuration slightly different than that shown in previous artist's conceptions but did not differ from previous discussions in over-all concept or in the key design factor that the vehicle depends on the 1.5-million lb. single chamber Rocket-dyne liquid fuel engine now under development (AW June 1, p. 30).

Their vehicle would carry two or three men, would be 220 ft. long, have a takeoff thrust of more than 6 million lb. in the first stage, and would return a weight of 8,000 to 9,000 lb. from the moon by using five stages.

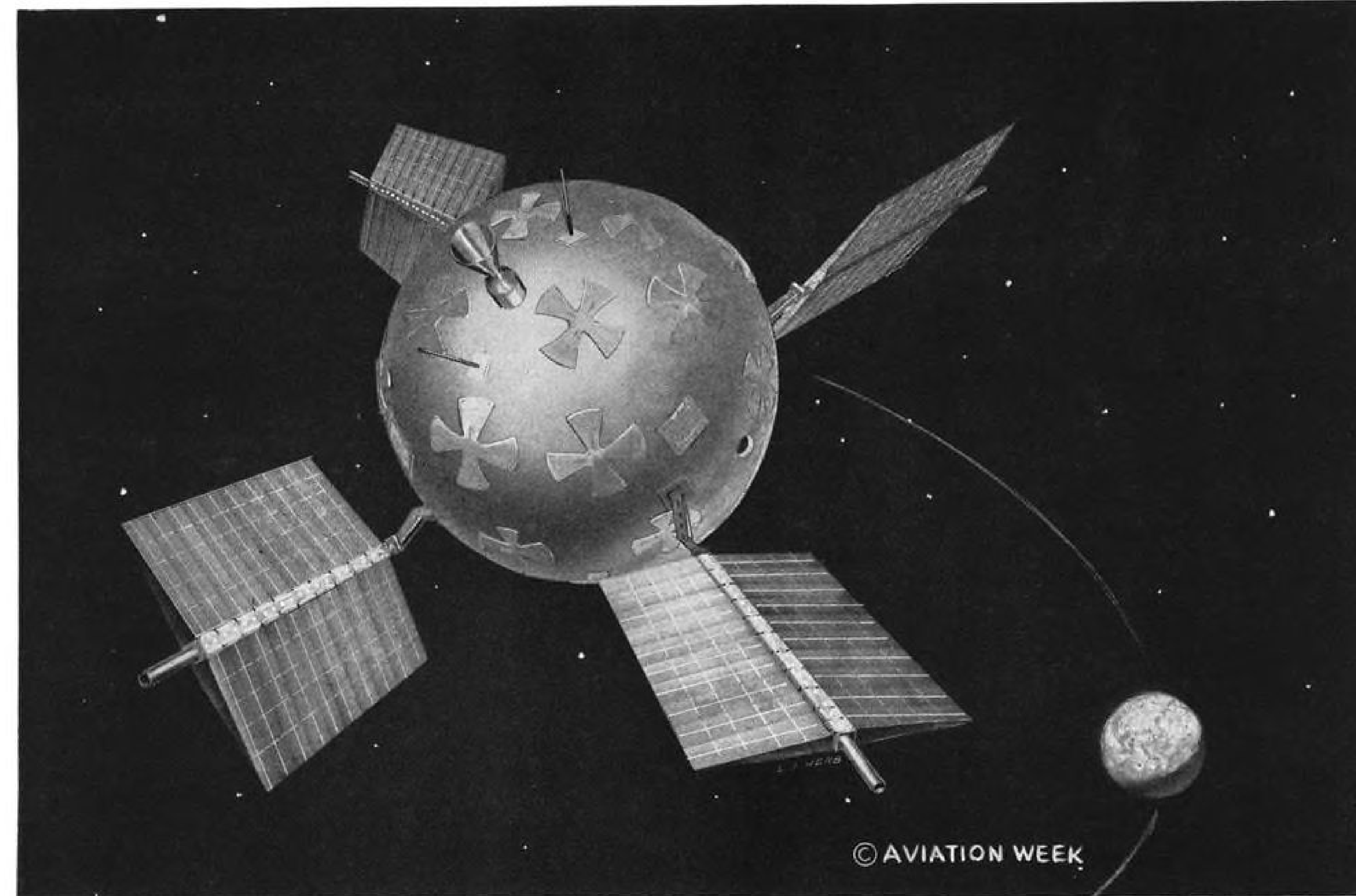
A low-cost, three-stage solid propellant space vehicle called Envoy was proposed by H. L. Thackwell, Jr., senior vice president of Grand Central Rocket Co. He said it would send 50 lb. to the moon or place a 230-lb. payload into a 300 mi. orbit at a cost of "considerably less than the \$500,000 figure for the Scout or the \$1-million for a single Thor liquid booster." Envoy would weigh only 17,000 lb. and stand 37.8 ft. high. Two-stage Envoy could put 60 lb. in a 300-mi. orbit or boost five pounds to escape velocity. Used as an air-launched satellite vehicle, Envoy could put 430 lb. into a 300-mi. orbit, he said.

#### Company Formed To Test Swiss P.16

Geneva—Flight testing of Swiss-built P.16 ground support fighters will be done by Aktiengesellschaft fuer Flugzeugunternehmungen, Altenrhein, a new company specially formed to relieve the P.16's manufacturers, Flug & Fahrzeugwerke Aktiengesellschaft, Altenrhein, of this responsibility.

Later on, the new company probably also will market this airplane. Activities of the new firm are registered as manufacture, sales, development, testing, repair, inspection, and maintenance of aircraft and aircraft components. Company capital is 500,000 Swiss francs, or about \$100,000.

Dr. Josef Riedener has been appointed director and Dr. Hans Studer, chief engineer. After the crash of the third P.16 prototype last year (AW June 9, p. 25) Swiss order for 100 P.16s as the second stage in Swiss Flugwaffe's re-equipment program was canceled in June, 1958, only about three months after the order was placed by a majority vote in Swiss parliament (AW Mar. 24, p. 65) and was substituted by an order for 100 Hawker Hunters. At present, Flug & Fahrzeugwerke has two completed P.16s and another one is nearing completion and will fly later this year.



ARTIST'S SKETCH shows how lunar satellite will have "propeller blade" units spotted on its surface to control internal heat.

#### Space Technology

## 'Propeller Blades' Control Able IV Heat

Satellite to be put into orbit around the moon by Atlas Able IV space vehicle scheduled for an Oct. 3 firing from Cape Canaveral, Fla., will include a new, stubby heat-reflecting "propeller blade," or pinwheel-shaped mechanism for precise temperature control within the orbiting sphere. The devices will be spotted over the satellite shell.

The satellite will scan the lunar surface through a hole (lower right on sphere) with a facsimile system similar to a television camera. Square, window-like units are heat sink installations, probably to dissipate heat from within the sphere. An injection rocket, with its nozzle protruding from the sphere, will give the satellite added boost, as required. Antennas protrude near each side of the rocket nozzle.

#### Instrumentation's Function

Functioning of the tightly packed instrumentation and batteries in the satellite, used in collecting and telemetering to earth the extensive informa-

tion on space conditions and lunar environment, will depend on maintaining an adequate heat level in interior compartments. Flush-mounted in many locations on the outside surface of the lunar satellite, the stubby propeller blade configurations, alternately exposed to intensive sunlight and shadow as the satellite orbits in space, will cover a small area of black heat-absorbing material. When temperatures within the satellite fall below a preset safe limit, a coil device will contract, causing the propeller blades to rotate, uncovering the black heat-absorbing patch to raise the temperature inside the sphere.

When the required upper limit temperature is attained, expansion of the coil control will rotate the heat-reflecting propeller blades to cover the heat-absorbing black patch.

This same propeller blade scheme for temperature control now is being checked out in Thor Able III (Explorer VI) satellite orbiting the earth in a long elliptical path.

Large paddlewheel - configuration vanes extending out on arms from the satellite are similar to those used on Explorer VI satellite.

Carried on arms spring-loaded to extend just before third-stage ignition, each cross-hatched vane comprises 2,000 silicon solar cells to take in energy from sunlight and charge batteries for the satellite systems.

#### Boost Vehicle

Boost vehicle for Atlas Able IV will be the Air Force-Convair Atlas intercontinental ballistic missile, coupled to upper stages as used for Thor Able III. Atlas Able IV originally was intended to put a satellite in orbit around the planet Venus (AW Feb. 23, p. 26), but was rescheduled as a lunar orbit exercise.

Project is part of National Aeronautics and Space Administration's space program, with Space Technology Laboratories designing and assembling the orbiting package.



# Pressure Rising for Service Unification

By Ford Eastman

Washington—Demands for unification of the military services and reorganization of the Defense Department hit new peaks last week as members of both the House and Senate urged immediate action to "end waste and confusion" in the Pentagon.

Current organization of the defense and space efforts drew sharp congressional criticism, and concrete proposals for reshaping and streamlining these efforts were made in both Houses. Comments and proposals included:

- **House Government Operations Committee** urged President Eisenhower to initiate studies leading to an Army-Air Force merger. In addition to achieving a unified effort in the development, construction and deployment of land-based missiles, the committee said the merger also should end inter-service conflicts over airlift and tactical support aviation and accomplish integrated planning for tactical and strategic missions. "Problems between the unified military service and the Navy would remain, but these would be of vastly lesser dimension," the committee said. Dr. Herbert F. York, Defense Department director of research and engineering, said recently that work is now under way toward defining the roles and missions of the three services in order to ease inter-service frictions.

- **Sen. Clair Engle (D-Calif.)**, a member of the Senate Armed Services Committee, touched off demands for reorganization earlier in a Senate speech proposing elimination of service designations and reorganization of the Defense Department on the basis of func-

tions and missions as an "absolute prerequisite" to meeting the challenge of modern warfare. Engle said the present basic difficulty in meeting the Soviet threat is the "multi-headed approach to the solution of defense problems and the bureaucratic quagmire that surrounds the missile and space effort. Reorganization is essential if the U. S. is to survive in the space age."

- **Sens. E. L. Bartlett (D-Alaska)**, Stuart Symington (D-Mo.) and John Stennis (D-Miss.), all members of the Armed Services Committee, as well as Sen. Joseph S. Clark (D-Pa.) and Sen. Thomas C. Hennings (D-Mo.) supported Engle's recommendations and urged full consideration of his proposals.

- **Sen. John Sherman Cooper (R-Ky.)**, a former member of the Armed Services Committee, called upon the President in a television interview to take personal charge of efforts to reorganize the Defense Department in order to eliminate present waste and lack of organization. Cooper said he would offer a bill to eliminate autonomy and duplication of Air Force, Army and Navy by making service secretaries undersecretaries of defense and by coordinating research and procurement.

- **Rep. B. F. Sisk (D-Calif.)**, member of the House Science and Space Committee, said, "there is no department in government that is more in need of reorganization" than the Defense Department. He added: "It is time to clean out the Pentagon, put all the services in one uniform and get some coordination of responsibility over there." Sisk made his statement during the committee's review of the reasons for cancellations by Air Force and Navy of their boron

fuel programs and why the Defense Department proceeded with construction of boron fuel plants after emphasis had been changed from aircraft to missiles (see p. 34). Similar opinions were expressed by Reps. Ken Hechler (D-W. Va.), Leonard Wolf (D-Iowa) and Joseph E. Karth (D-Minn.) of the House group.

Calling for action on the "long and difficult task" of modernizing the defense structure, Engle recommended the following steps as a basis for reorganization:

- **Complete reappraisal** of military and strategic objectives and development of a general plan to permit unification of the services to go forward in logical sequence in a carefully thought-out, time-phased program. The Senate Armed Services Committee should undertake this study as a guide for the Defense Department, Engle said, indicating that a resolution asking the committee to undertake the study would be made later.

- **Abolish the present organizational structure** of the Defense Department, eliminating the designations of Air Force, Army, Navy and Marine Corps and reorganizing on the basis of functions and missions which would include at least a retaliatory striking force, a limited war force, a continental defense and a logistics command.

- **Careful examination** of all problems involved in the merger of the armed forces. The range of difficulties to be considered, Engle said, is enormous, and the steps to be taken should be determined on a priority basis to prevent weaknesses from developing in the interim period.

## French Drop Long-Range Bomber Program

Paris—Gen. de Gaulle's plan to develop a long-range bomber strike force, with nuclear weapon capability, reportedly has been dropped because of heavy financial costs involved.

Military and civilian sources here claim the government has abandoned its project, announced earlier this year, of developing a larger version of its Mirage 4 attack bomber. Aircraft was to be powered by two Pratt & Whitney J75 turbojets built in France under license by Sncma. The large bomber was slated to be operational by 1964 at which time the French had hoped they would be capable of arming it with French-made nuclear weapons.

Decision to drop the bomber project reportedly was received in mid-August although no official announcement has yet been made. The French 1960 budget presently is under discussion and Finance Minister Antoine Pinay is determined to resist demands of the French military for additional funds to fight an Algeria-type war and at the same time finance a French atomic strike force. For the time being, unless Gen. de Gaulle personally intervenes, the military appears to have decided to put Algerian military demands first.

Reported decision reflects what many military observers here claim is a "sense of unreality" surrounding the current French military thinking. On one hand, the French are pushing ahead with an independent nuclear weapons program and on the other hand are uncertain about their ability to develop and finance an independent delivery system. Some observers say that in the end, the French will have to swallow their pride and attempt to make a deal with the U. S. for either an aircraft or missile delivery system.

Current version of the Dassault Mirage 4 bomber weighs about 50,000 lb. and is powered by two Sncma Atar 9 afterburning turbojets. Range is under 1,000 mi. French had planned to develop the Mirage 4 final version to weigh approximately 125,000 lb. and to be powered by two Pratt & Whitney J75 turbojets. This version, with greatly increased range capability, was to have been France's strategic bomber. About 50 to 80 large Mirage 4s, were slated to be ordered.

Last June Pratt & Whitney and Sncma signed a licensing agreement (AW June 8, p. 28) under which the state-owned French company was to build the J75 in France, mainly for the Mirage program. Pratt & Whitney also took over a 10% interest in the French company as part of the deal. Now, however, significance of the agreement is watered down, although Sncma will maintain and overhaul J75s in Europe.

- **Partial consolidation** of the missile and space programs to eliminate the duplication of military and civilian space activities. Removal of the services from the satellite business and creation of a military applications division within the National Aeronautics and Space Administration to look after military interests. NASA would be barred from booster development except in cases where no military booster could fit its needs.

- **Abolition** of the Advanced Research Projects Agency and transfer of its research activities to the Director of Defense Research and Engineering. ARPA acts as a fifth wheel in the space and missile organization, he said, duplicating the operating functions of the services.

Engle said that a study of the space and missile programs indicates that there is no logical basis for completely separating them. NASA was established to place emphasis on civilian and peaceful uses of outer space, he said, adding that the fact was overlooked that the Defense Department is under civilian leadership and that the "Russians haven't been too thin-skinned about the military operation of their space program."

He said, however, that NASA and the over-all space program have become too well established to completely abolish them and start over again, but that improvements should still be made.

"What I propose is that the development of the satellites and outer space vehicles be done by NASA," he said, "but that, in this development, there be given concern for specific military applications. If the military departments need a space vehicle, that vehicle can be developed by NASA and turned

over to the military for its particular type of application. When NASA needs a booster, they should take advantage of what the military has to offer, either in existing hardware or in know-how acquired from developing rockets for weapons. If the military hasn't anything to offer, then NASA can develop its own boosters."

With three of four essential problems involved in going to, remaining in and returning from outer space—propulsion, guidance and re-entry—completely overlapping between the civilian and military applications, Engle said, the two agencies should work closely together. The reason he supports a military applications division in NASA, he said, is to see that this coordination does occur and that duplication of work and overlapping of functions are avoided in the top echelon of the Defense Department and through the operating services.

Engle also criticized the time required to reach decisions. "At the top levels of decision-making," he said, "we find a proliferation of committees. The NASA law created a Space Council. It also set up a civilian-military liaison committee to coordinate space activities. . . . NASA itself has 14 research advisory committees on which military personnel serve and, in turn, there are 34 working groups and committees in the Defense Department on which NASA staff members serve. To complete the jurisdictional complexity and overlap, both NASA and agencies of the Defense Department give assignments to research and development units of the military services.

"As would appear inevitable," he said, "disputes arise as to the priorities and control of certain projects, and the solutions are always compromises which satisfy no one and cause further delays."

Engle said the problems of time-lags is not confined to the missile field alone, that the same faults in the decision-making process appear in the development of all air-weapon systems.



## Martin Bullpup to Undergo Further Development

Martin Bullpup air-to-surface missile, shown here slung under the wing of a North American F-100, will undergo further development at Martin's Orlando Division under a \$5 million Air Force contract. Missile will have atomic capabilities (AW July 14, p. 23) and is intended for close-in troop support by Tactical Air Command. Aerojet-General solid rocket gives it a speed of Mach 1.8.

## Non-Profit Status Proposed for STL

Washington—Space Technology Laboratories, a wholly-owned subsidiary of Thompson Ramo Wooldridge, "must be converted into a non-profit institution" if it is to continue as technical manager of Air Force ballistic missile programs, the House Government Operations Committee warned last week in a comprehensive report tracing missile programs and problems since the end of World War II.

"An unhealthy situation has developed. Government and private business values have become intermingled to the detriment of both, and there is increasing concern on the part of Congress and the public over the current status and position of STL."

The first step, the committee said, should be a complete divestiture of STL by Thompson Ramo Wooldridge.

"If satisfactory arrangements for non-profit status cannot be worked out, the alternative to further unstable relationships is a severance of the Air Force-company tie," according to the committee. "STL would have to go the way of all other contractors and compete in the market for its business."





### Vertol Twin-Turbine YHC-1A Makes First Flight

Army-Vertol YHC-1A makes first flight at Vertol Aircraft Corp.'s plant at Morton, Pa. Powerplants are two General Electric T58 turboshaft engines rated at 1,025 shp. each. Strain gages are housed in cylindrical objects above rotor hubs. Elongated duct in leading edge of vertical fin ingests air to cool transmission. Lip on upper aft portion of forward rotor fairing breaks up turbulence.

## GE, Bendix to Develop Satellite

Washington—Advanced Research Projects Agency has chosen General Electric Co. and Bendix Aviation Corp. to develop the "Task Steer" polar communication satellite element of communication satellite Program Notus.

General Electric Missile and Space Vehicle Division has received \$5.5 million for development of the polar satellite vehicle system, and Bendix Aviation will develop the communications subsystem under a \$8.5 million ARPA contract. The two contracts are administered for ARPA by the Air Force.

GE's Missile and Space Vehicle Division also has been chosen by Douglas Aircraft Co. to develop the nose cone for the XGAM-87A air launched ballistic missile.

"Task Steer" polar communication satellite will be a real-time repeater designed to provide instantaneous relay of voice or coded messages between aircraft and ground stations or between two ground stations. Satellite will orbit over the north and south poles, and its primary purpose is to provide reliable communications in the polar area where present communications are frequently disrupted by Arctic atmospheric conditions. Improved polar communications are especially vital to Strategic Air Command.

The polar satellite will orbit at an altitude of several thousand miles, and

a number of the communication vehicles will be orbited to provide complete coverage. Booster for the system will probably be the Convair Centaur which uses a USAF-Convair Atlas for its first stage and a Pratt & Whitney liquid hydrogen engine as second stage.

Polar communication satellites will form one element of the family of satellite systems ARPA will develop under Program Notus as a global communications system. In July, ARPA gave contracts to Philco Corp., International Telephone & Telegraph

Corp. and Radiation, Inc. (AW July 27, p. 33) to develop ground and vehicle communication elements for Courier, a delayed-relay satellite somewhat similar to the approach used in the Project Score Atlas satellite orbited last December. Courier (see picture, p. 89) will orbit at an altitude of approximately 500 mi.

Program Notus will also include a real-time communication satellite with a 22,400 mi. equatorial orbit which will hover in relation to the earth. This equatorial satellite will provide coverage up to within about 18 deg. of the poles, and the Task Steer vehicles will provide coverage in the polar areas.

### Soviet Scientist Details Re-Entry Needs

Moscow—Russian space scientist V. Dobronravov has warned that Soviet accomplishments in rocketing record payloads to high altitudes and returning experimental animals to earth do not necessarily guarantee early success for the safe re-entry of a man-carrying satellite.

Writing in the newspaper Promyshlenno-Ekonomicheskaya Gazeta (Industrial-Economic Gazette), Professor Dobronravov says the two single-stage geophysical medium-range ballistic rockets launched in July "embodied the latest Soviet instrument-making achievements in the fields of physics and radio electronics." He said the containers in which the experimental dogs and a rabbit were carried to high altitude and returned safely to earth were improvements over earlier models.

"Nevertheless," Dobronravov, a doctor of physical and mathematical sciences, declared, "it may be assumed that use of parachute re-entry methods alone, as was the case in launching certain Soviet geophysical rockets, will not suffice in returning a satellite, especially one containing a man. We need a satellite which can also be a unique type of glider—one that has devices to prevent the rocket from revolving around horizontal and vertical axes."

## New Space Service Forecast by Pirie

Washington—By the time hostile military forces are facing each other in space, Vice Adm. R. B. Pirie, deputy chief of naval operations for air, predicts that the U.S. will have a separate military service concerned specifically with space warfare.

Adm. Pirie made the prediction while discussing the roles of the services in space at an American Rocket Society meeting here. He also said control of space cannot be considered an end in itself and that, in naval warfare, the use of space will help accomplish routine naval objectives.

"On the other hand, it's equally clear that we will have to be able to prevent the use of space to the detriment of those objectives," he said. "The true naval benefit, therefore, from astronautics will be in being able to carry out old, and continuing, tasks on the earth's surface better than before."

Naval has proposed to the Joint Chiefs of Staff a plan under which a joint Military Space Command would command space system operations, assigning the various systems among the three services for operation (AW July 27, p. 26).

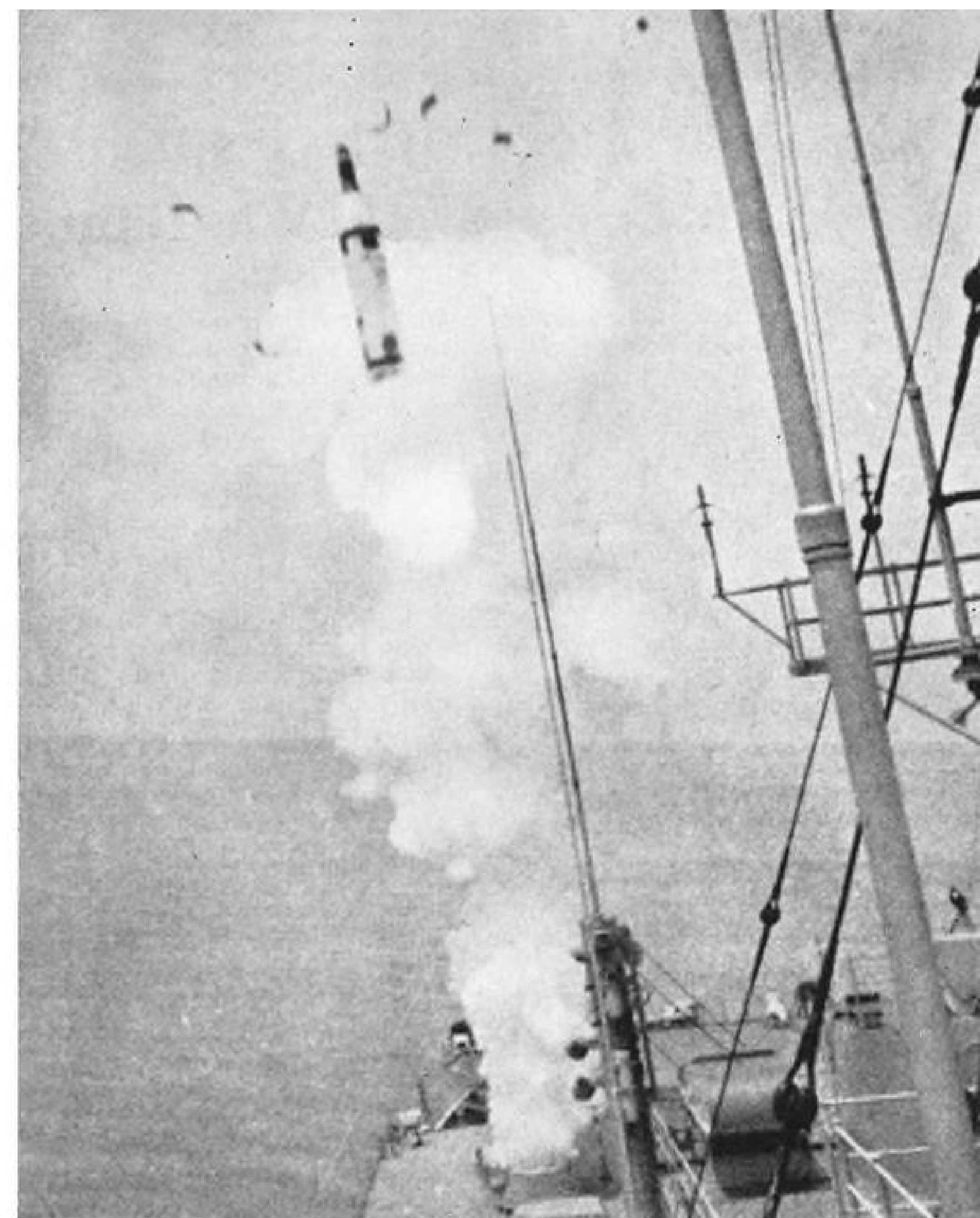
Adm. Pirie said Project TRANSIT (AW Aug. 17, p. 23) is a good example of Navy thinking for the future. TRANSIT is a navigation satellite Navy plans to have in orbit in the 1964-65 period which will provide navigation information to ships and aircraft under all weather conditions. Applied Physics Laboratory of Johns Hopkins University is building the satellite vehicle.

Navy also is interested in counter-space systems, Adm. Pirie said, and the anti-missile missile "will best be launched from naval ships at sea" because of the uncluttered environment and choice of launching sites.

Discussing manned space vehicles, Pirie observed that they are now completely in the hands of the National Aeronautics and Space Administration and the point when the military services will get manned vehicles is not discernible because of present Administration policy. He said that when the military needs a manned vehicle, the Administration in office will then have to decide which service will get it.

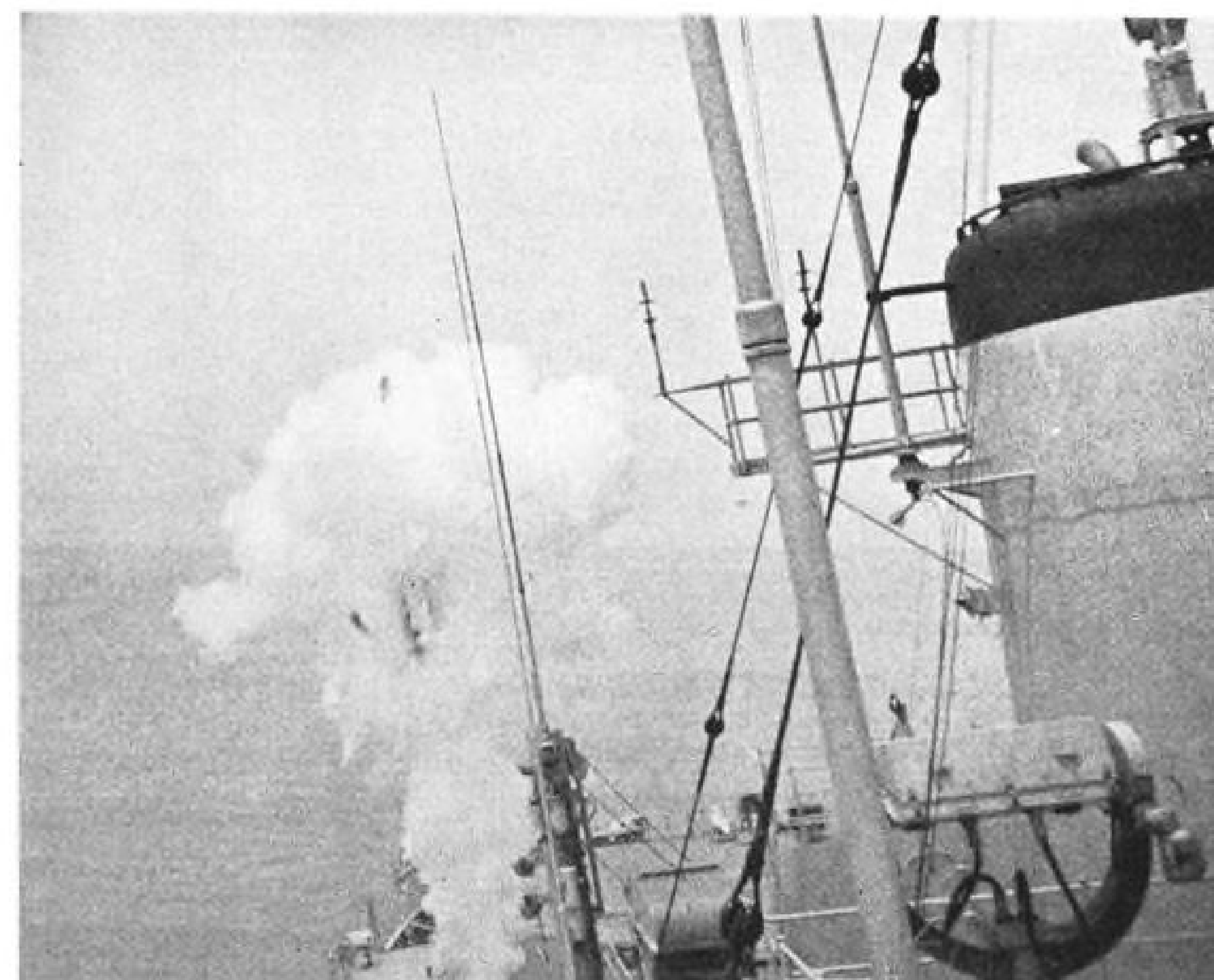
Navy astronautics program, exclusive of research and development aspects, has been placed under Pirie's command, and he predicted that in the future the Navy space role will "become more pronounced—and more and more apparent to the public."

Adm. Pirie also said that the Polaris fleet ballistic missile now under development by Lockheed Aircraft can be used as a booster for space application and can launch payloads of at least 50 lb.



### Polaris Launched From Observation Island

Navy-Lockheed Polaris was fired at sea from USS Observation Island for the first time in this launch while the ship cruised at 5 kt. off Cape Canaveral. Polaris test vehicle was launched by compressed air from a cylinder in the ship's deck similar to the launching tube designed for submarines. First stage ignited when the missile was about 70 ft. above the deck. Observation Island was ballasted to list 5-10 deg. so that Polaris would be fired at an angle and would not fall back on the ship in case of a malfunction.





# Moss Asks McElroy to Explain Why Gen. Power Book Was Banned

Washington—House Government Information Subcommittee asked Defense Secretary Neil McElroy last week to explain why he barred publication of "Design for Survival," a book written by Gen. Thomas S. Power, commander of Strategic Air Command (AW Aug. 31, p. 29).

In a letter to McElroy, Subcommittee Chairman John E. Moss (D-Calif.) requested "an immediate and complete explanation" of the procedures followed in reviewing the book and the authority used in prohibiting its publication. Sen. Stuart Symington (D-Mo.) also criticized the Defense Department ban on "Design for Survival."

Power was denied permission to publish the book under a Defense Department policy which bars top civilian and military defense officials from writing about their offices or commands while they still hold them. The Department said its disapproval applies only to a copyrighted book and that Power is free to express his views through such media as speeches and interviews.

Moss pointed out that the Power book had Air Force approval, and he quoted a memorandum from former USAF Under Secretary Malcolm A. MacIntyre which said all the material in "Design for Survival" is from open sources available to the press and existing in printed public form or cleared congressional testimony. He said much of the material was in speeches made by Power and other top civilian and military leaders.

Noting that the opinions in the manuscript were Power's and shouldn't be interpreted as official Defense Department or USAF policies, MacIntyre said: "Air Force clearance of this manuscript is given in the interests of allowing professional airmen to express constructively and logically their professional views and ideas as a contribution to military science, thought and literature. This is in accord with past Department of Defense policy and instructions on this matter."

Subcommittee investigation determined that the manuscript went to Defense Department Office of Security Review on April 21 after it had been reviewed in Air Force headquarters. Air Force approval, after recommended security changes were made, came from the Assistant Chief of Staff for Guided Missiles, USAF historian and the deputy chiefs of staff for materiel, plans and programs and operations and intelligence.

The manuscript was returned to the Air Force by Murray Snyder, Assistant

Secretary of Defense for Public Affairs, and revisions were made. It was returned to Snyder July 2 accompanied by the MacIntyre memorandum. After further comment from Snyder's office, the issue was discussed with Air Force Secretary James H. Douglas, and the manuscript was submitted again for Defense Department approval. It was denied.

Outlining this sequence of events, Moss said the investigation indicates that denial was based on DOD 5230.9, a directive which formerly set a "constructive contribution" standard for issuing information. This was amended in August, 1957, to require that information must not conflict with "established policies or programs of the Department of Defense or those of the national government."

A second basis for refusal was the policy produced by a meeting in 1954 between former Defense Secretary Charles E. Wilson and the service secretaries, which controls writing of books and magazine articles by top defense officials. Moss said Defense Department officials admit this policy has never been put in writing.

Moss told McElroy that whether or not there is agreement with the ideas expressed in "Design for Survival," it

## Military Requirement Demanded To Save Boron Fuel Investment

Washington—Members of the House Science and Space Committee last week warned the Defense Department to "come up" with a requirement for boron high energy fuels in order to prevent money already invested from "going down the drain."

Rep. James Fulton (R-Pa.) told John B. Macauley, deputy director of defense research and engineering, "No one here wants to produce a fuel for which there is no requirement. What we want is for you to come up with a requirement and promptly."

Macauley appeared before the committee to explain the reasons behind recent cancellation of Air Force and Navy boron fuel programs which resulted in the closing of two newly constructed five-ton-a-day fuel plants shortly before they were to go into production (AW Aug. 17, p. 26). About \$240 million has been expended on the program to date.

Fulton said he was distressed by the lack of decision and aggressiveness on the part of the Defense Department in

seems imperative that the American public should have access to those ideas in book form—particularly when the comments already have been made in public speeches and testimony."

In his letter, Moss quoted the preface to the Power book in which the SAC commander said he wrote it because of a growing awareness among the public "that the military problems of survival are no longer the sole concern of the men in uniform and their civilian superiors." Power said he was encouraged by the interest shown by private citizens, and that he feels it is important to present the situation to the public frankly and in simple terms.

Power said his book was written for the American people with the conviction that "we cannot solve the problems entailed in our design for survival unless the people fully understand these problems and decide to do something about them."

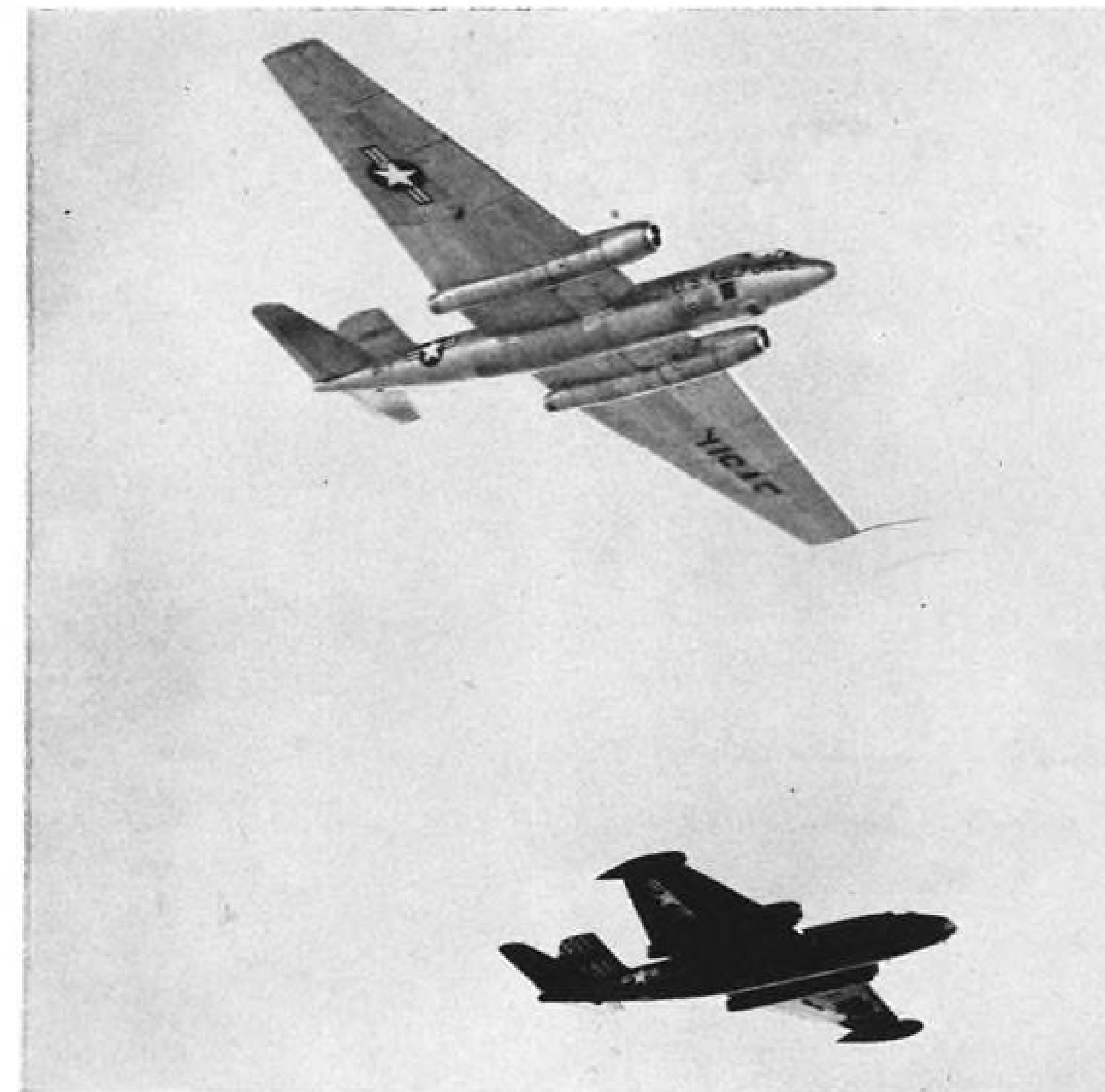
"This country has had problems before, and it has always managed to cope with them once it gained the understanding and support of its citizens," Power said. "Still, none of the dangers we have faced in the past can compare to the formidable threat of nuclear aggression which we are facing today. Nor will we ever again have the time to plan, to rally and to act after the aggressor has struck. If he were to strike today, he would find us ready to strike back but ill prepared to ward his blow."

not keeping the program alive and preventing the money already expended from going to waste.

Rep. Overton Brooks (D-La.) committee chairman, who noted it had been approximately two years since Sputnik I was launched and the U. S. shifted emphasis from aircraft to missiles, asked why it had taken from October, 1957, to this summer to determine that there was no longer any requirement for high energy fuel. "Had a prompt decision been made after Sputnik I, we would have saved the better part of \$200 million," Brooks said.

Macauley backed the testimony of earlier Air Force and Navy witnesses who said that the two services no longer have a requirement for the high energy fuel and that early engine tests cast considerable doubt on the fuel's ability to attain the improved performance that had been expected (AW Aug. 31, p. 30).

Macauley said the first estimates of the improved performance of boron fuels over conventional ranged upward



First Photo of Martin RB-57D

First official photo of Strategic Air Command's RB-57D high-altitude reconnaissance ship shows the major redesign necessary to develop the aircraft from the original Martin RB-57A (lower plane) medium bomber used by the Tactical Air Command. Most obvious alterations include incorporation of Pratt & Whitney J57 turbojet engines developing 10,500 lb. thrust each and a large increase in wing area accompanied by changes in the airfoil sections. The high-altitude aircraft does not require vortex generators used on the wing of the RB-57A. Design load factor of the RB-57D is much lower than that of its low-altitude predecessor, giving it a very low structural weight. This feature, plus the added wing area and improved engines, is the key to its altitude capability. Aircraft served originally as a testbed for the J57; bomber version is powered by two 7,200 lb. thrust Curtiss-Wright J65 engines.

from 50%. He added, however, that the most recent studies show that improvement is negligible at subsonic aircraft speeds and moderate at supersonic speeds.

In addition, he said the fuel cost has not been reduced to the point expected. In 1954, it was estimated by the contractors that a fuel cost from 60 cents to \$1 a pound would be possible at a moderate level of production, Macauley said. The estimate for the five-ton a day plants is around \$5 a pound, he said, with improved processes and larger scale production possibly bringing the cost to below \$2 a pound.

Earlier, however, Dr. W. H. Schechter, Callery Chemical Corp. vice president, testified that he regarded the boron fuel program as neither a failure nor a mistake.

Schechter, who termed the program a major technical and industrial achievement, said that even though Air Force requirements no longer exist for the J93-5 engine, boron fuel still delivers 4% more energy than conventional fuels and that it appears practical for

jet engines and promising in missile propulsion programs.

Schechter said other military requirements are likely to develop for aircraft or missiles utilizing turbojet and ramjet engines that can best be powered by boron fuels. The impetus of the Air Force and Navy fuel programs has touched off a variety of research projects at the university level in a number of new areas which are likely to result in other major developments, he said.

Because of possible future uses of boron, Dr. Schechter suggested the Muskogee plant be used for interim production of the fuels at partial capacity. It also is possible, he said, that the non-process portion of the plant, consisting of administrative buildings, shops, steam plant, and water system, could be utilized in the production of other military or industrial chemicals.

"If the termination order is effective in its original form," Schechter testified, "it will be a knock-out blow" to Callery, whose efforts have been devoted almost entirely to the boron fuel program.

Future use of either or both of the

two plants will depend to a large extent upon an engineering study being conducted by the Arthur D. Little Co. of Boston. Results of the study will be submitted to a meeting of Defense Department's Joint Working Group on Special Fuels on Sept. 10, which, in turn, will make its recommendations as to the fate of the plants to Defense.

## News Digest

North American B-70 Mach 3 bomber will fold downward in flight to assure maneuverability and stability at high speeds. Boeing Airplane Co., subcontractor for the delta wing, awarded Curtiss-Wright's Propeller Division a contract for actuators for the folding mechanism.

First tactically operational model of the Mach 2 Convair B-58 Hustler bomber is scheduled to make its first flight at Convair-Ft. Worth, Tex., early this month, signaling the start of delivery to USAF of combat-type Hustlers.

Pan American World Airways last week averted a threatened strike by its flight engineers by reaching an agreement covering certain jet crew functions. The agreement spells out that the third officer will not be used in any flight engineer functions on the aircraft. Flight engineers had contended that some captains were training the third officers in some flight engineer duties and causing "confusion in the cockpit."

General Electric Co.'s Small Aircraft Engine Department received its first order for CT58-100 turboshaft engines (1,050 shp.) from Sikorsky Aircraft for use in the S-61 and S-62 helicopters.

Maj. Gen. John W. Sessums, Jr., retired vice commander of Air Research and Development Command, has been named board chairman of Grand Central Rocket Co., succeeding Joe J. King, senior vice president of Tennessee Gas Transmission Co., which has an interest in the firm.

Avco Corp.'s Research and Advanced Development Division will do basic research and develop prototypes for the re-entry vehicle of the Minuteman solid fuel intercontinental ballistic missile (AW June 8, p. 59) under a \$36,655,000 Air Force contract.

Two white mice are being sustained in a sealed glass and plastic case by Chance Vought scientists, in a test of a closed ecological system that could apply to future space explorations.



# AIR TRANSPORT



**EJECTORS** which are part of Douglas DC-8 sound suppressor units are extended on this Delta Air Lines transport in traffic pattern. Ejector cuts sound and increases takeoff thrust to offset loss caused by tailpipe daisy-type nozzles (AW Nov. 17, p. 91).

## FAA Presents DC-8 Type Certificate

**United, Delta plan to begin service on Sept. 18; model with JT4 scheduled for December approval.**

By L. L. Doty

Baltimore, Md.—Federal Aviation Agency last week formally presented Douglas Aircraft Co. with a type certificate for the DC-8 transport powered by four Pratt & Whitney JT3 turbojet engines at ceremonies at Friendship Airport to clear the way for the simultaneous entry of United and Delta Air Lines into U. S. jet competition on Sept. 18.

United Air Lines, which has been forced to juggle schedules to meet Boeing 707 competition by American Airlines and Trans World Airlines and to cut schedules so that pilots could be withdrawn from service for jet training, will enter the competitive race with one daily nonstop round trip flight between San Francisco and New York on Sept. 18.

Delta, which thus far has had no back-to-back jet competition on any of its routes, will launch its DC-8 service on the same day with one round trip daily between New York and Atlanta. On Oct. 15, the carrier will expand its service to include turbojet flights between Chicago and Atlanta and between Atlanta and Miami.

Thus Delta moves into the jet race well ahead of its principal competitor, Eastern Air Lines, which chose to wait for delivery of its fleet of 16 DC-8s until the aircraft powered with larger P&W JT4 turbojets are available in order to avoid future conversion costs.

According to Donald Douglas, Jr., Douglas Aircraft president, certification of this JT4-powered model is now scheduled for December, with certification target date for the Rolls-Royce Conway model set for February of next year.

### Delivery Schedule

Eastern expects delivery of its first DC-8 in November so that it can start training at that time and begin scheduled service in January. National Airlines, which has three JT4A-powered DC-8s now on order, also plans to inau-

gurate service at the first of the year.

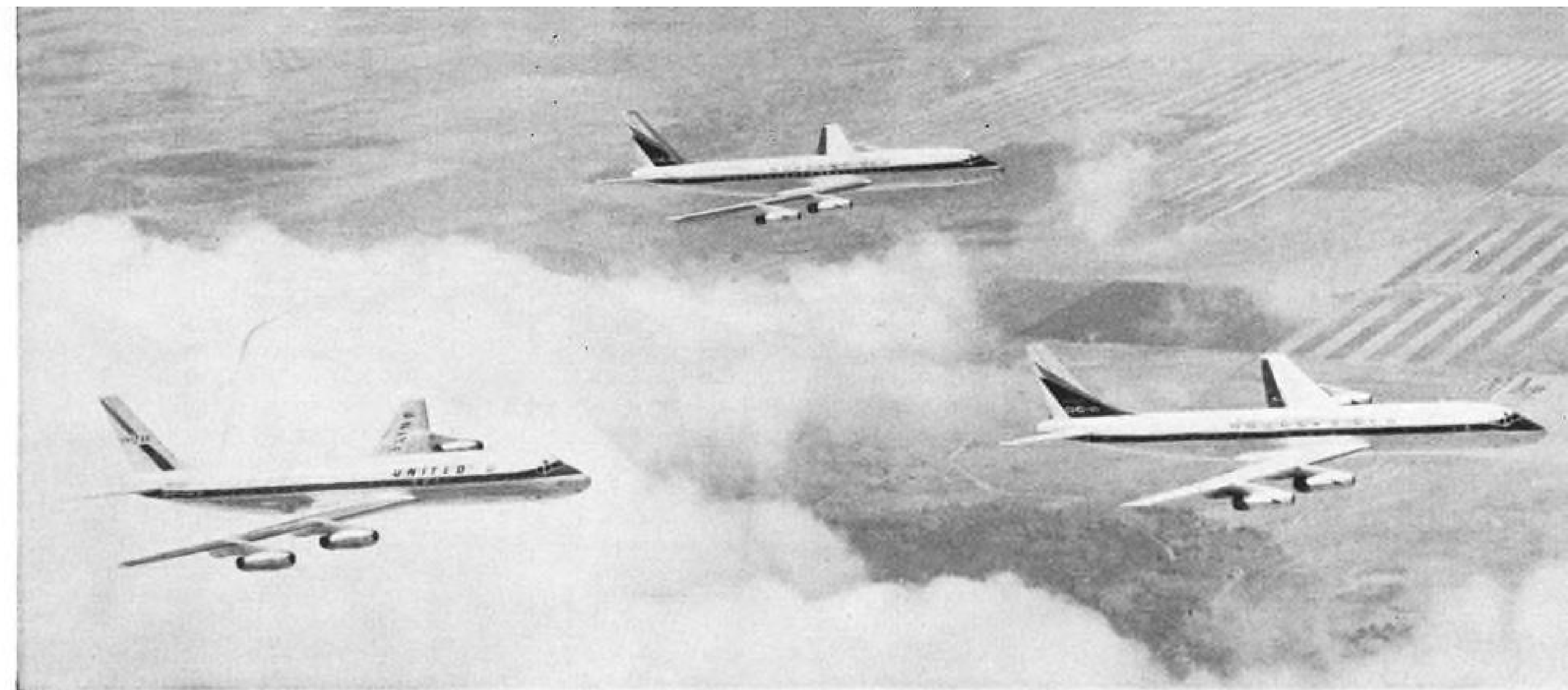
Of the 143 DC-8s on order, 24 are powered with the smaller JT3 engines. C. E. Woolman, Delta president, told AVIATION WEEK that his company ordered the six DC-8s with the JT3 engines in order to avoid any unnecessary delay in beginning service. He said the company plans to convert the aircraft to the larger powerplants or to turbofans at a later time.

### Conversion Plans

United President W. A. Patterson also said his company plans to convert the 18 DC-8s equipped with JT3 engines to either turbofan or JT4s after three or four years of service. United has a total of 40 DC-8s on order at a cost of \$225 million.

Patterson has often acknowledged that his decision to buy the DC-8 in preference to turbojet transports immediately available for delivery put United at a competitive disadvantage. However, he once noted that "... the long-term advantages of the DC-8 would outweigh this temporary disadvantage and that any diverted traffic would be regained quickly when DC-8 jet Mainliner service begins."

Last week, he enlarged upon these "long-term" advantages during formal presentation here of type certification to



**UNUSUAL** view of three DC-8 jet transports in formation; two are in Douglas markings and the third in United's. The aircraft flew 2,284 hr. in Douglas flight tests prior to last week's certification and made 1,782 landings during the test phase.



**DELTA DC-8** flew from the Douglas Aircraft plant at Long Beach, Calif., to Miami, Fla., in 4 hr. 43 min. Configuration is for 119 passengers, including seven seated in the lounge.

**SIDE VIEW** of United's DC-8 emphasizes ejector in extended position. Unit has clamshell doors which can be closed for thrust reversing action during landings. N8005U is powered by four Pratt & Whitney JT3C-6 engines rated at 13,000 lb. thrust each.





Douglas Aircraft by the Federal Aviation Agency:

- **Speed of turbojets** will not be an immediate factor in creating obsolescence of aircraft as was the case of piston-engine aircraft. On the other hand, fixed passenger comfort can create a degree of obsolescence as service patterns change. Interior of DC-8 provides aircraft with a long-range selling advantage, in United's opinion.

- **Increase in weight** sometimes destroys economic balance of an aircraft. DC-8 can absorb certain amount of increase in gross weight without sacrifice to payload, according to Patterson.
- **United found DC-8** to be "easiest to fly" and more advantageous from a flight operation point of view.

Agreeing that these factors were also instrumental in Delta's decision to buy the DC-8, Woolman added that his company chose the aircraft because of its "confidence in the Douglas product."

#### Type Certification

Type certificate for the airplane was presented to Donald Douglas, Sr., chairman of the Douglas board, by E. R. Quesada, Federal Aviation Agency administrator, during a luncheon at Baltimore's Friendship International Airport.

Although type certification of the DC-8 was completed a month in advance of the original target date of Oct. 1, actual certification was granted only 24 hr. ahead of the luncheon ceremonies arranged by Douglas to publicize the certification. Special flight of a DC-8, powered with the JT4 engines, from Los Angeles to Baltimore one day prior to the ceremony was used to conduct the last phase of the functional and reliability tests of the type certification program. The aircraft was flown here to be used for guest flights arranged as part of the presentation ceremonies.

Douglas accelerated its certification program as a means of getting the DC-8 into scheduled service at the earliest possible date to prevent the Boeing 707 from getting too large a lead in the jet race. However, FAA inspectors, backed by a personal warning from Quesada that no short-cuts were to be taken, followed certification procedures to the letter during the entire program.

Douglas made the decision to build the DC-8 in 1955. Drawing board stage began in 1952. Since the production model took to the air for the first time on May 30, 1958, DC-8s have made 1,782 take-offs and landings and logged a total of 2,284 hr. of flight. This includes 1,302 hr. of instrumented tests under all operating conditions.

On the pre-ceremonies flight from Los Angeles to Baltimore, the JT4-powered DC-8 flew the coast-to-coast

#### DC-8 Cargo Version

Baltimore, Md.—Douglas Aircraft Co., looking to airfreight as the next big field of transport expansion, is building an all-cargo prototype of the DC-8 to be completed next year.

The aircraft will be a swing-tail cargo plane and will be powered by Pratt & Whitney JT3D turbofan engines. The plane will be designed to operate in the direct operating cost area of four cents a ton-mile. According to Donald Douglas, Sr., no orders for the aircraft have been received, but the company expects that a number of sales will be made.

Douglas officials noted that the sale price of the DC-8 turbojet transport, ranging from \$4.2 million to \$6 million, depending on interior requirements, will not cover developmental costs of the DC-8. However, sales of the DC-8 cargo version are expected to enable the manufacturer to pass its break-even point.

The aircraft will include a sophisticated system of cargo handling, based on Douglas C-124 and C-133 experience.

distance in 4 hr. 34 min. Takeoff weight was 255,000 lb. gross and initial climb was at 2,000 fpm. On cruise portions of the flight, average speed was 553 mph., while maximum speed on any one flight leg was 595 mph.

Cruise altitude was 33,000 ft. initially. To avoid turbulence at one point, the plane climbed to 37,000 ft. The plane was certificated to operate up to 42,000 ft. and will have an operating-takeoff gross weight of 273,000 lb.

Landing weight on the flight was 188,000 lb. The aircraft used 67,000 lb. of the 110,000 lb. of fuel it carried. Douglas engineers reported that no mechanical items on plane required attention of maintenance crews after landing.

Behind the trailing edge of the wing, the fuselage is equipped with a series of hat-sections incorporated for additional stiffening to minimize sound level in the aft cabin area. This structural feature provides the equivalent of raising skin gage from .040 to .078.

Beginning with the 30th DC-8 to come off the production line, wing slots will be installed on four sections of the wings—two on each wing. Two 34 in. sections will be located inboard of the inboard nacelle, and two 80 in. sections will be located between the two nacelles. Wing slots will cut stall speed 10 kt. and reduce roll on take-off by 1,000 ft.

Delta will operate its DC-8s with 40 first-class seats, 72 coach seats and a seven seat lounge, for a total of 119 seats. Service will begin with two airplanes and will be increased in October when a third will be delivered. Delta Air Lines is scheduled to receive its en-

tire fleet of six by the end of the year.

United will expand its initial service in October to include Los Angeles-New York, San Francisco-Chicago and Los Angeles-Chicago flights. In November, service will be introduced on the West Coast between Los Angeles and San Francisco and from San Francisco to Chicago and Washington.

Six aircraft will have been delivered to United when service begins next week. By the end of the year, 16 will have been delivered, and a total of 32 is scheduled to have been delivered by the end of 1960. United will have all 40 of its DC-8s by the summer of 1961.

United's DC-8s will carry 52 first-class seats and an eight-seat first-class lounge. Coach section will have 48 seats, with a five-seat lounge. All lounge seats on both Delta and United's planes will be saleable.

Both airlines will use four stewardesses on jet flights.

Eighteen commercial airlines have ordered the DC-8. They are: Alitalia, Delta, Eastern, Japan Air Lines, KLM, National, Northwest, Olympic, Pan American, Pan American-Grace, Panair do Brasil, Philippine Air Lines, SAS, Swissair, TAI, Trans-Canada, UAT and United.

#### Flying Tiger Outlines CL-44D Route Costs

Los Angeles—Rates between six cents per ton-mile and 20 cents per ton-mile, with an average return of about 13.5 cents per ton-mile, were forecast by Robert Prescott, Flying Tiger Line president, in speaking of the Canadair CL-44D turboprop air freighter his company will place in service in 1961.

Prescott, speaking at a joint meeting of the American Society of Traffic and Transportation, Inc., and Los Angeles Transportation Club here, said the first of the 10 planes, worth \$48 million, is expected to enter service in the spring of that year.

If scientists, through the use of chemical additives, double the power of today's (turbine type) fuel, then "the long haul truck will go the way of the pony express," Prescott said. He cited these figures concerning the Canadair airplane, which is a swing-tail adaptation of the Bristol Britannia—a payload of 73,000 lb., coast-to-coast speed of 400 mph., a cubic capacity of 7,391 cu. ft. (for cargo density of approximately 10 lb./cu. ft.).

Another point Prescott dwelt on was the costs—operational and fixed. He cited the average fixed cost per airplane per day, which is estimated to be \$2,500 for the CL-44D, covering depreciation, taxes and insurance. At a utilization rate the same as obtained with the line's Lockheed Constellations today,



#### Newark Control Tower Readied

Newark Airport's new \$1,750,000 control tower, almost complete structurally, now is being furnished by Federal Aviation Agency with \$1 million worth of electronics and other equipment. Tower is circular at ground level with 78-ft. diameter at that point; a 117-ft. concrete shaft supports the upper structure. FAA will staff the facility with 16 electronics specialists and 58 air traffic control specialists.

10 hr. per day, this reduces to \$250 per flight hour.

"If we can push this utilization to 16 hr. per day with the CL-44, our fixed costs would be reduced to \$155 per hour, a saving of about \$100 per hour. If you carry the arithmetic out, 16 hr. a day is 6,000 hr. per year, and if you save \$100 per hour, you have saved \$600,000 operating cost on each airplane per year.

"We believe this kind of improvement can be brought about in the CL-44, principally by the time saved in loading and unloading through the swing tail . . . and the greatly reduced ground maintenance time required for a turbine-powered airplane versus the piston," Prescott said.

The effort to improve utilization will entail some "radical changes in sched-

uling from our present method," he said; today's shippers are used to regular late night departures at origin and early morning arrivals at destination.

"We don't yet know exactly how we are going to bring it about, but in the new jet era we will have to schedule the flights on an around-the-clock basis in order to achieve low costs. It may be that there will be a tariff separation between shippers who want the fast overnight schedules and those who can wait for a second day delivery. Perhaps we may do it on a commodity separation basis. It will be one of our toughest problems, and I assume we will end up solving it on a trial and error method," he declared.

Another radical change that will come about, Prescott said, will be in tariffs.

"Today, coming westbound, we charge the same price for every commodity we carry, without regard to such factors as ease of handling, value of service or many other factors that enter into tariff making. This we know is not the best tariff policy, but we have had no opportunity thus far to correct it.

"We now have an intensive research program under way. Upon the results of this we will construct a new tariff. We expect to have rates on various commodities ranging from as low as six cents per ton-mile (with the CL-44D)."

Forecasting traffic, Prescott noted that "today we are doing slightly better than 80 million ton-miles annually. The CL-44Ds . . . have an annual all-up capacity of five hundred million ton miles—or about one half of what the total airfreight industry, domestic and international, is doing today.

"By 1965 we expect the industry to be doing 7 to 10 billion ton-miles with our own company flying 600 to 700 million ton-miles," he said.

#### Aerolineas' Comet May Be Total Loss

New York—Aerolineas Argentinas Comet 4 jet transport which made a crash landing Aug. 20 short of the runway at Asuncion, Paraguay, may be a total loss, leaving the carrier with a fleet of two jets until further deliveries next year, officials said here last week.

The Comet, coming into Asuncion on an ILS approach after a flight from Buenos Aires, hit about 6 mi. from the airport in a clear spot surrounded by trees and sloping terrain. The captain was killed in the first impact and two of the other six crewmen were injured seriously. The 54 passengers aboard were able to deplane, but one woman died shortly afterward, reportedly from a heart attack.

The airline was not sure last week whether the plane, now resting in a highly inaccessible spot, can be recovered and repaired. Weekly round trip schedules between New York and Buenos Aires have been cut from three to two and a reduction in Buenos Aires-Santiago flights from five to three a week is under consideration. The Argentine carrier also flies two weekly round trips between Buenos Aires and Europe with its Comets. Three more of the British jets are scheduled for delivery next year to Aerolineas.

The airline has been using Asuncion instead of Rio for Comet stops since mid-August because of runway deterioration at Rio caused by the jet blast, according to the carrier. It hopes to see early completion of a runway strengthening program at Rio so it can resume service there and end the loss of traffic in and out of the Brazilian city.



# 707 Crash Prompts Restudy of Training

Riverhead, N. Y.—Re-evaluation of training maneuvers such as two-engine-out approaches will result from investigation of the Aug. 15 fatal crash of an American Airlines Boeing 707-120 jet transport attempting to land at the Peconic River Airport, Calverton, Long Island, N. Y. (AW Aug. 31, p. 39).

According to testimony at a Civil Aeronautics Board hearing here on the accident, most witnesses said the aircraft, which had been cleared to land on Runway 23 at the Grumman-operated field, banked left, recovered, and then entered a right turn which became progressively steeper until the plane went almost vertically down.

The student pilots aboard the jet were in the sixth period of their transition instruction, which would probably encompass maneuvers that simulate a jammed stabilizer condition, an inoperative stabilizer and/or additional engine-out landings.

Following the accident, American Airlines suspended two-engine-out jet approaches except under certain restrictions: the second engine was not to be cut back until the aircraft was going straight in for its landing. Federal Aviation Agency later directed that 707 maneuvers involving simulated failure of two engines on one side be performed "at altitude," pending results of the crash investigation.

## Maneuver Required

Prior to this Aug. 26 directive, the simulated two-engine-out maneuver at low altitude was required for type rating checks and captains' six-months type proficiency checks in all four-engined aircraft.

One indication that the 707-120 involved in the accident was maneuvering with its two right engines idling was provided by readings of its oil temperature gages, which showed temperatures at impact of 105 deg. on engines No. 1 and 2, compared with 70 deg. and 74 deg. respectively for engines No. 3 and 4.

Development of information for a re-evaluation of the training maneuver was begun during the hearing, which was the operational part of a two-phase investigation and will be followed in a few weeks by a hearing on the structures group's findings.

Several 707 pilots testified during the hearing as to operating characteristics of the plane under certain flight conditions and on instructor techniques used in the training program. During their testimony, each was asked whether he felt anxiety or apprehension during two-engine-out maneuvers. J. R. Gannett, Boeing senior transition and train-

ing pilot; Glenn H. Brink, American Airlines 707-120 captain; and Howard U. Morton, American Airlines 707-120 captain replied that they felt no apprehension and considered the maneuver a desirable part of training.

Oscar Bakke, CAB Bureau of Safety director and a member of the board of inquiry in the hearing, developed this line of questioning. He said later that considerable additional information on the subject will be accumulated and the desirability of such maneuvers will be carefully re-appraised.

Gannett of Boeing described flight tests the manufacturer had run since the accident, including use of air brakes and lateral control simultaneously with inboard spoilers off (simulating a jammed stabilizer condition). He noted no unusual response. He yawed the aircraft left and right with full control application to obtain flight recorder air-speed response to yawed flight. Power was symmetrical during these yawed conditions.

Gannett reported an experience during a training flight in which he was turning downwind after takeoff and setting up for a two-engine landing. As he gradually eased back on two engines, his student applied aileron but no rudder. The student then applied just a little rudder; the plane began to yaw and roll 60-70 deg. toward the power-on engines. Gannett took over, applied full rudder and brought the aircraft back.

According to the Boeing pilot, two

other airline operators of the 707-120 have experienced similar control situations where students made rudder errors and instructors had to take over. One incident involved a 3,500-ft. altitude loss, another a 1,000-ft. loss and a third a 5,000-ft. loss, Gannett said.

From the stabilizer setting of the wrecked plane, Gannett said, it is unlikely that a jammed stabilizer approach was being made.

Capt. William A. Reedholm, superintendent of flying for American Airlines, testified that the airline had recently run tests to determine how long it takes the airplane to recover from induced yaw rolls. At 170 kt. airspeed, power on engines No. 1 and 2, gear down, 30 deg. flaps, and holding rudder to maintain straight course, time to roll from 30 deg. left to 30 deg. right was 10 sec., Capt. Reedholm said. The nose then started down.

## Evasive Action?

Capt. Reedholm agreed with Gannett that evasive action to avoid other traffic should not have caused the jet to roll during its approach before the accident. This possibility was raised by testimony of several witnesses who had noticed a lightplane in the vicinity at the time, and by the testimony of Sgt. Harold Mahoney, a Suffolk County Air Force crew chief and owner-pilot of a Piper J-3 Cub.

Sgt. Mahoney said he was flying the red and white Cub at 300 ft., operating out of a farmer's field nearby. He had been flying out of the field for about two months, he said. The field has not been inspected by FAA, is not on aeronautical charts, and he had no agreement with Grumman's tower about operating in the vicinity of its pattern. The Cub had no radio.

He first sighted the jet, Sgt. Mahoney testified, when it was about 800-1,000 ft. away approaching on a perpendicular course from his left. The 707 turned left, he said, then its right wing went down and the nose went down. It rolled on its back and hit that way, Sgt. Mahoney said.

"He was above me when I first saw him but when he went into a spin I just wanted to get out of there," the airman testified. Before that, he saw no need for evasive action. There was about 500 ft. of altitude separation, he said. He estimated that the 707 was at about a 10 o'clock position from the Cub when he first sighted it and the Cub was between one and two o'clock from the jet.

Samuel Gates, American Airlines attorney, questioned Sgt. Mahoney vigorously and some of his queries were ruled

out of order by Claude M. Schonberger, CAB hearing officer. One question was whether the airman was familiar with Civil Air Regulations. Schonberger considered this outside the scope of the investigation.

Preliminary data from the structures group introduced at the hearing indicated that the American plane hit the ground at an impact angle of about 25 deg. on a 285 deg. magnetic heading. Position at impact was about 15 deg. nose down attitude, yawed slightly to the left and slightly right-wing-down. Landing gear and 30 deg. of flaps were extended at impact and there were 1½ units of airplane nose up trim. While impact damage might have made the trim tab readings inaccurate, the stabilizer trim switch on the copilot's side indicated 1.78 deg. nose down; on the pilot's side, the stabilizer trim switch reading was full deflection nose down.

Speed brake handle was in an eight degrees position, indicating spoilers up

eight degrees. Manual stabilizer control handles were both in. Left side stabilizer trim switch was in half-way position, indicating "on" position; right side Mach trim switch was ¾ toward the on position, indicating "on". The major portion of the aircraft was consumed by fire after impact.

The structures group's preliminary report found no major discrepancy in a cursory examination of the aircraft maintenance records. Consensus of pilots who had flown the aircraft was that it functioned normally and was a good plane.

The report noted an inflight control incident experienced with the plane on the day before the accident with another crew under Capt. C. H. Rickards. According to Capt. Rickards' statement, he set up a jammed stabilizer condition, 1½ deg. nose down, while descending to enter the Peconic pattern. The captain asked his student pilot to demonstrate a jammed stabilizer trim by the

split spoiler method. Altitude was 2,000 ft. and airspeed was 190 kt. The student properly deactivated the inboard spoilers and started an easy turn to the left in order to circle the field. While applying left aileron, he pulled up the speed brake handle to 30 deg.

## Increasing Roll Rate

This resulted in increasing the roll rate to the left to about 45 deg. of bank and the student immediately applied right aileron. Capt. Rickards couldn't determine whether the 45 deg. bank was caused by the speed brake application or by too much aileron control application. No flaps were extended at the time. With zero flaps, the outboard ailerons are locked out. In this maneuver, with a nose heavy condition, it is necessary to deactivate the inboard spoilers and use the outboard spoilers to get pitch up.

This results, Capt. Rickards said, in sufficient stick travel to flare the aircraft during landing. With inboard spoilers deactivated and outboard aileron locked out, the aircraft's lateral control has been reduced 50%. When the student applied opposite aileron, the aircraft stopped its roll to the left. The student then put the speed brake handle full forward, and opposite aileron returned the aircraft to level flight.

## Jet Service Supports Soviet Airline Growth

Moscow—Aeroflot, Soviet state-owned airline, increased its passenger traffic by 42% during the first half of 1959, according to deputy chief V. Bashkurov.

The Soviet carrier attributed its gains in large measure to the introduction of 100-passenger twin-turboprop Tu-104 transports and 80-passenger four-engine Il-18 turboprop transports into scheduled service last April. New 85-seat four-engine An-10 turboprop transports will not have an impact on Aeroflot's passenger traffic until the latter half of the year.

Despite the healthy traffic increase, Aeroflot's system-wide gain in terms of additional passengers flown as compared with the first-half of 1958 is well below that of the U. S. transport industry. It is estimated that a 42% gain for all of 1959 would represent less than 3.4 million more customers for Aeroflot, where a 10% gain for U.S. carriers would mean nearly 5 million additional passengers.

Significantly, even the large percentage gains that Aeroflot has been reporting in recent years are beginning to taper off. In 1957, the Soviets announced a 69% traffic increase over 1956. Last year, the gain was 56%, and it now appears that this year's percentage increase will drop further.

## American Wins Nonstop Rights

Washington—Civil Aeronautics Board last week authorized nonstop rights between San Francisco and New York for American Airlines on grounds that the traffic potential of the market and the stimulating effects of jet service in the development of new traffic warrant a third carrier on the route.

This is the first time that the Board has based a route decision almost entirely on the influence of new equipment on traffic potential—in this case the inauguration of turbojet transport schedules on transcontinental routes. Prior to this decision, only United Air Lines and Trans World Airlines have been authorized to provide nonstop service between the two points. American will start the service Nov. 1.

Northwest Airlines was an unsuccessful contender in the case. The Board turned down Northwest's petition on grounds that American had already established identity in the market "which can be readily harnessed to stimulate the new nonstop service."

Board Chairman James Durfee and member Harman Denny took sharp issue with the majority opinion which estimated that normal traffic growth in the market during the next three years will amount to 33%, with an additional 10% to reflect jet stimulation in 1960.

In their strongly worded 25 page dissent, Durfee and Denny said "the record is not ripe for a Board decision" and criticized the majority action on the following grounds:

- Record contains no evidence of economic or operational impact of jets.
- Public need for added competition over the route was not proven.
- Traffic volume forecast by the Board is insufficient to support three carriers.
- Addition of American in the nonstop market will cause heavy revenue diversion from Trans World and United.

In its opinion, the majority found that past services provided by United and TWA did not fully meet the needs of the traveling public, and they added:

"The evidence clearly shows that during and prior to 1957 it was difficult for the traveler to obtain his choice of schedule or departure time on nonstop coach flights during peak periods."

The majority admitted that plans to inaugurate a full schedule pattern of jet nonstop service will create a substantial amount of additional capacity in the New York-San Francisco market. However, they noted that the market potential which exists will be "substantially enhanced by the unique advantages of jet aircraft" and that the "authorization of a third carrier holds the greatest prospect of the full development of that potential."

The majority was enthusiastically optimistic over the prospects for traffic growth. In a statement that was clearly a direct reply to charges by the majority of trunklines that competition was too strong on most major routes, the majority concluded:

"Despite the addition of a substantial amount of new competitive service in many markets during the past several years, the aviation industry has continued to grow and prosper and the number of passengers being transported . . . has increased year by year." They forecast a continuation of that trend.