

December 23, 1957 75 Cents

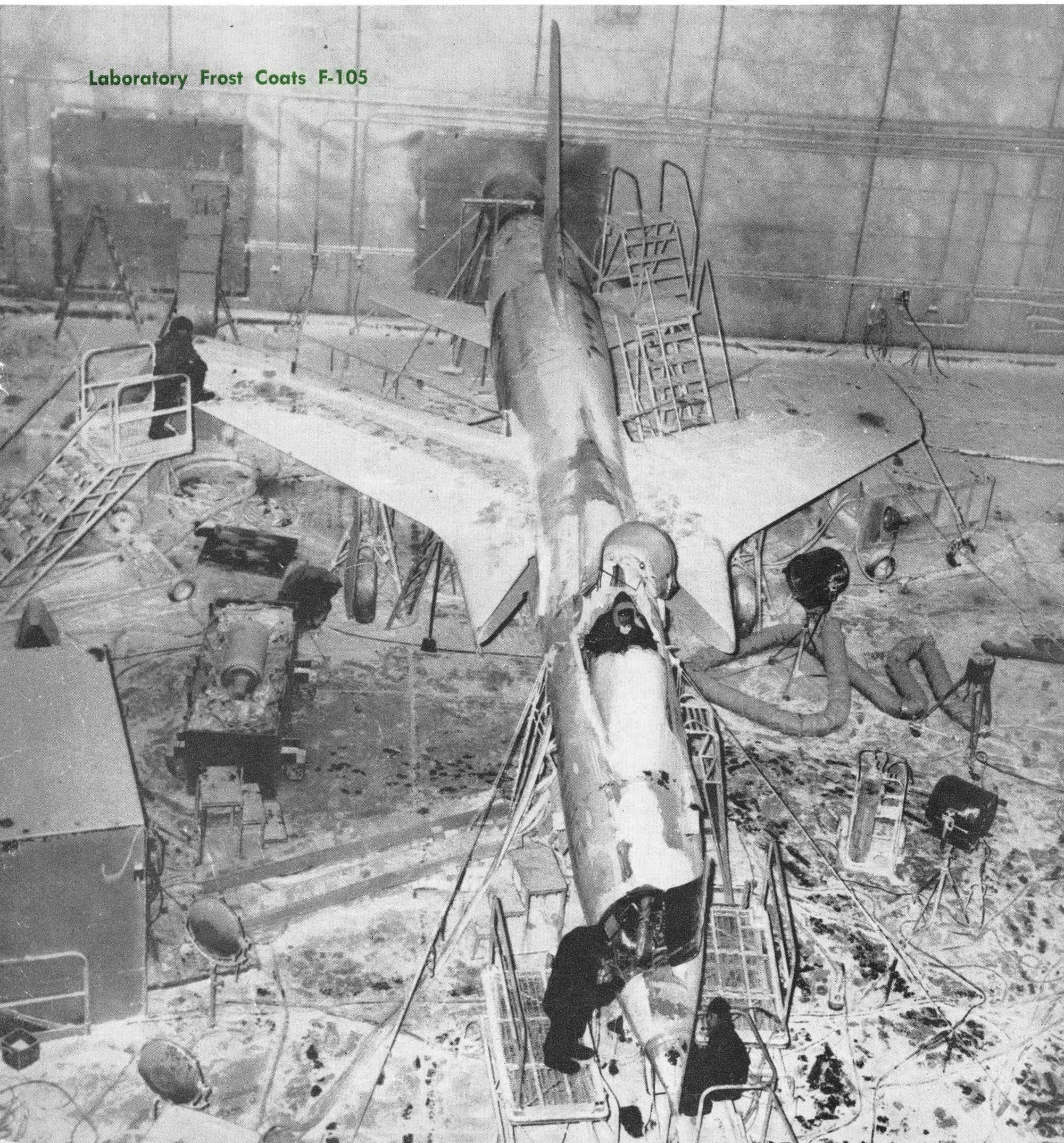
AVIATION WEEK

A MCGRAW-HILL PUBLICATION

German Orders Are
Best SR.177 Hope

•
Company Builds on
Solid Propellants

Laboratory Frost Coats F-105



*he's watching the progress of
the Air Age from his machine...*



Piston engines . . . jets . . . and now, missiles, Foote Bros. craftsmen are watching the steady advance of American air progress from their machines. They're not only watching it—they are an important part of it, because, at this moment they are helping produce components capable of performance undreamed of a short time ago.

At Foote Bros., yesterday's technology, methods and standards of precision are obsolete. Today, these men are working with new metals in new ways, with greater precision, to produce lighter, stronger and more reliable gearing, power transmission and actuating mechanisms for the air age of tomorrow.

It is the willingness to innovate, the ability to anticipate, and the determination to excel that have helped Foote Bros. engineers and production men keep pace with, and earn the confidence of, the aviation industry.

We may be able to help solve your problems involving precision gearing and actuating mechanisms, and would welcome the opportunity of talking with you.

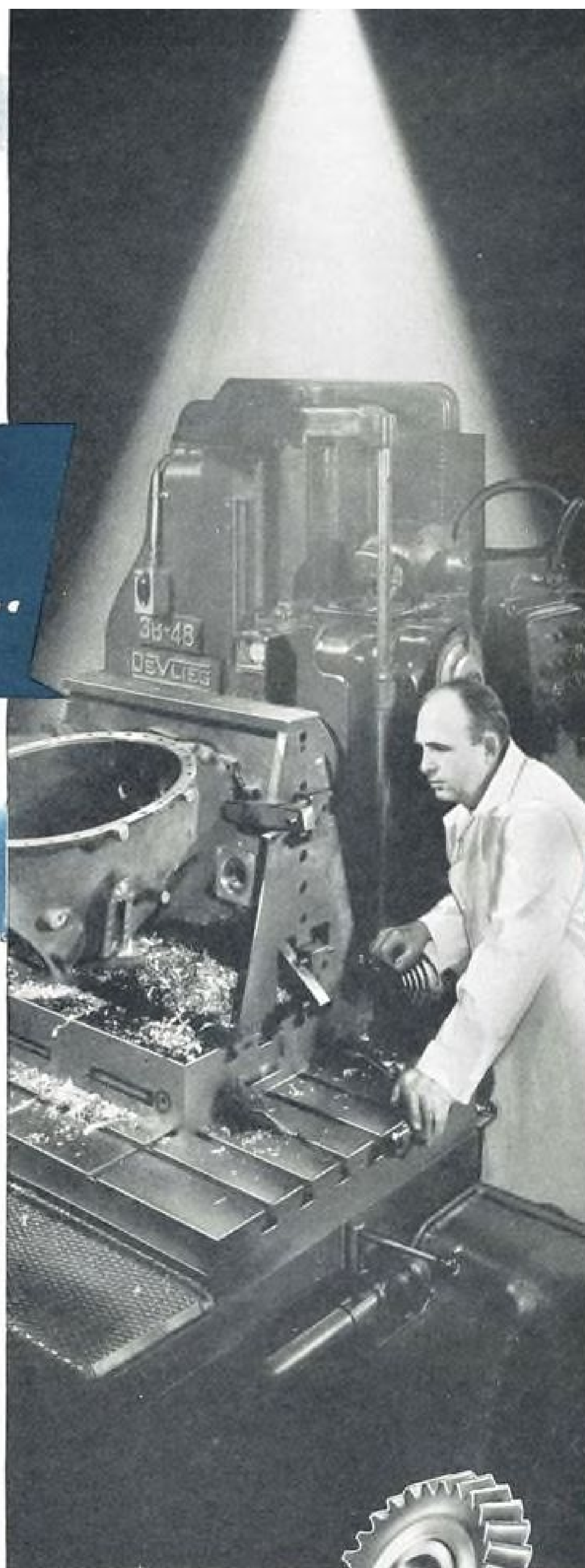
this trademark stands for the finest industrial gearing made



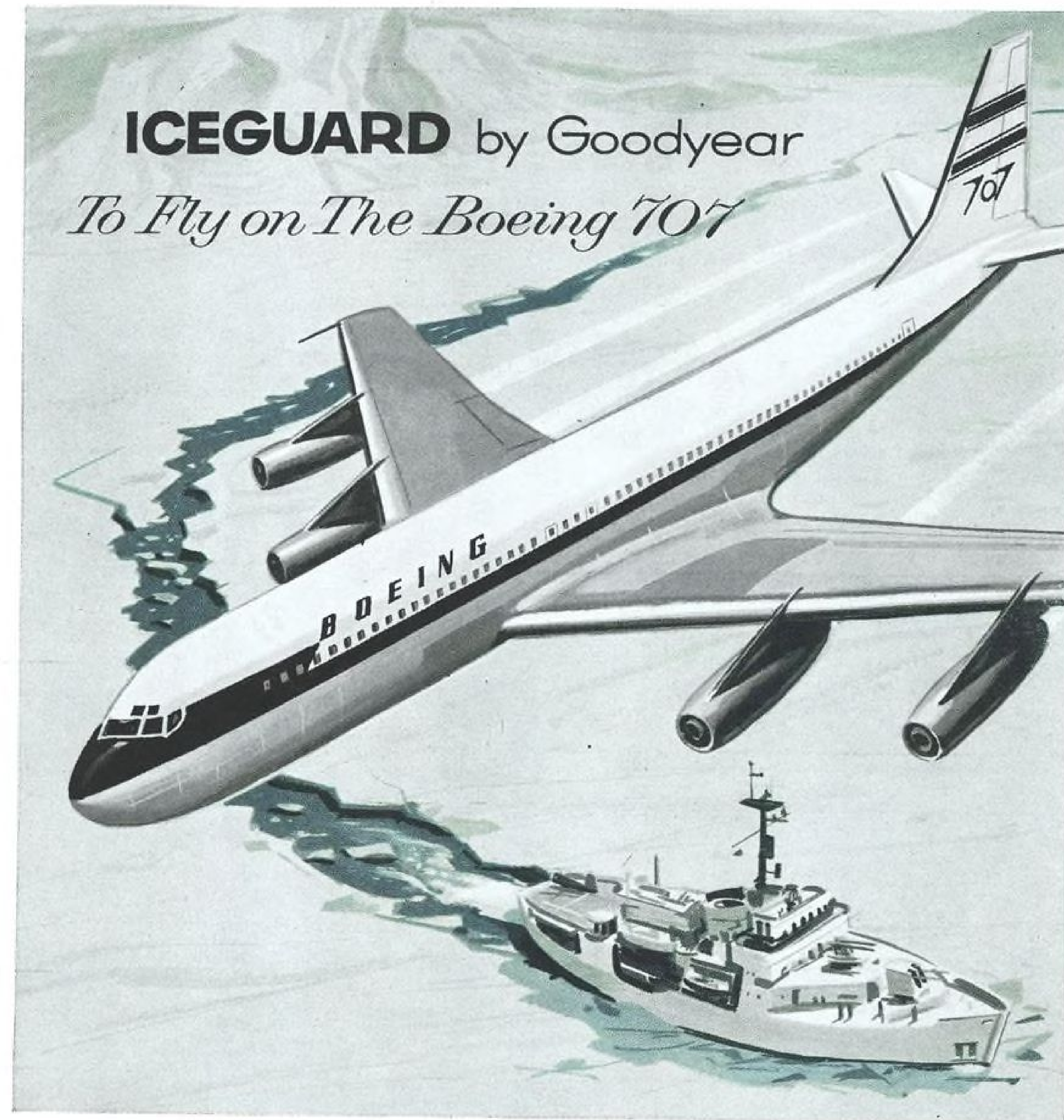
FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
4545 South Western Boulevard, Chicago 9, Illinois



ICEGUARD by Goodyear *To Fly on The Boeing 707*



Advanced Systems Of Ice Protection Pioneered By Goodyear—already proved in actual Arctic Circle operation on military jet aircraft—Pave Way For New Commercial Jet Airliner.

The Boeing 707, commercial jet transport, will fly with the most advanced type of ice protection on all three leading edge surfaces of its huge empennage:

Iceguard by Goodyear!

Embodying revolutionary electrothermal systems of ice protection—developed through the teamwork of the National Research Council of Canada and Goodyear—one system of the Iceguard has already been in lengthy service above the Arctic Circle on the Canadian Avro CF-100 all-weather fighters.

Now the other has been selected by Boeing for jet transport service.

For information on the erosion-resistant Iceguard—how these two systems of foolproof ice protection can be applied to air scoops, wings, propellers, antennas, pipe, conduit—anywhere ice presents a problem—write: Goodyear, Aviation Products Division, Akron 16, Ohio, or Los Angeles 54, California.

ICE PROTECTION BY

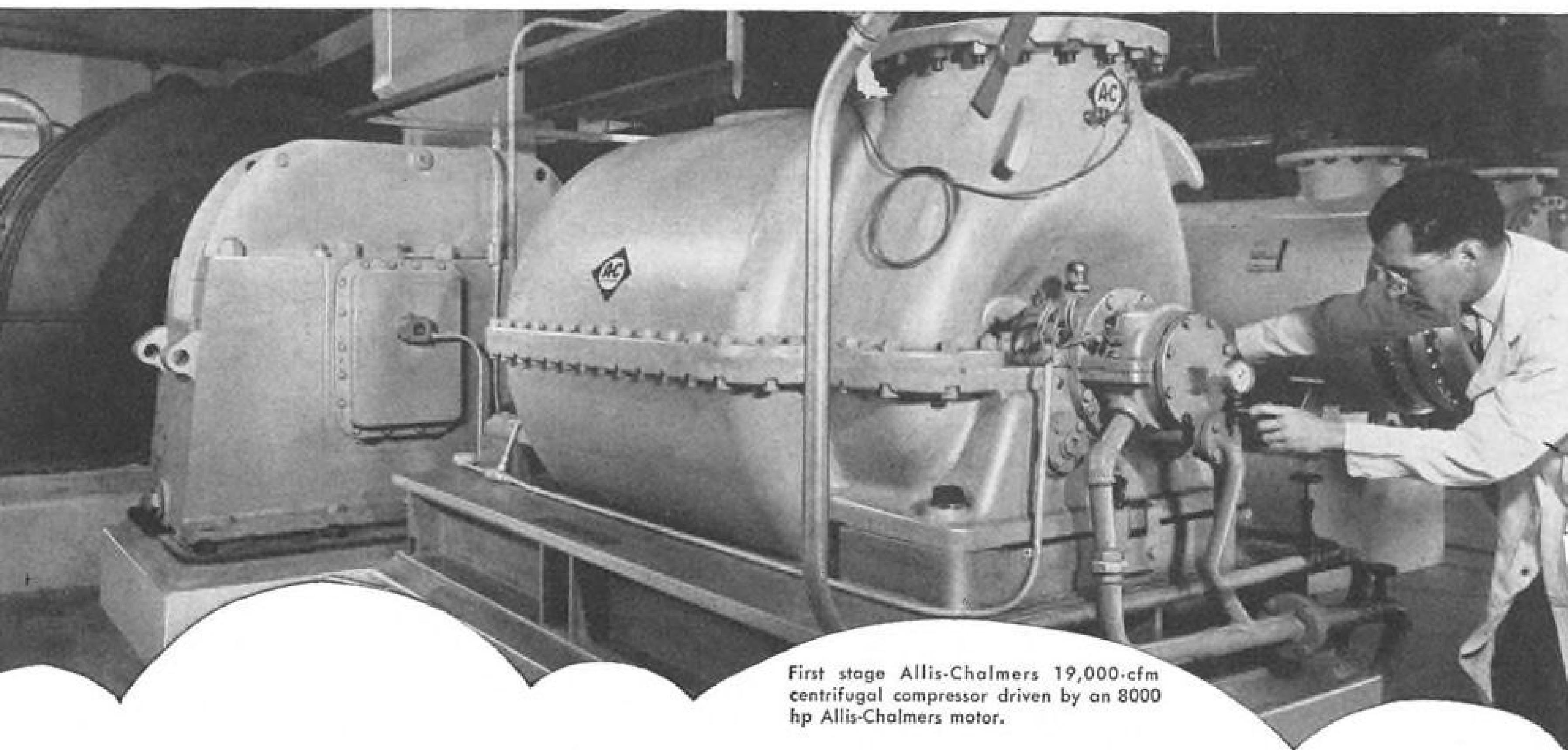


Where Research and Development work to Advance America's Global Position In The Race For Air Power

Iceguard—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



Compressors for new Convair wind tunnel for testing designs to Mach 5



First stage Allis-Chalmers 19,000-cfm centrifugal compressor driven by an 8000 hp Allis-Chalmers motor.

Uses combination of Allis-Chalmers compressors, motors, switchgear, control

Convair's new high speed wind tunnel is a blow-down, intermittent-flow type. This design was chosen because of its comparative simplicity and because it requires only a fraction of the horsepower of continuous flow tunnels.

Over 8,000,000 cfm in U. S. aviation test facilities, including wind tunnels and engine and component testing equipment, have been installed by

Allis-Chalmers. Equipment supplied by A-C includes axial, centrifugal and rotary compressors, and over 400,000 hp in electric motors, plus transformers, control and switchgear.

Allis-Chalmers can provide unsurpassed experience in compressor design and installation. Call your nearby A-C office or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wis.



Second and third stage centrifugal compressor driven by the same 8000-hp motor.



Allis-Chalmers also supplied switchgear and control for power distribution and protection.

Chicago Bridge & Iron Co., Prime Contractor
Fluidyne Engineering Co., Consultants
Convair, a Division of General Dynamics Corporation

ALLIS-CHALMERS



A-5576

AVIATION CALENDAR

- Jan. 6-8—Fourth National Symposium, Electronics Reliability and Quality Control, Hotel Statler, Washington, D. C.
- Jan. 9-10—Meeting of Airlines Proximity Warning Indicator & Air Collision Avoidance System Committee, Hollywood-Roosevelt Hotel, Los Angeles, Calif. Open to public only Jan. 9. Those wishing to make presentations must write to Air Transport Assn., Washington, D. C., by Dec. 20.
- Jan. 13-15—10th Annual National Convention, Helicopter Association of America, Western Hills Inn, Dallas-Ft. Worth.
- Jan. 13-17—1958 Annual Meeting, Society of Automotive Engineers, Sheraton-Cadillac and Hotel Statler, Detroit, Mich.
- Jan. 13-May 14—Lecture series on Space Technology, sponsored by University of California and Ramo-Wooldridge Corp., to be held in Los Angeles, San Diego and San Francisco. For details write: University of California Extension, Dept. of Conferences and Special Activities, Los Angeles 24, Calif.
- Jan. 14-15—Yankee Instrument Fair & Symposium, sponsored by Instrument Society of America (Boston, Connecticut Valley and Fairfield County Sections), Hotel Bradford, Boston, Mass.
- Jan. 18-31—14th Annual Technical Conference, Society of Plastics Engineers, Sheraton-Cadillac Hotel, Detroit, Mich.
- Jan. 20—Winter Meeting, Provisional Western States Section, The Combustion Institute, California Institute of Technology, Pasadena, Calif. For details write: Mr. G. S. Bahn, Marquardt Aircraft Co., Van Nuys, Calif.
- Jan. 20—"Information Theory and the Communications Engineer," speaker: Dr. Marcel Golay, consultant, Physical Sciences Auditorium, University of Pennsylvania, Philadelphia.
- Jan. 20-21—First Annual General Meeting, Association of Local and Territorial Airlines, Washington Hotel, Washington, D. C.

(Continued on page 6)

AVIATION WEEK • DECEMBER 23, 1957



Vol. 67, No. 25



Published weekly with an additional issue in December by McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder, Executive, Editorial, Advertising and Subscription offices: McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Publication Offices: 59-129 North Broadway, Albany 1, N. Y. Donald C. McGraw, President; Joseph A. Gerardi, Executive Vice President; L. Keith Goodrich, Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator.

Subscriptions are solicited only from persons who have a commercial or professional interest in aviation. Position and company connection must be indicated on subscription order.

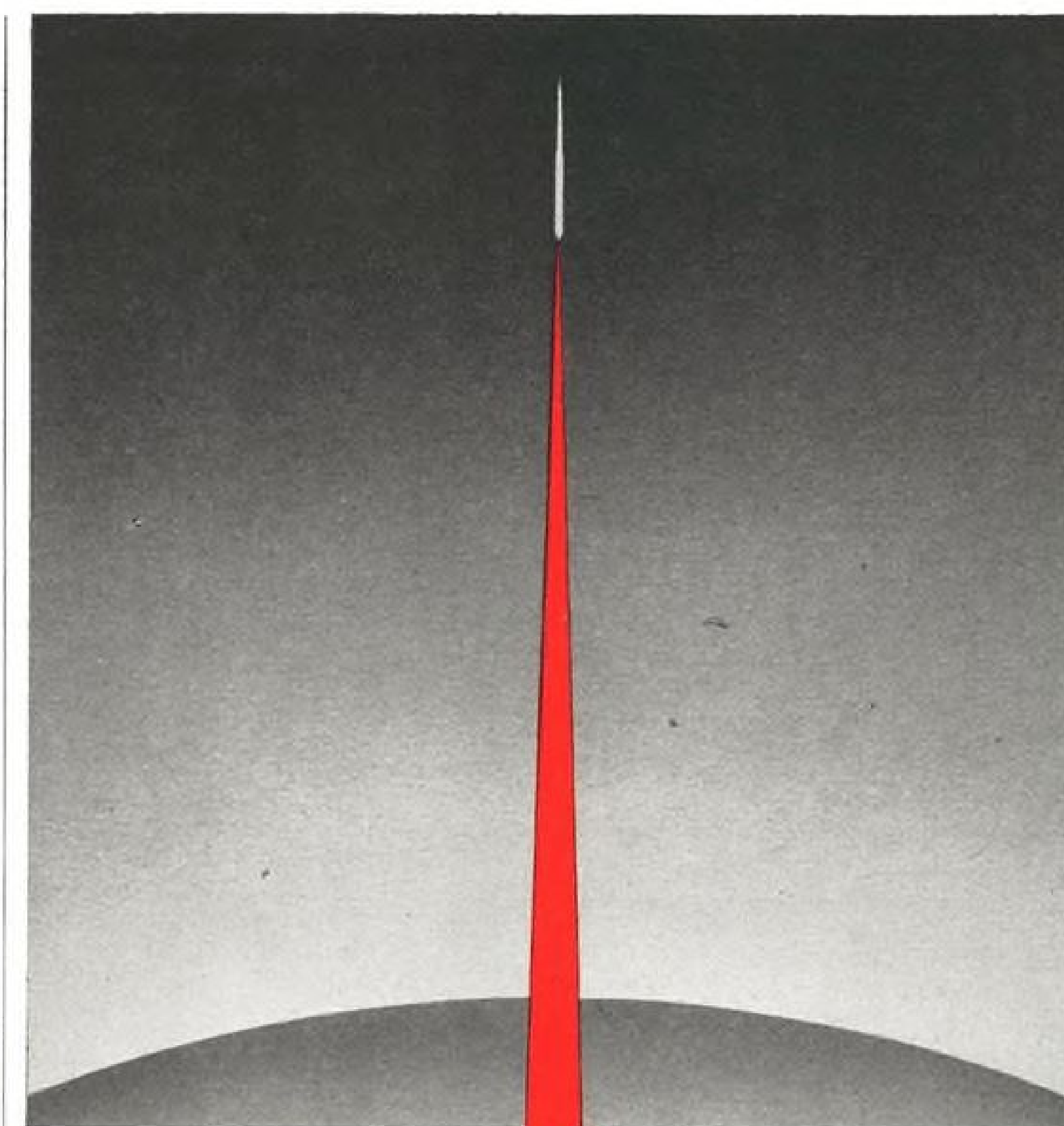
Single copies 75¢. Subscription rates—United States and possessions, \$7 one year, \$14 two years, \$14 three years. Canada, \$8 one year, \$12 two years, \$16 three years.

Second class mail privileges authorized at Albany 1, N. Y. Printed in U. S. A. ©Copyright 1957 by McGraw-Hill Publishing Co., Inc. All rights reserved. Cable Address: "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.

Subscription: Address correspondence and change of address to Subscription Manager, Aviation Week, 330 West 42nd Street, New York 36, N. Y. Subscribers should give old as well as new address, including postal zone number, when changing address. Enclose recent address label if possible. Allow one month for change to become effective.

Postmaster: Please send form 3579 to Aviation Week, 330 West 42nd Street, New York 36, N. Y.

AVIATION WEEK, December 23, 1957



no cloud above
no earth below

...a universe of sky and GO!

Advanced missiles are blazing new trails in the universe of outer space . . . and precision components help determine the success of their high speed, high altitude course.

Experience, skilled personnel and modern facilities at Lavelle are focused on the precision fabrication of Missile, Engine, Airframe, and Electronic components in titanium, aluminum, stainless steel and other heat resistant, high strength alloys . . . to the most rigid specifications.

Ram jet engine cone and diffuser sections, fuel manifolds, flame holders, combustion chambers and liners are typical components made by Lavelle for major manufacturers. They rely on Lavelle's quality workmanship, dependable delivery and reasonable costs.

Where your production standards demand only the finest in reliable components . . . contact Lavelle!

Write for illustrated brochure describing Lavelle's services in detail.



Lavelle

LAVELLE AIRCRAFT CORPORATION • NEWTOWN, BUCKS COUNTY, PA.

Between Philadelphia, Pa., and Trenton, N. J.



ignition



Boeing 707 JETLINER

Powered by

Pratt & Whitney Aircraft

GENERAL LABORATORY ASSOCIATES, INC.

Norwich  New York

AIRCRAFT IGNITION AND ELECTRONIC EQUIPMENT

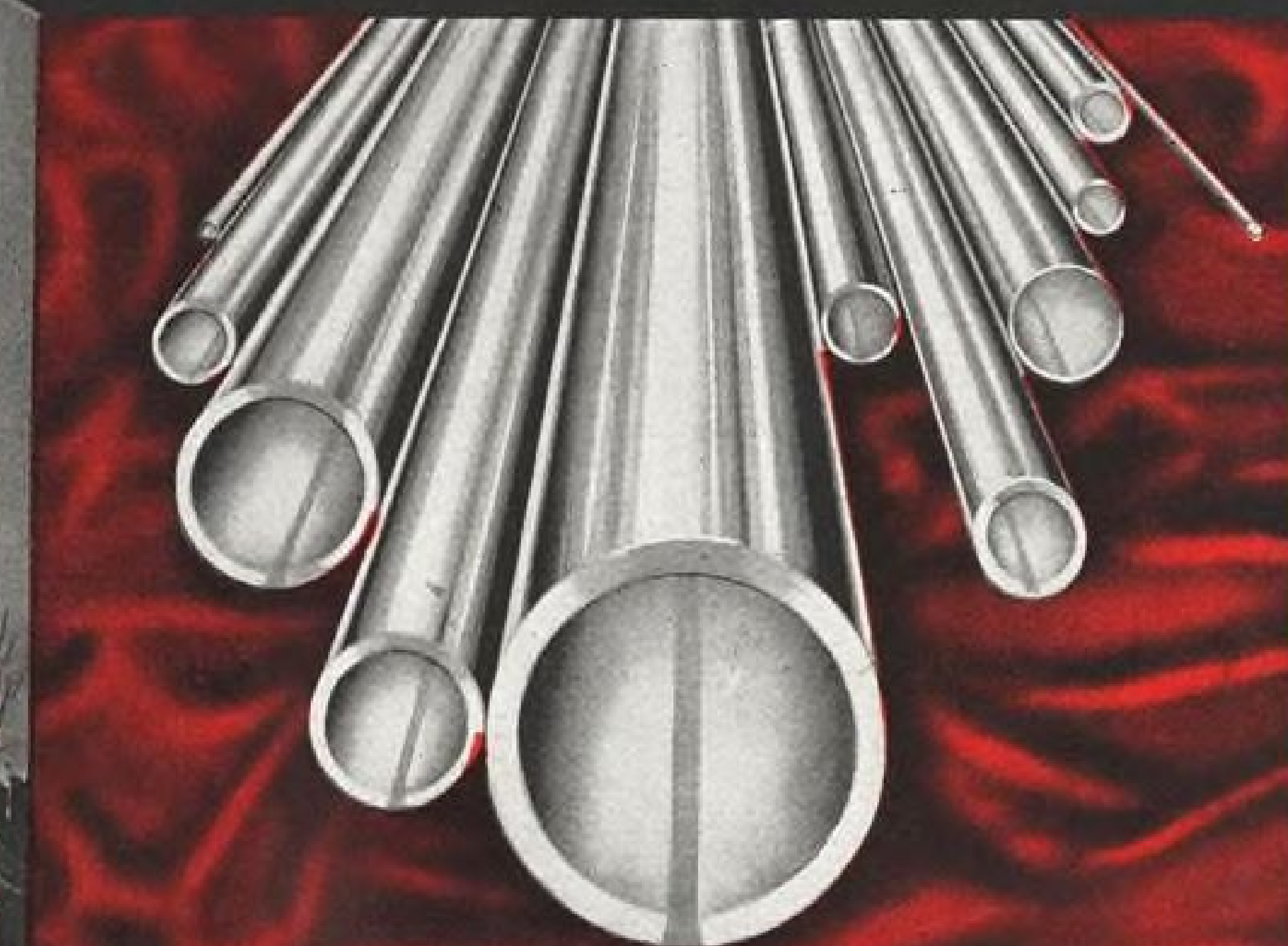
WEST COAST SALES & SERVICE, 3903 Warner Blvd., Burbank, Calif., Victoria 94390

AVIATION CALENDAR

(Continued from page 5)

- Jan. 20-Feb. 7—Aviation Institute for Commercial Carriers and Business Pilots, Univ. of Southern California, Los Angeles.
- Jan. 22-26—First International Air Show & Exposition, Master Field, Miami, Fla. For details write: P.O. Box 2879, Miami 17.
- Jan. 27-30—26th Annual Meeting, Institute of the Aeronautical Sciences, Sheraton-Astor Hotel, N.Y.C. Honors Night Dinner, Jan. 29.
- Jan. 29-31—Fourth Annual Meeting, American Astronautical Society, Main Auditorium, Engineering Societies Bldg., 29 W. 39 St., N. Y. C.
- Jan. 30-31—American Society for Engineering Education, 1958 College-Industry Conference, U. of Michigan, Ann Arbor.
- Jan. 30-31—Seventh Annual Instrument Short Course, sponsored by Southern California Meter Association and Los Angeles Harbor Junior College, at Los Angeles Harbor College, Wilmington, Calif.
- Feb. 3-4—Industry-Service Symposium Flight Control-Panel Integration, Biltmore Hotel, Dayton, Ohio. For details: Mr. J. H. Kearns, Box 942, Dayton.
- Feb. 19—"Are Flying Saucers Fact or Fancy?", Dr. Hugh Winn, Missile and Ordnance Systems Department, GE, Engineers Club, Philadelphia, Pa.
- Mar. 13-14—Second National Conference on Aviation Education, Hotel Mayflower, Washington, D. C.
- Mar. 17-20—Joint Aviation Conference, American Rocket Society-American Society of Mechanical Engineers, Statler-Hilton Hotel, Dallas, Tex.
- Mar. 17-21—1958 Nuclear Congress, managed by American Institute of Chemical Engineers, 25 W. 45 St., N. Y. C.
- Mar. 18-19—First Interscience and Industry Symposium on Guided Missiles Training equipment (limited to those with Secret clearance) Naval Ordnance Laboratory, White Oak, Silver Spring, Md. For details write: Mr. J. G. Vaeth, Head of New Weapons & Systems Division, U. S. Naval Training Device Center, Port Washington, L. I., N. Y.
- Mar. 24-29—Fourth International Instrument Show, Caxton Hall, London.
- Mar. 30-Apr. 1—RFC-RNAS Reunion (World War I), Toronto, Canada. Contact: C. B. Stenning, Chairman, 149 South Drive, Toronto 5.
- Apr. 8-10—Eighth International Symposia, Electronic Waveguides, Microwave Research Institute of Polytechnic Institute of Brooklyn Engineering Societies Bldg., 29 W. 39 St., N. Y. C.
- Apr. 14-18—Annual Technical Meeting, American Welding Society, Hotel Statler, St. Louis, Mo.
- Apr. 16-19—14th Annual National Forum, American Helicopter Society, Sheraton Park Hotel, Washington, D. C.
- Apr. 17-18—Institute of Environmental Engineers, Second Annual Technical Meeting, New Yorker Hotel, New York.
- Apr. 22-24—1958 Electronic Components Conference, Ambassador Hotel, Los Angeles, Calif.
- Sept. 1-7—1958 Flying Display and Exhibition, Society of British Aircraft Constructors, Farnborough, England.

New book tells full story of stainless pipe and tubing



**CONTOUR
TRENTWELD**

STAINLESS and HIGH ALLOY
PIPE and TUBING
1/8" to 40" O.D.

TRENT TUBE COMPANY East Troy, Wisconsin

SUBSIDIARY OF CRUCIBLE STEEL COMPANY OF AMERICA

If you use stainless or high alloy pipe or tubing, this new illustrated handbook was written for you. It's 48 pages big — packed with informative data that you'll refer to again and again.

The table of contents is too long to list here, but it includes, for example, analysis and conversion tables, corrosion characteristics, weights, alloy prop-

erties, bending, joining and installation hints.

We can't guarantee how long the supply will last. To be sure of getting your free copy, why not clip and mail the coupon now?

**CONTOUR
TRENTWELD**

TRENT TUBE COMPANY

A Subsidiary of Crucible Steel Company of America
GENERAL OFFICES: EAST TROY, WISCONSIN
MILLS: EAST TROY, WIS.; FULLERTON, CALIF.

Trent Tube Company
East Troy, Wisconsin

Please send me a copy of your new tubing handbook.

Name

Address

City Zone State



TAILORED TO WITHSTAND ENVIRONMENTAL HAZARDS

**Originally introduced as Bendix† Scinseal, this remarkable protective covering for wiring assemblies has achieved wide acceptance because of its versatility and adaptability to virtually any installation condition. Benseal is identical to the product produced under the former name Scinseal.*

If your operations require the use of wiring assemblies which must function in extreme temperature conditions or withstand other environmental hazards, you need the protection of Benseal. It is the perfect protective material for wiring assemblies and usually eliminates the need for metal conduits.

The Benseal process was developed by Scintilla Division of Bendix for

the fabrication of wiring assemblies using polyvinyl sleeving and molded junctions. It is formulated to provide wiring with an air-tight seal against operational hazards and gives the protection you need, whether your problem is extreme heat, extreme cold, fuel and acid proximity or, perhaps, a combination of these factors.

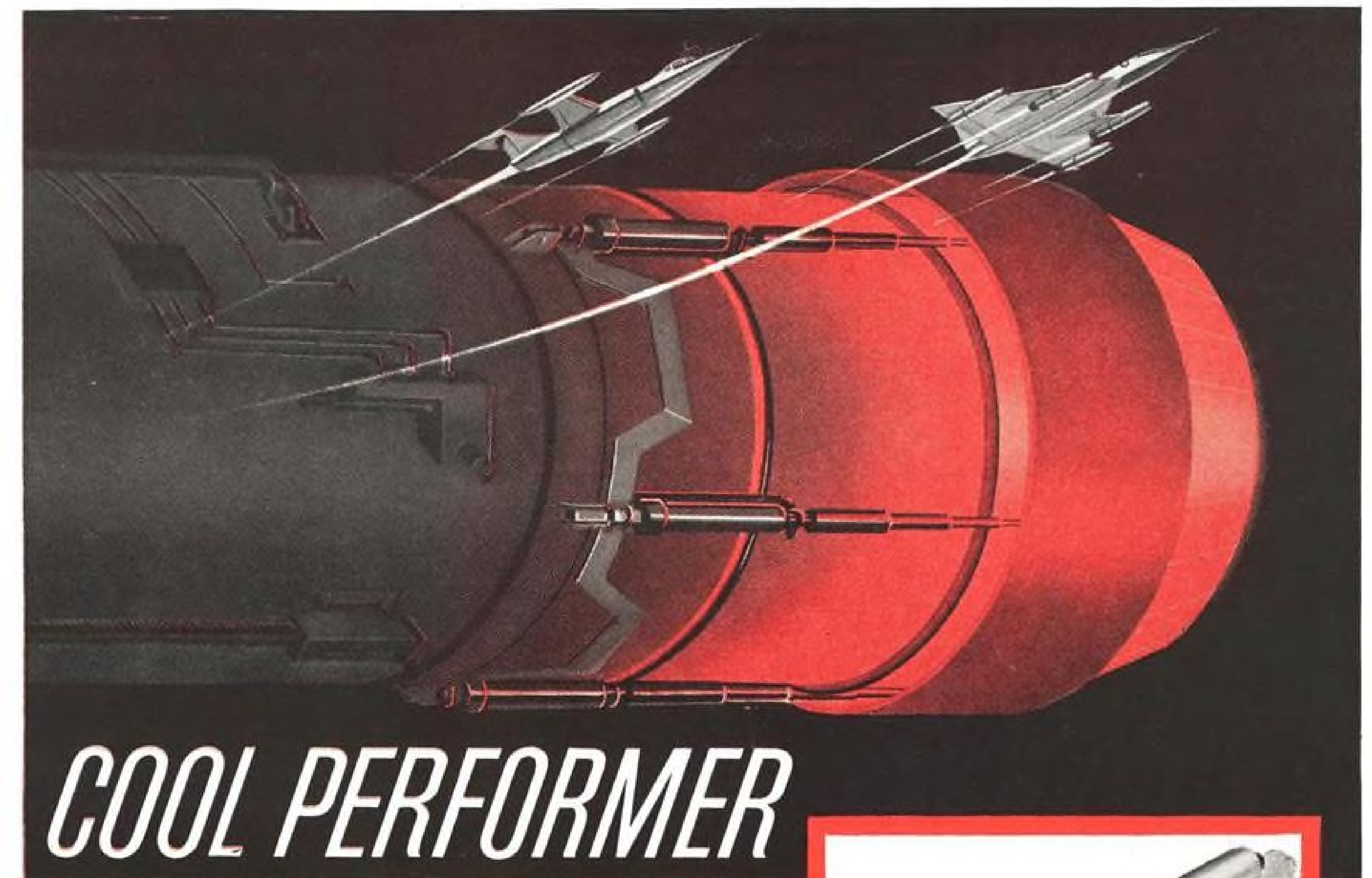
Whatever your wiring assembly difficulties may be, it's a good bet

that Benseal can help you solve them. It comes in varying colors, each indicating a different function, and can also be hot-stamped to provide positive identification. Many electrical connector adapter molds are available, as well as the T's, Y's and variable molds necessary to provide reliable assemblies of any configuration.

Detailed information and data on Benseal are available on request. SCINTILLA DIVISION OF BENDIX AVIATION CORPORATION, SIDNEY, NEW YORK.

†TRADE MARK.

Scintilla Division
SIDNEY, NEW YORK



COOL PERFORMER WHEN THINGS GET HOT

Aeroproducts hydraulic actuators — with exclusive, patented oil flow and seal systems — offer you proved reliability even at 1,000° F.

When a jet pilot calls for afterburners or thrust reversers, response must be instantaneous. That's why Aeroproducts high-temperature hydraulic actuators have been specified for afterburners on the supersonic Lockheed F-104 fighter and Convair B-58 bomber.

And this is only one example of how Aeroproducts' advanced engineering and production know-how is being successfully applied to increasingly critical aircraft accessory requirements.

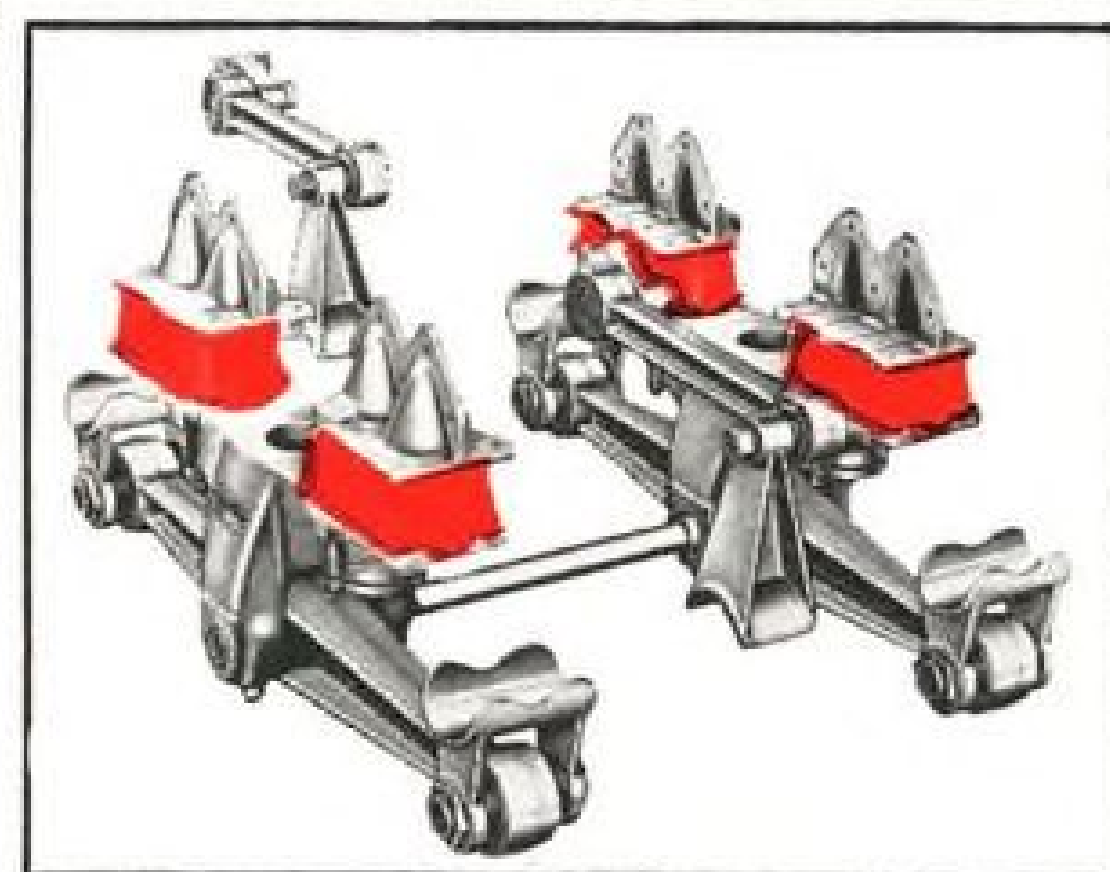


Patented design features of Aeroproducts high-temperature hydraulic actuators offer flight-proved dependability for operation of engine exhaust nozzles, afterburners, thrust reversers, or converging-diverging nozzles at ambient temperatures up to 1,000° F. Available with proved self-locking and synchronizing features.

If you're on a design team for aircraft, missiles or power plants, Aeroproducts stands ready to apply its vast experience to your air-borne actuator, ram-air accessory and turbo-propeller requirements. Write us on your company letterhead for 28-page brochure, "Actuators for Aircraft" and new design catalog, "Aeroproducts Ram Air Accessories."

Building for today... Designing for tomorrow
Aeroproducts
ALLISON DIVISION OF GENERAL MOTORS • DAYTON, OHIO





The unique design of the "load cushion" accounts for smooth, even rides in the full range of loads, empty to full. Enjay Butyl Rubber (in red) made it possible.

ENJAY BUTYL

"LOAD CUSHION"

replaces steel springs in big Tractor Trailers

The "load cushion" is an important innovation in tandem suspension. Developed by the Hendrickson Mfg. Company, it is made of Enjay Butyl and replaces steel leaf springs. Utilizing the great strength and impact resistance of Enjay Butyl, the "load cushion" gives the ultimate in a soft, easy ride within the complete range of loading, from empty to full. Besides giving a smoother, steadier ride, it increases tire mileage, reduces weight and significantly reduces wear and tear on equipment.

Enjay Butyl has proved to be the answer to problems in many fields of industry. It may well be able to cut costs and improve the performance of your product. Low-priced and immediately available, Enjay Butyl may be obtained in non-staining grades for white and light-colored applications. Get all the facts by contacting the Enjay Company. Complete laboratory facilities and technical assistance are at your service.



Enjay Butyl is the super-durable rubber with outstanding resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.



Pioneer in Petrochemicals

ENJAY COMPANY, INC., 15 West 51st Street, New York 19, N.Y.
Akron • Boston • Chicago • Los Angeles • New Orleans • Tulsa

December 23, 1957

Editorial Offices

PUBLISHER.....Robert W. Martin, Jr.
EDITOR.....Robert B. Hotz

ASST. MANAGING EDITOR (TECHNICAL)
David A. Anderton
WASHINGTON.....Cecil Brownlow
NEW YORK.....William Gregory,
Robert I. Stanfield, Harry Raven
LOS ANGELES.....Irving Stone, Richard Sweeney
DALLAS.....Craig Lewis
ENGINEERING.....Robert H. Cushman,
Russell Hawkes, J. S. Butz, Jr.
AVIONICS.....Philip J. Klass, James A. Fusca
CONGRESS.....Katherine Johnson
MILITARY.....Claude O. Witze, Evert Clark
TRANSPORT.....Glenn Garrison, L. L. Doty,
Ford Eastman
EQUIPMENT.....G. L. Christian
BUSINESS FLYING.....Erwin J. Bulban
ART EDITOR.....Lawrence J. Herb
ASST. ART EDITOR.....Robert G. Young
EDITORIAL PRODUCTION.....Jerome E. Kelley
EDITORIAL ASSISTANTS.....Elizabeth M. Hein,
Marjorie Nail, Jerome Bailey,
Edith Walford, Marjorie Todd
LIBRARIAN.....Jeanne Rabsteinek

FOREIGN NEWS SERVICE

EDITOR.....John Wilhelm
LONDON.....William J. Coughlin
PARIS.....Robert E. Farrell
BONN.....Morrie Helitzer
MEXICO CITY.....John H. Kearney
RIO DE JANEIRO.....Peter Weaver
TOYO.....Dan Kurzman

DOMESTIC NEWS BUREAUS

ATLANTA 3.....1301 Rhodes-Haverty Bldg.
CHICAGO 11.....520 No. Michigan Ave.
CLEVELAND 15.....1510 Hanna Bldg.
DETROIT 26.....856 Penobscot Bldg.
HOUSTON 25.....1303 Prudential Bldg.

SALES

ADVERTISING SALES MANAGER
E. P. Blanchard, Jr.
ATLANTA.....R. H. Powell
BOSTON.....A. C. Boughton
CHICAGO and ST. LOUIS.....J. S. Costello,
F. E. Bauman
CLEVELAND.....H. P. Johnson
DALLAS.....Gordon Jones, E. E. Schirmer
DENVER.....John G. Patten
DETROIT.....C. A. Ransdell
LOS ANGELES.....C. F. McReynolds,
D. T. Brennan, D. A. McMillan
NEW YORK.....M. J. Storz,
R. G. Hathaway, R. R. Butera
PHILADELPHIA.....J. D. Willis, W. L. Blanchard
SAN FRANCISCO.....William Woolston

PROMOTION AND RESEARCH MANAGER
W. H. Jack
C. C. Gersna, Asst.

RESEARCH AND MARKETING

Mary Whitney Fenton,
Judith P. Wheeler, Eleanor Di Preta

BUSINESS

BUSINESS MANAGER.....J. G. Johnson
CIRCULATION MANAGER.....T. J. Lucey
PRODUCTION MANAGER.....W. V. Cockren

AVIATION WEEK

Vol. 67, No. 25

New York 36—330 W. 42nd St., Phone: LOngacre 4-3000 (Nights LO 4-3035)
Washington 4, D. C.—National Press Bldg., Phones: NAtional 8-3414, REpublic 7-6630
Los Angeles 17—1125 West Sixth St., Phone: MAdison 6-9351
Dallas 1—1712 Commerce St., Phone: Rlverside 7-5117

European Office—1 rue du Temple, Geneva, Switzerland

Pentagon Girds for New Research Feud..... 18

► Military services are ready to battle for control of R&D with less Defense Department interference.

Executive Losses Pose Threat to Capital..... 28

► Departure of Austin may disrupt sales structure; discouraging financial outlook is blow to morale.

Solid Fuels May Claim Big-Missile Field..... 37

► Grand Central specializes in these propellants, foresees wider uses for them.

MISSILE ENGINEERING

Solid Fuels May Claim Field..... 37
Why Thor and Jupiter?..... 21
Atlas Fired Successfully..... 22
Russians Study ICBM Deception..... 24
Soviets May Strike With ICBM..... 26
First Genie Photo..... 27
Rocketdyne Tests Redstone Engines..... 38
Jupiter Satellite 30 In. Long..... 39
NACA Evaluates Nose Cones..... 41
Booster Rocket Pushes Regulus II..... 44
Thunderbird Strikes Jindivik..... 46
Moon Missile Forecast for 1958..... 46
Fiberglass Trimmer Vanes..... 49
Parachute Brakes Matador..... 50
Titanium Tanks for Missiles..... 55

AIR TRANSPORT

Executive Loss at Capital..... 28
BEA, Industry Cool to Jet..... 29
New Routes Recommended..... 31
Night Coach Fare Cut..... 32
Subsidy No Solution, Smith Says..... 32
Indian Airline Tests Noratlas..... 32
Shortlines..... 33
Airline Observer..... 33
Airline Income Table..... 34

MANAGEMENT

Pentagon Girds for Research Feud..... 18
Congress to Boost Budget..... 19
NATO Cool to IRBM..... 21
Who's Where..... 15
Industry Observer..... 15
Washington Roundup..... 17

AERONAUTICAL ENGINEERING

SR.177's Future..... 56
Republic Developing Drone..... 24
F11F Carries Sidewinder..... 25
F-101 Sets Record..... 27
HUP-2 Lands on Water..... 62
Capt. Kincheloe's Story of X-2..... 65
P-1 Passes Mach 1..... 68
British Will Cut Back Production..... 71
Production Briefing..... 82

EQUIPMENT

American Plans N. Y. Terminal..... 79
N. Y. Opens Idlewild Facility..... 81
NACA Flight-Tests Reverser..... 82
New Aviation Products..... 83

SAFETY

Crash Tied to Check Flights..... 85
Bolt Caused Viscount Crash..... 95

AVIONICS

Florida Grows as Avionics Center..... 74
Print Unit Performs Read-Out..... 76
Expansions, Changes..... 76
Filter Center..... 77

Calendar..... 5
Letters..... 102

EDITORIAL

Voodoo Brings Home the Bacon..... 13

COVER: Republic F-105 Thunderchief undergoes —65F cold weather tests at USAF climatic laboratory, Eglin AFB, Fla. Supersonic fighter-bomber will be flown to Alaska in January for flight and ground tests in cold weather environment. Area-ruled aircraft is 63 ft. 1 in. long, 19 ft. 8 in. high at tail, has 34 ft. 11 in. wingspan (AW Aug. 5, p. 30). Note fin ram air intake for afterburner cooling.

Picture Credits:

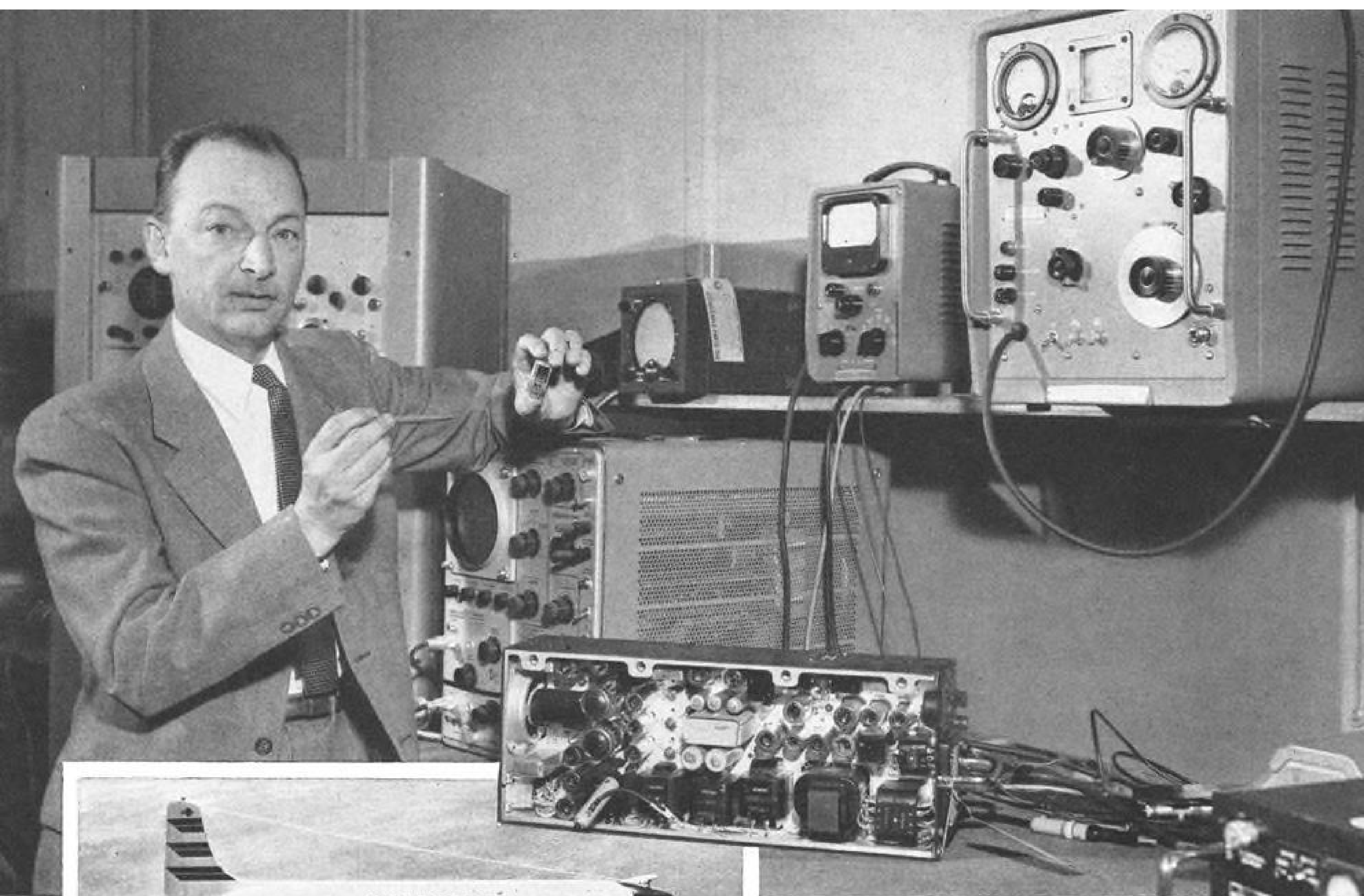
19, 20, 23, 44, 45—Wide World; 93—Sovfoto.

70,038 copies of this issue printed

AVIATION WEEK • December 23, 1957 • Vol. 67, No. 25

Member of ABP and ABC

AVIATION WEEK, December 23, 1957



F. C. Barker, Director of Communications,
Northeast Airlines

Says:

"Reliability and long life are two important reasons Northeast uses G-E 5-Star Tubes!"

"General Electric 5-Star Tubes have proved a sound buy for Northeast. We particularly like their dependability and long life that help us keep communications gear out of the maintenance shop and in the air.

"This saves money. It allows us to reduce the number of electronic units kept in reserve . . . fewer man-hours are logged for tube replacement . . . costly flight delays due to tube troubles are rare. And along with this, don't forget, we need to stock fewer tubes!

"Low tube microphonics is another 5-Star advantage. Shocks and vibration don't affect radio reception. Messages come through loud and clear on all occasions.

"General Electric 5-Star Tubes are doing a top job for us. We know they will help us continue Northeast's record of efficient, progressive service to the public."

* * *

Bring the same tube reliability and long life to your airborne operation! For more information . . . for prompt tube delivery . . . contact your local G-E tube distributor! *Distributor Sales, Electronic Components Division, General Electric Company, Owensboro, Kentucky.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

161-1F3

EDITORIAL

Voodoo Brings Home the Bacon

Heartiest congratulations are due McDonnell Aircraft Corp., Pratt & Whitney Aircraft and Air Force Maj. Adrian Drew for bringing back the official world speed record to the U.S. with a 1,207.6 mph. average speed over the Edwards AFB official record course in the F-101A. This performance when homologated by the Federation Aeronautique Internationale will bring the world speed record back to the U.S. from Great Britain where it has reposed since March, 1956, as a result of the 1,132 mph. performance of Peter Twiss in the Fairey FD.2 Delta research aircraft.

At the time the British recaptured the record from the North American F-100A, we wrote some lines—intended in no way to detract from the superb performance of the Fairey Delta and its pilot—criticizing the U.S. Defense Department policy of refusing to allow U.S. military aircraft to participate in world record breaking efforts.

Long-Time Capability

We noted then that there were already five USAF and Navy planes well along in flight testing that were capable of topping the 1,132 mph. British mark, and the F-101 Voodoo was one of those specifically mentioned.

At that time, some of our British friends were a bit skeptical of our claims, largely on the logical assumption that, if we had such planes, we would waste no time in nailing down the record. They, fortunately, were not acquainted with the ostrich head in the sand policies of the former Defense Secretary Charles E. Wilson or the even more ridiculous public relations policies of his then deputies in this department, Karl Honaman and Robert Tripp Ross.

Consequently, we are delighted to be able to offer concrete proof of our original thesis in the performance of Maj. Drew and the McDonnell F-101A. To get the proper time reference, it should be emphasized that the F-101A has been in service with operational units of the Tactical Air Command for more than a year and was quite capable of its currently recorded performance even longer ago.

Production Line Aircraft

The F-101A that set the record was a standard production line aircraft from an operational fighter-bomber wing of Tactical Air Command. It is armed with cannon and can carry a moderate sized atomic bomb. Although it would be naive to assume that some special "tuning up" was not done on this particular aircraft and its two Pratt & Whitney J57 turbojets for the record attempt, this speed mark was set with an aircraft that is essentially a fighting machine, not a racing craft.

It is also interesting to note the Soviet Union's attempt to get into the world speed record act with a

hasty announcement that one of its fighters reached 1,242 mph. on a routine test flight by Lt. Col. Nicolai Korovushkin. The Soviets did not identify the plane by type but it could have been any one of several new Russian designs without straining our technical credulity. AVIATION WEEK reported as long ago as July, 1956, that the Soviet MiG-21 Faceplate (AW July 16, 1956, p. 33; Dec. 16, 1957, p. 67), which we observed in flight at Tushino, was in the 1,200 mph. speed class. Both the Fishpot delta series of Pavel Sukhoi and the rocket-powered interceptor in Red air force service are also capable of speeds in excess of 1,200 mph.

The interesting angle on the Soviet quick jump into print with Korovushin's unofficial performance was their sensitivity on the international prestige impact of superior technical performance. This was a point the former regime in our Defense Department could never grasp and, as a result, our prestige in this field took a severe and undeserved slump during their five-year tenure.

It is also interesting to note that the Soviets have been steadily filing official claims with the FAI for a wide variety of helicopter world record performances. We would not be surprised to see them make an officially recorded attempt to wrest the absolute speed record away from USAF and the F-101A.

Recapture Altitude Record

There is one other item on the world record agenda that should be dealt with as soon as possible. That is the recapture of the altitude record held by Britain for many years and pushed last summer to 70,000 ft. by a Canberra bomber boosted by two Napier Scorpion rockets.

In this category it must be candidly admitted that, for a long time, we had no aircraft or engines capable of wresting this mark from the British. But we now have at least two fighters that can top the Canberra-Scorpion mark. They are the Lockheed F-104A and the Grumman F11F-1F, both powered by the General Electric J79 turbojet. Both of these aircraft already have flown well in excess of 70,000 ft., and it would breach no genuine military security to permit them to do so for the official altitude record.

We are pleased to see both USAF and Navy taking a more active interest in the prestige of official records. The Navy's splendid performances with its carrier-based Vought F8U-1 Crusader have now been eclipsed by the USAF runs with the F-101A, and both our domestic confidence and international prestige have been bolstered by this spirited and technically sound rivalry. Lets keep it up.

—Robert Hotz

HIGH FLYING FORGINGS

KEY TO FORGINGS SHOWN:

1. Missile Ring Splice...
Aluminum - 54 lbs.
20 inches
2. Missile Rib...
Titanium - 95 lbs.
98.50 inches
3. Missile Fin...
Aluminum 8 lbs.
30 inches
4. Accumulator...
Aluminum - 282 lbs.
30 inches
5. Spar Fin...
Aluminum - 65 lbs.
59 inches

In the Jet — Missile — Rocket Age, dependable forgings by Wyman-Gordon are meeting the challenge of progress. Whether for Defense or in the interest of Satellite Science, there is no substitute for Wyman-Gordon quality, experience and know-how.

WYMAN-GORDON COMPANY

Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM
WORCESTER 1, MASSACHUSETTS
HARVEY, ILLINOIS • DETROIT, MICHIGAN

WHO'S WHERE

In the Front Office

Donald K. Tasker, a vice president, Marquardt Aircraft Co., Van Nuys, Calif.

Stanley Gewirtz, vice president and assistant to the president, Air Transport Association of America, Washington, D. C.

James C. Cupp, vice president and chief engineer, and Arthur B. Mayer, sales manager, Condenser Research Corp., subsidiary of Marathon Electric Manufacturing Corp., Seymour, Ind.

Zeke R. Smith, vice president and director of engineering, Potter & Brumfield, Inc., subsidiary of American Machine & Foundry Co., Princeton, Inc.

Capt. Jack E. Gallagher, vice president-operations, New York Airways, Inc., New York, N. Y.

Tad Stanwick, a corporate vice president, Cleveland Pneumatic Tool Co., Cleveland, Ohio.

Dr. Robert M. Page, director of Research, Naval Research Laboratory, Washington, D. C.

Col. James W. Anderson, Jr. (USAF, ret.), special assistant to the board chairman, The Magnavox Co., Fort Wayne, Ind.

Louis W. Davis succeeds William G. Key as assistant to the president, Fairchild Engine and Airplane Corp., Hagerstown, Md.

Dr. Walter R. Dornberger, technical assistant to the president, Bell Aircraft Corp., Buffalo, N. Y.

Robert J. Norris, administrative assistant to the vice president of engineering and maintenance, Pacific Northern Airlines, Inc.

Honors and Elections

Roy T. Hurley, chairman and president of Curtiss-Wright Corp., has been elected to New York University's Board of Trustees.

Francis L. Hine, president of Airwork Corp., has been elected president of the Aviation Distributors and Manufacturers Association, Philadelphia, Pa., and D. H. Hollowell, of Continental Motors' Aircraft Division, and Paul A. Kennedy, of Southwest Airmotive, have been elected vice presidents.

Changes

Gene Hopkins, manager-Dayton, Ohio, corporate office, The Martin Co., Baltimore, Md.

T. R. Just, administrative engineer-testing division, Engineering Dept., Douglas Aircraft Company, Inc., Santa Monica, Calif.

George E. Ellis, industrial products manager, Stratos Division, Fairchild Engine and Airplane Corp., Bay Shore, N. Y.

Robert D. Davis, manager-marketing department, Research and Advanced Development Division, Avco Manufacturing Corp., Lawrence, Mass.

Thomas S. Mederos, sales assistant to the president, Applied Science Corporation of Princeton, Princeton, N. J.

Richard L. Snyder, manager-semiconductor plant, Sylvania Electric Products, Inc., Woburn, Mass.

INDUSTRY OBSERVER

► Bell BOMI hypersonic glider project (AW Dec. 2, p. 28) would utilize double wall construction to solve problem of aerodynamic heating. Three-quarter inch space between inner and outer walls would be filled with lithium which would be used both as a coolant and as a fuel. Bell has made 652 presentations to the military on this project without obtaining a decision. North American Aviation also is incorporating double wall construction into its X-15 high-altitude research aircraft.

► Lockheed Missile Systems Division is testing approximately 15 different shapes in its Polaris fleet ballistic missile program. The various shapes are now being evaluated as scale models, probably in very high speed wind tunnels. Nose cone tests are being conducted with scale models in shock tubes.

► Airlines, after considerable debate over whether to use JP-4 or kerosene in their jet aircraft, have decided on the latter. Carriers will use ASTM Type A which has a freezing point of -58F. Decision probably will be formally ratified by the technical committee of the International Air Transport Assn. Petroleum company sources say a round figure for the cost of the kerosene in quantity would be 15 cents per gal. This compared to the round figure cost of 18 cents per gal. for 100/130 octane gasoline used in most of today's piston-engine airliners. There also is a tax on gasoline which does not apply to kerosene.

► Inertial guidance system for Air Force Thor intermediate range ballistic missile reportedly can accommodate engine thrust variations several times greater than that of the inertial guidance system used in Army's Jupiter IRBM.

► Sikorsky is cutting metal for a new, company-financed helicopter designated the S-62. Helicopter will have a flying boat hull on the order of the S-61 (AW Oct. 7, p. 23) but will approximate the S-55 in weight class.

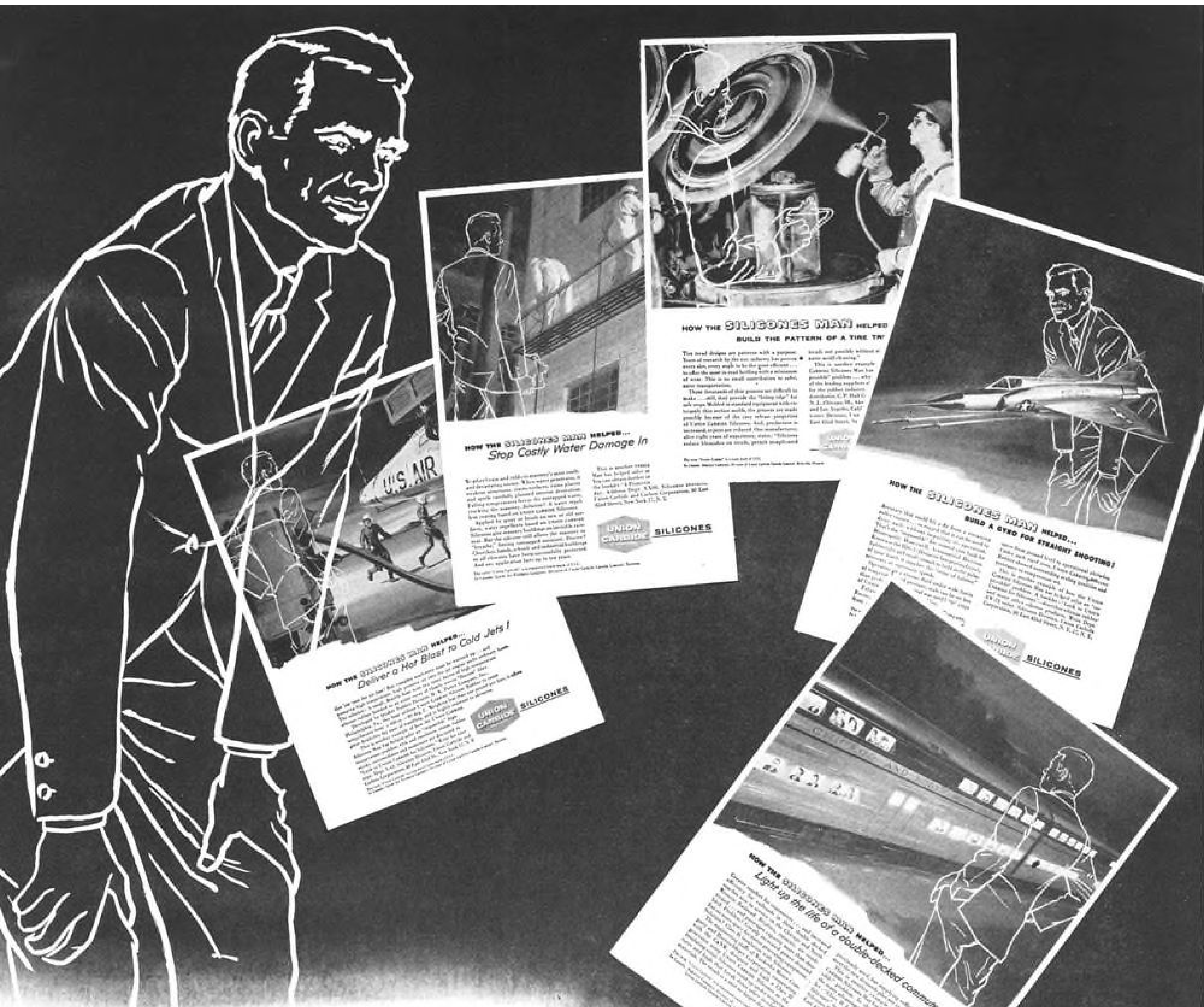
► Two oxidizers are receiving increased attention from rocket propellant research groups. Jet Propulsion Laboratory of California Institute of Technology has purchased 75,000 lb. of nitrogen tetroxide, a very dense liquid which was previously used in 100 lb. lots. Army Chemical Corps has ordered 400,000 lb. of chlorine trifluoride, which is a more efficient oxidizer than those now in use and much easier to handle than fluorine.

► Advance design characteristics of Northrop's T-38 supersonic trainer have been successfully flight tested through use of variable stability aircraft at National Advisory Committee for Aeronautics' Ames Aeronautical Laboratory, Moffet Field, Calif. Variable stability aircraft used for the tests was a North American F-100.

► Sundstrand Aviation Division of Sundstrand Machine Tool Co., Rockford, Ill., has acquired American Machine & Foundry Co.'s Turbo Division in Pacoima, Calif. Turbo Division, one of 16 prime contractors in the ballistic missile program, is building auxiliary power supplies for both ICBM and IRBM projects. Before sale was made to Sundstrand, seven bidders—including Thompson Products Inc.—were involved in negotiations with American Machine & Foundry for purchase of the division.

► Convair B-58 Hustler supersonic bomber suffered landing gear damage recently when brakes malfunctioned on landing at Kirtland AFB, N. M. Aircraft, with pod attached, had taken off on test flight, but failure of telemetry forced the aircraft to return to its base. Touching down at a high gross weight, Convair test pilot W. Winchell rode aircraft down 90% of the runway before running it off the side to avoid more severe damage that would have been incurred by going off the end of the runway. Crew was shaken up but unhurt. Pod, which has a base value starting at \$250,000, was undamaged.

► Douglas' El Segundo Division is developing an airborne missile that will be controllable in flight by pilot of the mother aircraft.



HAVE YOU MET THE SILICONES MAN?

He'll tell you the story of the "impossible" rubber that helps deliver a hot blast to cold jets... or the case of the 3600 mph wind tunnel. Perhaps you'll want him to tell how he helped seal a delicate gyroscope... or show you the brick that floats. Here's a man with a thousand success stories about UNION CARBIDE Silicones.

But the Silicones Man is in reality many men—in sales engineering, technical service, research, and development—all working together as the Silicones Division of UNION CARBIDE. Between them they possess tremendous knowledge about the wonderful world of silicones. There's a Silicones Man in most major cities. Put him to work on your problems today. For a complete description of many silicone products, write for the booklet "Look to UNION CARBIDE for Silicones," Dept. AW-16, Silicones Division, Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.



The term "Union Carbide" is a registered trade-mark of UCC.
In Canada: Bakelite Company, Division of Union Carbide
Canada Limited, Toronto 7, Ontario

Washington Roundup

U. S. Atomic Secrecy

Congress is ready to open the door for disclosure of technical atomic information to NATO nations as a top order of business when sessions begin next month. The 1946 Atomic Energy Act, written in the period of a U.S. atomic monopoly, bans any disclosure.

There appears to be general agreement on a basic first step—remove the legislative ban and make the disclosure of technical atomic information a matter of executive discretion, along with all other types of defense information.

But there are still congressional apprehensions. Controversy over what strings should be attached to this general proposal is expected.

New York's Rep. Kenneth B. Keating, ranking Republican member of the House Judiciary Committee, wants a standardization of security safeguards among the NATO nations as a pre-condition to free interchange of atomic information in the interest of mutual scientific advancement.

A study prepared for the Joint Committee on Atomic Energy by Thomas E. Murray, a former member of the Atomic Energy Commission and now a consultant to the congressional committee, recommends a two-step approach. It says: "In the first phase, the exchange should be limited to technical data on small weapons. The value of withholding this information from friendly nations has diminished to the point where it ought to give way to higher considerations of unity in the common defense. However, there should be a postponement—of three to five years—of the second phase of exchange, which would be concerned with large weapons. The value of secrecy with regard to the science and technology of large weapons still remains paramount, at least for the time being."

Nixon: 'Can Spend'

There is new evidence that Vice President Richard M. Nixon is grabbing the bull by the horns to lead a public education program on the necessity for an all-out U.S. effort in missile and space technology (AW Dec. 16, p. 25).

Nixon made a surprise appearance last week at an Air Force Assn. seminar conducted as a public service to educate newspaper reporters, magazine writers and radio-television men on the mysteries of the missile era. Contrary to the doctrines laid down not many months ago by Republican spokesmen, Nixon said the U.S. "can spend all we need to spend" for national defense. He appealed for full maintenance of the Strategic Air Command until the missiles are ready, refused to fix political blame for U.S. tardiness in the ballistic field.

Nixon created an excellent impression on the press, showed signs of sound preparation for his short speech, which was delivered without notes or text. Most important of all, he exhibited understanding of the military, technical and public relations problems involved in getting the U.S. on the road to progress.

Astronautics Cost

Contrary to the general opinion, Richard Horner, Assistant Secretary of the Air Force for Research and Development, does not believe entry into astronautics involves budget-breaking finances. Horner told the Sen-

ate Preparedness Subcommittee that the work can be done inexpensively.

A small investment, he said, can turn USAF's existing industrial plants, technology and test facilities to the problems of conquering space.

Soviet Trims Bureaucracy

It hasn't been widely publicized, but Moscow has shaken up its ministry organization to facilitate preparations for war. Four ministries concerned with defense production have been abolished and replaced by a State Committee on Defense Technique, headed by A. V. Domrachev, with a rank higher than that of a minister. This is a promotion for Domrachev, who was Minister of Defense Industries.

Possibly even more important is the fact that the Aviation Industry Ministry was wiped out, replaced by a "State Committee" that operates on a higher level. It is headed by Peter Dementyev, former minister of the aviation industry.

Western observers assume the various changes are designed to clear red tape delays, speed weapons to the using commands.

Bilateral Fears

Airlines are becoming alarmed for the third time this year over the manner in which the State Department is negotiating air transport agreements with foreign countries. Current situation results from talks now being conducted with France.

A representative of one U.S. international carrier said U.S. airlines have not yet been informed of just what France is seeking, although the French have indicated publicly that they want a route to the U.S. West Coast and a Polar route to the Orient. The spokesman said the State Department, after standing pat against the awarding of new routes to France earlier, may be willing to "give in" on a West Coast route. The Civil Aeronautics Board is willing to go along with State on that—another puzzle to the airlines.

Another spokesman said last week's apparent willingness to give France at least one additional route could have been "window dressing" for the NATO conference in Paris.

CAB: Space Denial

Civil Aeronautics Board is at least one government agency that hasn't yet bought the idea of space flight. In denying the first recorded formal application for interplanetary space routes, the Board ruled the request premature "since at the present time no commercial equipment is available and there is no indication as to the present feasibility of such service or traffic which might move to points beyond the earth."

The formal application for authority to operate a space carrier between the U.S. and points in the universe was filed recently by Terminal Transports Co. Inc., of Atlanta. The Board chose to follow the examiner's recommendation that pointed out that the applicant failed to designate routes and terminal or intermediate points on the proposed routes. The examiner also emphasized his recommendation was based in part upon the applicant's failure to document the type of space machine he proposed to use.

—Washington staff

Pentagon Girds for New Research Feud

Military services are ready to battle for control of R&D with less Defense Department interference.

By Claude Witze

Washington—New battle over the direction of research talent and funds is under way in the Pentagon with the military services ready to fight for control with less interference from Defense Department monitors.

Military research and development spokesmen in the armed forces already are starting to receive support from some important defense contractors.

The fight may assume proportions that surpass in bitterness and importance the clashes of last spring when the Defense Science Board rebelled against the conservative dictatorship of Frank D. Newbury, the Assistant Secretary of Defense for Research and Engineering (AW April 15, p. 26).

Genesis of the new conflict was an announcement by Defense Secretary Neil H. McElroy that he will establish a new Advanced Research Projects Agency—a single manager to control the anti-missile missile, space flight and other “upstream” projects. This agency, McElroy indicated, will carry on research and development, turning over the new weapons to using commands when they are close to operational capability (AW Nov. 25, p. 26).

Attack by Kimball

Most spirited attack on the McElroy concept was made here last week by Dan A. Kimball, former Secretary of the Navy and now president of Aerojet-General Corp., manufacturer of rocket engines for guided missiles.

“These programs,” Kimball told an American Rocket Society meeting, “are clearly military and the problem of making them operational belongs to the services, not to an Advanced Research Agency. . . .

“Any research agency which would try to supervise all these phases of missile development would only introduce excessive costs, unnecessary delays and inferior end products from the operational point of view.

“What we need is not so much another high level organization as a new kind of organization at high level—an organization which will simplify, not duplicate, the task of reaching an effective solution to our missile problems.

“We need a system which will supervise but not interfere.”

Kimball made it clear he was talking about advanced research, beyond the satellite and anti-missile programs.

At the working level, where the im-

pact of McElroy's decision was slow to be recognized, USAF was the first of the armed services to run afoul of the Defense Department program.

Holaday Raps USAF

Accused of an attempt to “grab the spotlight” in the newly-respectable field of space flight, the Air Force has temporarily withdrawn its order setting up a Directorate of Astronautics in the office of the Deputy Chief of Staff for Development (AW Dec. 16, p. 26).

Charge that the action “jumped the gun” was made by the Defense Department's Director of Guided Missiles, William M. Holaday, before the Senate

Preparedness Subcommittee. Acknowledging that the astronautics field is outside his jurisdiction, Holaday said he still opposes the consolidation of USAF's activity at this time.

Reason given was that the new Advanced Research Projects Agency has not been established nor a director chosen to head it. In the absence of Defense Secretary Neil H. McElroy, in Europe for the NATO conference, Holaday took his case to Deputy Defense Secretary Donald A. Quarles and won immediate support. Quarles said he asked USAF not to establish the new directorate.

In withdrawing the order signed by Lt. Gen. Donald L. Putt, USAF deputy chief of staff, development, USAF called it “premature.” Secretary James H. Douglas declared the action was the result of a misunderstanding and contrary to a promise he had made that nothing would be done until it could be coordinated with the plans for ARPA.

The Air Force Secretary said the purpose of the new directorate will be to serve as a contact with ARPA, but it was not made clear why USAF's consolidation of “upstream” projects must await formation of the new and apparently unpopular defense agency.

USAF Opposition

Almost immediately after the Air Force retreat, witnesses from Air Force headquarters made it clear to the Senate Preparedness Subcommittee that they look with disfavor on Advanced Research Projects Agency.

Even Douglas, asked why all three services need separate research and development programs, pulled no punches in his reply:

“You only get urgent effort from the user and prospective user. You never get effective pursuit except when you have the user expressing the need” and doing the work.

Douglas said he had no objection to having basic research done elsewhere, “but once you move over the poorly defined line to applied research, I would object.”

The Secretary was supported vehemently by his military colleagues.

Said Lt. Gen. Clarence S. Irvine, deputy chief of staff, materiel:

“What we don't need in Washington are more committees, czars, directors, secretaries—we need more decisions from the Secretary of Defense.

Gen. Irvine said the Secretary should hand out roles and missions and, if they are not carried out, “crack heads.”

Gen. Putt, who raised the storm over USAF's new Directorate of Astronautics, was asked by the senators if

he thought a civilian agency should be established to bring new weapon systems into operation. He said “I do not,” and continued:

“As weapons become more complex it is absolutely necessary that the user develop the operational concept, ground handling support, training, preparation of bases, etc.”

The general said he feared a civilian agency to develop prototypes and then show the armed forces what they will do “would stretch out the time instead of shortening it.”

Negative by Schriever

The same point was emphasized by Maj. Gen. Bernard A. Schriever, commander of USAF's Ballistic Missile Division. He said:

“If you ever separate research and development of military weapons from the user, you are going to stretch the time of development.”

Gen. Schriever said he wanted to register with the Senate group “a strong negative against ARPA. This would be a very great mistake.”

In the month that has elapsed since McElroy announced his intention of creating the new single manager agency, there has been almost nothing to clarify his plan or give more details. In his testimony, Holaday indicated that the ARPA office will control funds only and that the armed services will continue to work on their own research and development programs.

This is contrary to the impression given by McElroy a month ago. At that time, he said the single manager will assemble a “fairly substantial sized research and development effort” with “those people who have been working in these areas in the past as the nucleus.”

Need for Decision

On this subject, Kimball, a veteran of many years' experience in the Pentagon, voiced a firm opinion in his speech to the Rocket Society.

The Aerojet president said “we don't need any more overlapping agencies.

“We need decisions—decisions that stick—in the Defense Department.

“We need to have these decisions implemented by the military services, not by a hodge podge of Department of Defense people trying to adjust the military programs.”

Then Kimball spoke about a top-level research and development staff:

“Research and development project management requires a rather large and competent technical and procurement staff.

“Such a staff does not exist in the Department of Defense and obtaining such a staff would be difficult and time consuming.

“A research and development organi-

zation has no place in the Department of Defense, where it duplicates the separate efforts of the armed services.”

Kimball said he wanted to propose a program to “put America on the road to missile supremacy” and replace “the haphazard system we've been using.”

He said the appointment of Dr. James R. Killian, president of the Massachusetts Institute of Technology, as a special assistant to President Eisenhower was a good starting point but “we need more than advice to the President.” Kimball suggested:

- Dr. Killian and his scientific advisers should set missile policy for a Director of Guided Missiles.

- Director of Guided Missiles should be appointed by the President, confirmed by the Senate for a specific period of years. He should work for the Secretary of Defense.

- Only a small staff is needed by the Director of Guided Missiles to direct

the work of the armed services, but not do it for them. The director must not be at the mercy of civil advisers whose opinions can outweigh those of the military men.

The rocket manufacturer said insufficient money is being spent on advancing the state of the art.

Stepping into the current problem of the Thor and Jupiter intermediate range ballistic missile production order, Kimball indicated that he does not believe the Army should be allowed to produce Jupiter for USAF use.

He said the Director of Missiles should have authority to determine types and missions and allocate development and production to the service which will be responsible for operation.

For Congress, he urged a simplification of legislation concerning construction of facilities and procurement methods—to make it easier for industry and government to get together.

Congress to Boost Defense Budget Above Administration Requests

By Evert Clark

Washington—Substantial increase in the Fiscal 1959 military budget—even beyond what the Administration will ask—appears certain as a result of the Senate Preparedness Investigating Subcommittee's extensive look at missile and satellite programs.

Increases are expected to range far outside the missile area to cover aircraft, submarines, warning and detection systems, research, operating funds and personnel.

Major points developed thus far in questioning of military and scientific leaders are:

- Fiscal 1959 budgets have been prepared largely on the basis of fiscal guidelines laid down before Defense Secretary Charles E. Wilson left office, rather than on needs, and reflect little awareness of the Russian threat as evidenced by missile and satellite launchings.

- Major deficiencies exist almost across the board in military programs, especially in USAF's Strategic Air Command and Navy's missile-submarine and anti-submarine programs. Supplemental requests for Fiscal 1958 funds and the planned 1959 budget still do not correct this.

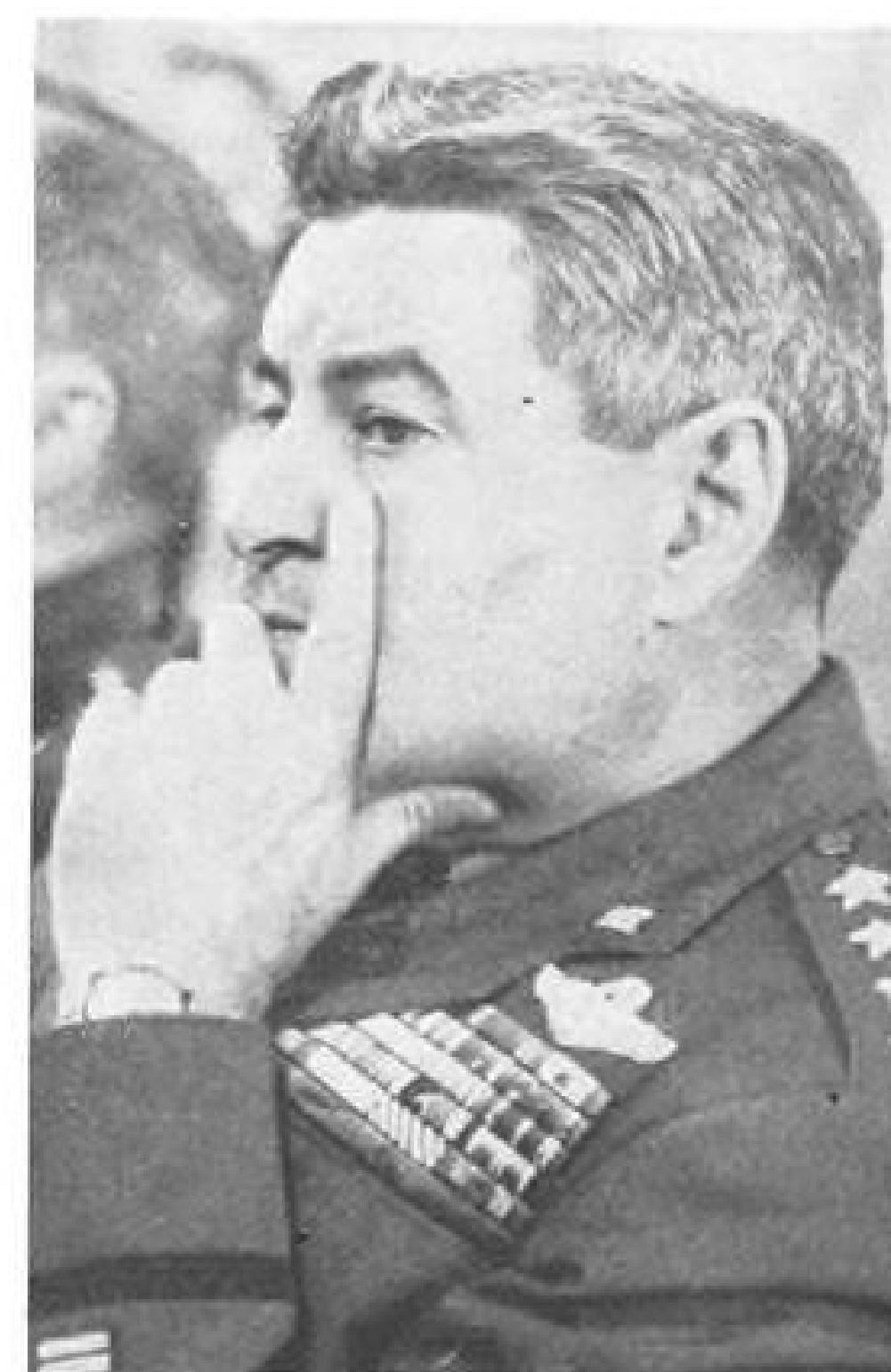
- Subcommittee does not believe the Administration has yet caught the proper “sense of urgency” even though military witnesses were outspoken about harmful effects of fiscal ceilings over the past several years.

- Atlas intercontinental ballistic missile program was accelerated as of last week, but a strong Air Force recom-

mendation for acceleration of Titan ICBM program had not yet been approved by Defense Department when Air Force witnesses testified.

Subcommittee Chairman Lyndon Johnson (D-Tex.) also is Senate majority leader and a member of the Appropriations and Armed Services Committees. He has continually pressed military witnesses for specific answers on their needs and has assured them he will do everything possible to see that the needs are filled.

Republican minority members of the



GEN. CURTIS E. LeMAY



GARRISON NORTON

subcommittee have made few attempts to defend the Administration's budgetary limitations on military programs.

Testimony on the seriousness of the current situation has ranged from mild concern to the statements of Gen. Curtis LeMay, USAF vice chief of staff, that the U. S. probably is ahead of Russia in air striking power right now but probably will not be before war comes.

LeMay Doubtful

"I think we have waited pretty long," Gen. LeMay said. "It is doubtful in my mind whether we can catch up before we have a general war, but I sure want to try."

"Unless we do something and something very radical we will be in an inferior military position with Russia in a very short time. What worries me is while we are enjoying a superior position we are not doing very well . . . in an inferior position, we are going to lose ground very rapidly."

Subcommittee asked some 100 industry and science leaders by letter what bottlenecks they had found in the defense system and what they recommend to remove them.

In addition to a number of recommendations that military research and development—particularly for space flight—be put under a new civilian agency, many of the letters called for a stronger sense of urgency within the Defense Department and the Administration, considerable streamlining of the defense management organization, more freedom for contractors in making technical decisions and long-range funding of research and development instead of year-to-year funding.

Some letters called for a crash program on space flight.

Industry leaders will testify when

hearings resume Jan. 7. Educators also have been asked to submit recommendations for improving scientific and technological training.

Members Dissatisfied

Subcommittee members expressed dissatisfaction with testimony of Defense Department Director of Guided Missiles William Holaday as to what authority he now has and what he is doing to accelerate missile development and production, but they denied reports, printed several days after he testified, saying most of them thought he should resign.

Holaday revealed plans to launch a satellite at least as heavy as Sputnik II's 1,120 lb. but would not give the timetable in open session.

Acceleration of the Atlas, he said, will require more money for Fiscal 1958



JAMES H. DOUGLAS

and "about one third more than was planned" for Atlas in Fiscal 1959.

Maj. Gen. John B. Medaris, chief of the Army Ballistic Missile Agency, said a committee he served on urged development of a 220,000 lb. thrust rocket engine in the summer of 1956 because "we felt we couldn't get away with any more" thrust than that. An engine of "much higher thrust" is "coasting along on an engineering basis" at North American Aviation Inc. now because "nobody can put down their finger today on the specific project for which they need the engine." He urged development of it on "a crash basis."

Dr. Wernher von Braun, technical director of the Army missile program, urged creation of a National Space Agency with a \$1.5 billion budget and a goal of putting man into space and retrieving him within the next five years and establishing a manned space system in 10 years.

He also criticized interference from committees and said he had to visit the Pentagon twice a month and Medaris once a week to justify programs and to talk with committees.

Lt. Gen. James M. Gavin, Army

chief of research and development, urged replacement of the Joint Chiefs of Staff with an "integrated" staff system using three and four-star general officers who would then retire or serve in unified theater commands.

Garrison Norton, Navy Undersecretary for Air, was the most outspoken critic of the "total dollar straitjacket" imposed on the services for the past few years and said it had seriously hampered research, procurement and combat readiness. He said the Secretary of Defense told the Navy to cut its budget, and he assumed the President told the Secretary of Defense what to do. Norton also is responsible for Navy research and development.

Polaris Breakthrough

Other Navy witnesses praised the Polaris 1,500 mi. fleet ballistic missile program highly and said there have been "most significant technological breakthroughs in all areas," including navigation, solid propellants and guidance.

Except for Polaris, which has been greatly accelerated since the Oct. 4 firing of the Soviets' first earth satellite, there has been only slight relief from budget ceilings in research and in aircraft procurement, they said.

Adm. Arleigh Burke, Chief of Naval Operations, called for "more money, men and ships"—especially submarines and anti-submarine equipment. Navy called the Russian submarine-missile threat without parallel in history.

Air Force officials called for more effort in every area, from crews, operational funds, aircraft and dispersal for Strategic Air Command to research on spacecraft, anti-satellite missiles and defensive satellites.

Gen. LeMay said "a majority of SAC



DR. WERNHER VON BRAUN

was grounded for the last five weeks" of Fiscal 1957 for lack of gasoline. Others put more emphasis upon near and far future weapons but most USAF witnesses agreed aircraft, missiles and space problems should share about equal priority.

Gen. LeMay and Lt. Gen. Donald L. Putt, USAF Deputy Chief of Staff for Development, testified the U. S. probably would not detect more than one or two ICBMs if Russia fired them at this country now and said even that would be "accidental."

Putt spoke of "recent" breakthrough in ICBM detection work and said work should proceed as fast as possible on a warning system. He recommended public education on military research problems, streamlining of decision making machinery, and consistent research effort, and said he would have asked for another \$150 to \$250 million for his work if the Fiscal 1959 budget had not had a ceiling.

Maj. Gen. Bernard A. Schriever, commander of USAF's Ballistic Missile Division, said Thor, Jupiter, Atlas or Titan would make perfect boosters to place considerable weights in orbit, or even to fire a rocket to the vicinity of the Moon by 1959.

NATO Cool to IRBM, Warmer to R&D Plan

Paris—U.S. encountered resistance from the NATO countries to its plan to arm Western Europe with intermediate range ballistic missiles and nuclear stockpiles, but a proposal of Secretary of State Dulles for a coordinated research and development program for "a selected group of modern weapon systems" was received with interest.

Limited accord was reached on the IRBMs. The Dulles proposal, not spelled out completely, called for setting up a temporary NATO ad hoc group including scientists and engineers. Among other things, they would recommend a weapon system suitable to the NATO mission and which would be built in Europe.

Cornell Will Direct Reconnaissance Study

New York—Two year study to provide the Army with better battlefield reconnaissance based on radar, infrared, acoustical, meteorological, photographic, television and visual surveillance has been placed under the direction of the Cornell Aeronautical Laboratory in Buffalo, N. Y.

The \$1.5 million contract will secure the services of 35 Cornell scientists. Their function will be to:

- Evaluate present combat recon-

Why Two IRBMs?

Washington—Decision to produce both Army's Jupiter and USAF's Thor intermediate range ballistic missiles is still strongly opposed by the Air Force, testimony before the Senate Preparedness Investigating Subcommittee revealed. Army favors the decision, although USAF will be the user of both missiles.

Subcommittee has spent a large portion of its time questioning Defense Department and service witnesses on the subject. Here is a resume:

- William Holaday, Director of Guided Missiles—"I was playing it safe to give us early availability of a number of missiles." After Holaday made his recommendation, Defense Secretary Neil McElroy briefed President Eisenhower on the plan. Final decision was made Nov. 27 at the White House in a meeting attended by Vice President Richard Nixon, Presidential Assistants Sherman Adams and James R. Killian, Jr., Budget Bureau Director Percival Brundage, Secretary of State John Foster Dulles, McElroy, Deputy Defense Secretary Donald A. Quarles and Holaday.

This prompted subcommittee counsel Edwin Weisl to ask: "Of all these men, how many know anything about missiles?"

Holaday put the extra cost of two programs at about the cost of carrying on the research and development part of one program. He said only 10% of the Jupiters and Thor scheduled for firing have been launched so far.

- USAF Secretary James H. Douglas—Both are satisfactory for production, but Thor will be available in quantity before Jupiter. Cost to produce Thor alone would be some \$200 million less than cost of producing both under the "present operating program."

- Gen. Thomas D. White, USAF chief of staff—"Thor and Jupiter are both fallout from the Atlas program . . . engines in all three systems are Air Force engines."

- Lt. Gen. Donald L. Putt, USAF deputy chief of staff for development—"In addition to two development programs, there are the additional costs of tooling up different lines, somewhat different sets of ground handling equipment, training to handle different systems, a number of parts and pieces doubled up—it is considerably more than just the increased cost of developing two systems."

- Lt. Gen. Clarence S. Irvine, USAF deputy chief of staff, materiel—Air Force does not need the Jupiter. The hundreds of millions of dollars could well have been spent on anti-missile missiles, the X-15 rocket research aircraft, the chemical bomber and other such projects. Accent on Jupiter was to develop a weapon, not a weapon system. Thor has real equipment, "not just pictures and ideas. This stuff is on wheels, and we can drive it around the country—if that is what you want." But Irvine suggested "some people had better look at some pictures of World War II and what targets convoys made." USAF has five plans for moving Thors "and we can do it." Gen. Irvine said he did not agree with the Jupiter-Thor decision, "but I have my orders, and I'm carrying them out."

- Maj. Gen. Bernard A. Schriever, commander, USAF Ballistic Missile Division—Thor is nine months ahead of Jupiter in tooling and 12 months ahead from the production standpoint, and Thor could be further accelerated. Jupiter is too expensive a backup. Thor drew heavily on the Atlas program, and when Thor was started, USAF needed only one additional contractor—Douglas Aircraft Corp.

- Army Secretary Wilbur Brucker—"The progress made during the last two years (on Jupiter) has been an outstanding technological feat for which the Army is justly proud. Never before has so much been accomplished within such a short time on a complex new weapons system. The recent decision . . . is based on the success of this program. It is remarkable that such a decision could be made after such a short period of development."

- Maj. Gen. John B. Medaris, chief of Army Ballistic Missile Agency—No production money has been provided. (Others testified it will appear in a supplemental Fiscal 1958 appropriations request.) Program was started a year after Army recommended it and only after the Killian report urged a 1,500 mi. missile. Project lifetime estimates varied from five months to as low as 45 days as work progressed. Seventy per cent of Jupiter's components are identical to Redstone's. Gen. Medaris doubted development could have gone faster.

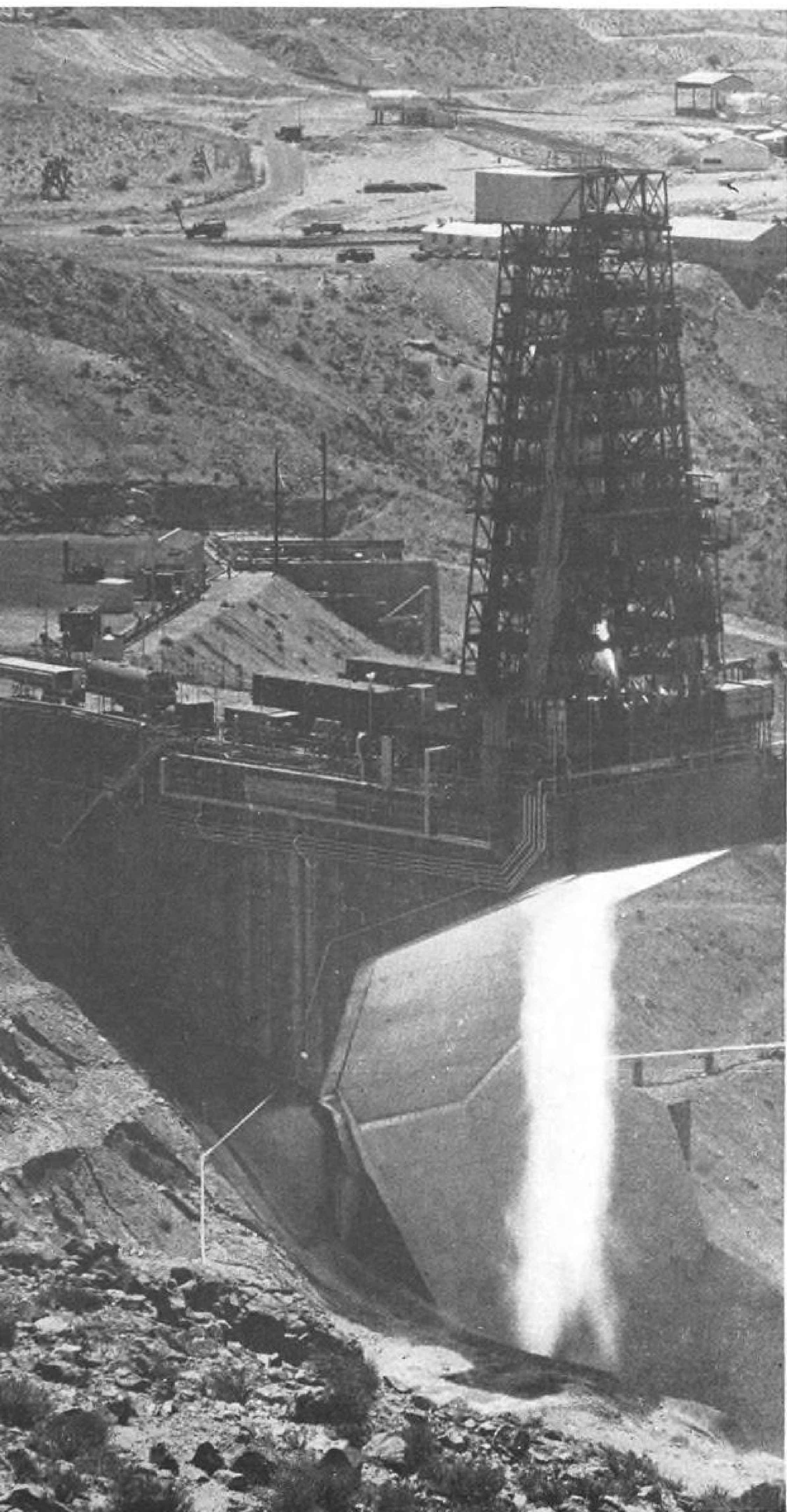
naissance programs within the Department of Defense.

- Review tactics of present and planned reconnaissance procedures.

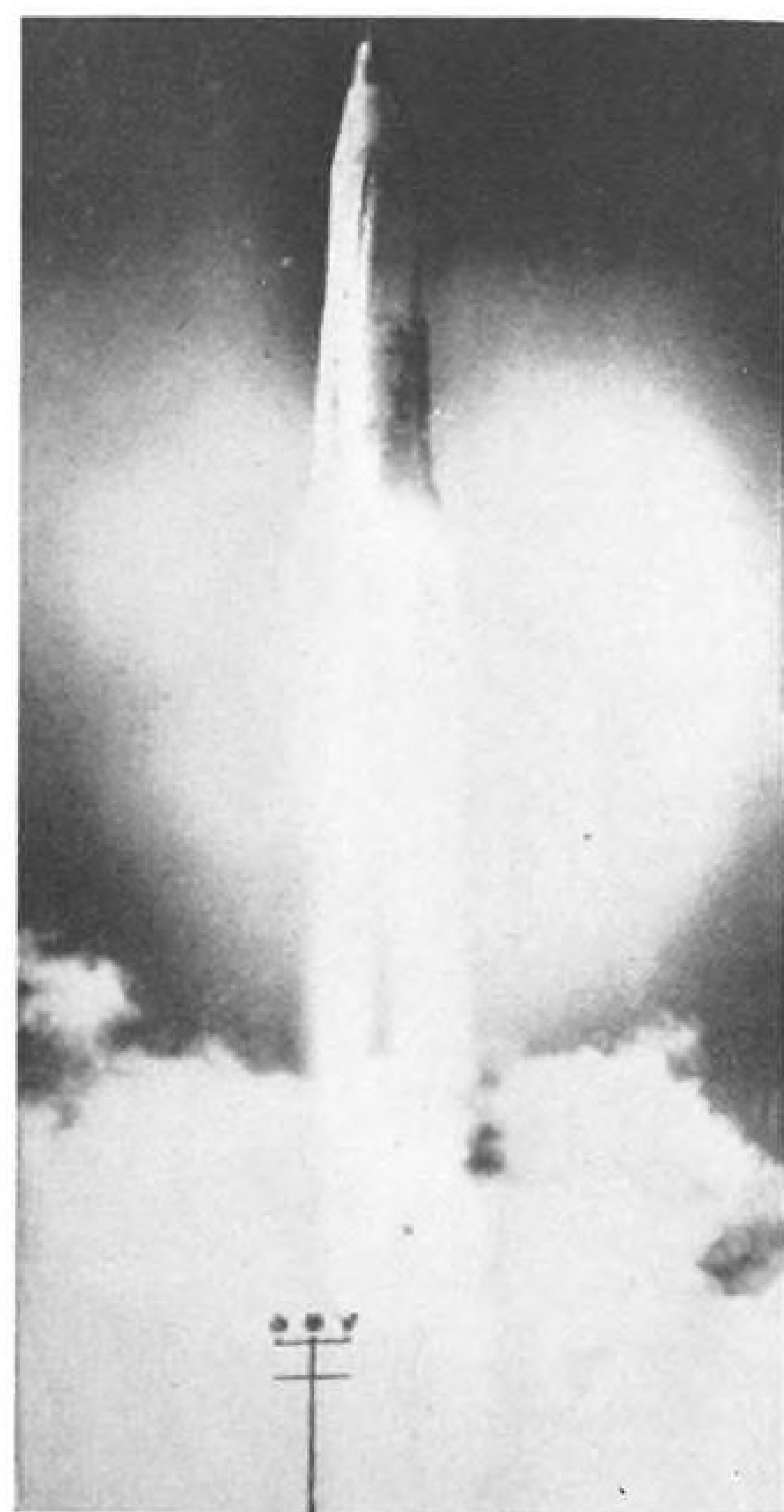
- Devise and recommend new reconnaissance systems and supporting research programs.

Presently stated objectives of the study are to provide battlefield com-

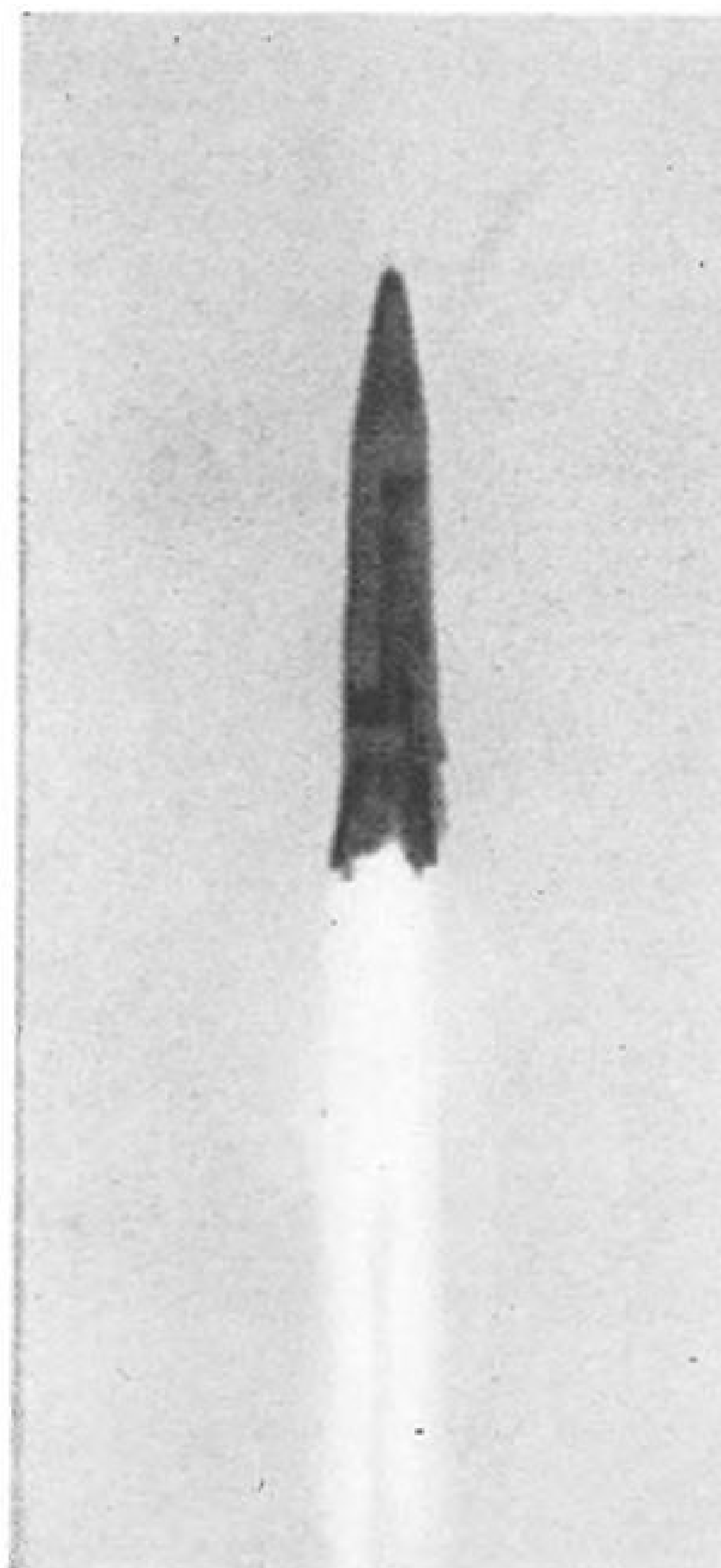
manders with continuous means to scan a large area, locate targets, prepare missile guidance information, fire a missile, and observe the results almost instantaneously. Surveillance packages would be designed to fit into drones and to be carried by high performance manned reconnaissance aircraft such as the Grumman AO-1.



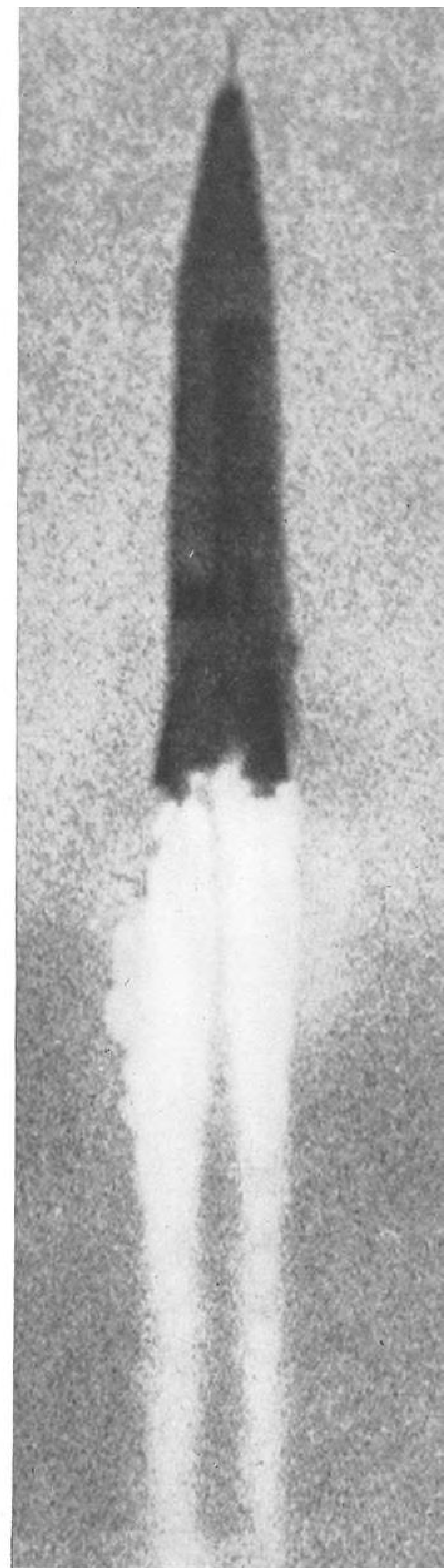
STATIC test firing of Convair Atlas ICBM on stand at Edwards AFB, Calif., shows large flame from main engines, smaller flame above from vernier engine.



SEQUENCE of Atlas firing at Cape Canaveral, Fla., shows details of configuration...



... Clearly visible are twin exhaust plumes of two rocket engines, nozzles of the engines and protrusions on lower end of missile—either plumbing or external guidance package.



ANOTHER detail shown is flared tail of Atlas. Nozzles also show clearly.

USAF Reports

Washington—The USAF-Convair Atlas intercontinental ballistic missile last week made its first successful test launching from the Air Force Missile Test Center at Cape Canaveral, Fla., on the 54th anniversary of the Wright Brothers' first airplane flight.

Only a few hours before the Atlas shoot, J. R. Dempsey, director of the program for Convair, said he was expecting a call from the Defense Department to launch a satellite weighing from 500 to several thousand pounds.

The Atlas propulsion system, Dempsey said, can be adapted for the satellite in less than a year.

The Florida test, announced at the Pentagon, was not a full flight over a 5,000 mile course. The Atlas was reported to have flown a little less than 500 mi. for a test of certain components. The results were satisfactory.

The missile had failed on two other attempts, in June and September.

Speaking at a missile seminar held by the Air Force Assn., Dempsey esti-

Successful Atlas Launching

mated that the unit cost of the Atlas, once it is in production, will be about \$2 million. This is without consideration of the money invested in research and development.

Maj. Gen. Bernard A. Schriever, commander of USAF's Ballistic Missile Division, told the Senate Preparedness Investigating Subcommittee the day of the firing that he is completely confident the Atlas nose cone problem has been licked, based upon exhaustive ground tests and tests with the X-17 missile.

He also indicated guidance and propulsion problems are well in hand.

The Atlas' vernier engines also reportedly operated satisfactorily during last week's firing.

Atlas is 80 ft. long and 10 ft. in diameter (AW Sept. 2, p. 28). Its two Rocketdyne booster engines produce 165,000 lb. thrust each and the sustainer develops 65,000 lb. thrust.

Design features include a corrugated, blunt nose cone to solve the re-entry heat problem and an external guidance

package, visible in some of the photos. Length of the nose section, including corrugations, is 9 ft.

Action Log

Washington—Here's the action announced by the U. S. last week in its battle to challenge the Soviet Union's technological-propaganda lead:

- Ordered acceleration of Atlas intercontinental ballistic missile program. Administration will submit supplemental appropriation bill to Congress to cover the Fiscal 1958 acceleration. Atlas funds for Fiscal 1959 will be approximately one-third greater than planned.
- Atlas test vehicle makes first successful launching.
- North Atlantic Council agrees in principle with U. S. plan for equipping NATO countries with intermediate range ballistic missiles. Under the compromise, countries who do not want the bases can refuse them although they may have signed the agreement.

Russians Study ICBM Deception By Fragmentation of Final Stage

Russia's missile scientists reportedly are investigating a technique for assisting their intercontinental ballistic missiles to penetrate this country's missile defenses by confusing defending anti-missile radars and computers with large numbers of decoy warheads.

Technique is to separate the missile's final stage rocket from its warhead somewhere near apogee and blast the rocket casing, fuel tanks and motor into fragments with a high explosive charge. Fragments will disperse for miles in front, behind and on all sides of the warhead, with many of the fragments making better radar targets than the warhead itself.

United States scientists developing the Army's Nike-Zeus and Plato and the Air Force's Wizard anti-missile systems have expected Soviet efforts in this direction and are extremely concerned about finding counter techniques. They have been handicapped, however, both by lack of funds and by restrictions placed for security reasons on communication between groups working on closely related parts of the problem.

Counter Techniques

The problem of finding methods of countering decoy warheads is serious. At the extreme altitudes where the final stage rocket would be fragmented, the very thin solar atmosphere would not slow the decoy fragments appreciably.

They would maintain about the same relative velocity as the warhead until slowed by re-entry into the heavier atmosphere about 25 mi. from the target. Also, they would be distributed over an area of several thousand square miles both forward and behind the warhead.

There are three approaches to countering this type of decoy:

- **Detection at re-entry.** The heavier mass of the warhead will cause it to maintain a higher relative velocity through re-entry. The problems, however, of determining which target is the warhead and its interception point, plus launching and guidance of an anti-missile missile against the warhead, approaching from about 25 mi. away at a speed near 15,000 mph., are enormous.

- **Detection prior to decoy launching.** If the approaching missile can be detected and tracked for long enough to compute its trajectory before fragmentation of the rocket, the target following the original elliptical trajectory could be presumed to be the warhead. This technique, however, implies a degree of cooperation from the Soviets that it might not be reasonable to expect.

- **Detection by target analysis.** There have been several proposals both to the Army and Air Force as to methods for analyzing radar return signals from all targets to determine which target is the warhead. To date, no contract has

been let for study of any of the various proposed counter techniques.

Security restrictions have seriously handicapped the interchange of information between groups working on the anti-missile missile problem. At least one group of scientists attempting to solve the missile interception problem was not informed of classified National Advisory Committee for Aeronautics reports, published more than two years ago, that describe methods for maneuvering and extending the range of warheads by utilizing the glide potential of a cone shape at speeds above Mach 5.

Their first knowledge of these reports came after declassification from an article appearing in AVIATION WEEK (Nov. 11, p. 26).

Sophistication Needed

A weapon system that would effectively counter an incoming enemy ballistic missile "would be the most difficult development of all time," former Assistant Secretary of Defense Dr. C. C. Furnas told a recent meeting of the American Ordnance Assn., "but a successful result would be so important that the project should be pursued vigorously." All of the problems for the development of such a system have not been solved.

Scientists and military planners working on the problems of missile defense say that much basic study remains to be done. New and highly sophisticated techniques for detection, computation and guidance are mandatory. An effective missile defense system must measure in seconds the time between detection and destruction of any incoming intruder.



F11F Carries Sidewinder, Area Rule Tanks

Navy Grumman F11F-1 fighter is shown carrying Sidewinder infrared air-to-air missiles and low drag, area ruled fuel tanks under the wing. The auxiliary fuel tank installation was specifically included as a part of the area rule application to the basic aircraft. Sidewinder weighs 155 lbs. is produced by General Electric and Philco, and is in operational use.

Joint Atomic Energy Committee Asks Nuclear Plane Acceleration

By Katherine Johnsen

Washington—Joint Atomic Energy Committee is still dissatisfied with the actions taken to accelerate the U.S. missile and nuclear propulsion programs. The move is another indication of the firm hand Congress will take in directing defense policy in the coming session.

"Much more remains to be done," Rep. Carl Durham (D.-N. C.), chairman of the committee, and Sen. Clinton Anderson (D.-N. M.), vice chairman, wrote the President.

They said, however, they were "pleased to note a somewhat greater recognition by the executive branch of this challenge" posed by Russian advances.

The committee specifically urged President Eisenhower to expand present programs for development of nuclear propelled rockets and aircraft.

Pointing out the military advantages of a nuclear-powered aircraft as a mobile platform for intermediate range missiles, the committee added:

"In terms of world opinion, the psychological advantage of getting the first nuclear propelled plane into the air would be great and perhaps crucial to American scientific prestige."

The Administration recently followed the committee's recommendation in

centralizing control of nuclear aircraft projects under USAF Maj. Gen. Donald J. Keim (AW Nov. 25, p. 28). But, the committee said, further action "in improving program support for efforts to get a prototype flying as soon as possible" is necessary.

Rep. James Patterson (R.-Conn.), a committee member, protested that: "This year \$100 million was indiscriminately slashed from the nuclear aircraft engine development program and the whole project was down-graded. . . . It was a colossal error. . . ." Patterson promised to push for "a bare-knuckle investigation" by the joint committee next month if the Administration fails to restore the funds cut from the atomic aircraft program to keep under a budget ceiling. This included a sharp reduction in the nuclear aircraft engine program of Pratt & Whitney (AW Aug. 19, p. 34).

The committee urged "full utilization" of the manpower and facilities of the Atomic Energy Commission's Los Alamos and Livermore laboratories in the nuclear rocket development program and asked President Eisenhower to report on steps planned in this direction.

The need for additional facilities for production of atomic weapons also was emphasized. The committee urged that "the Joint Chiefs of Staff revise its

method of estimating future requirements in order that these estimates be based on actual projected military requirements rather than being dependent upon AEC available production."

Meanwhile, two top leaders who influence sizable blocs of votes reflected the divergent outlook in Congress.

- **Sen. Lyndon Johnson** (D.-Tex.), majority leader and chairman of the Preparedness Subcommittee now moving forward with a comprehensive investigation of the missile-satellite program (AW Dec. 2 p. 31), called for an all-out spirit of urgency "in stepping into the age of space."

- **Sen. Harry Flood Byrd** (D.-Va.), chairman of the Finance Committee and a high ranking Democrat on the Armed Services Committee, cautioned against any "extravagances" that might affect the country's economic stability.

"Certainly, neither our total governmental expenditures nor our total taxes can be further increased without weakening our economy in inflation and by dangerously stimulating deterrents to increased national production," Byrd warned. "We cannot afford nonessentials in military programs"—or other programs.

Johnson declared that "there is something much bigger and more important in front of us than a few pieces of military hardware"—such as missiles or satellites. "What is really before us is a new frontier—a new age. . . . Rockets to the moon are just over the horizon. Space ships are only a few years away. . . . The scientists are already talking in serious terms about the day when we



Republic Developing Army SD-3 Surveillance Drone

Model depicts all-weather SD-3 surveillance drone which is being developed by Republic Aviation Corp.'s Guided Missiles Division for the Army Signal Corps under a \$5 million contract for development and production of the SD-3 and a more advanced jet version of the drone. Vehicle is designated an unmanned flying and spying machine and is called the first of its kind. Army says the SD-3 uses advanced surveillance sensory devices and is equipped with three different interchangeable nose units for performing photography, radar or infrared missions. Drone can be launched at zero length with jet-assisted takeoff, and is reported to be recoverable.

will escape the solar system and explore the universe."

Johnson outlined five steps the U.S. should take:

- "First, we must step up the development of the weapons which will assure our survival.
- "Second, we must revise our methods of teaching and our curricula so that science and technology are no longer ignored.
- "Third, we must mobilize our popu-

lation to face the challenge, tapping the now unused reservoirs of talent and ability among people who are retired.

- "Fourth, we must step up our research into the physical and biological problems of outer space—perhaps through a space academy.
- "Fifth, we must lodge—either in a new or an existing agency—specific responsibility for the physical, economic and legal problems of exploring outer space."

Power Says Soviets May Strike With Sufficient ICBM Potential

Washington—The chief of the Strategic Air Command warned last week that Russia will attack the U.S. "when they think they are stronger than we are."

Gen. Thomas S. Power indicated the Soviets will consider it time to strike when they have a large stockpile of operational strategic missiles. Most informed observers expect Russia to have this capability by the end of 1960.

Gen. Power, commander of USAF's long range bombers, said he believes SAC today is strong enough to discourage the Soviets from starting a general war. But he warned that the situation may change as Red production of strategic missiles continues.

Blunt Warning

In an address to an Air Force Assn. seminar on guided missiles, Gen. Power gave the bluntest evaluation of Soviet military objectives of any military commander in recent years. His speech, approved by the State Department, was read for him by Lt. Gen. Francis H. Griswold, vice-commander of SAC. Gen. Power's text said, in part:

"It is my considered opinion that as this stockpile (of Russian missiles) grows, so does the threat of general war. . . . The United States has been and still is their major obstacle. It, therefore, stands to reason that the Soviets will make every effort to eliminate that obstacle as soon as they have attained—or believe they have attained—the capability of doing so with impunity.

"Possession of a large stockpile of operational strategic missiles may well give them the conviction that they have attained that capability."

The General pointed out that dictator nations never build a military establishment without using it. He said a realistic appraisal of the Russian machine makes it clear it will be used for aggression against the United States, with no possibility that moral considerations would divert Russia from the horrors of nuclear war.

"They will initiate aggression as soon

as they consider it expedient to do so," Gen. Power said, adding that "the Soviet rules will accept even sizable losses in Russian lives and property as long as such losses will not jeopardize their own positions and welfare or impair the achievement of their goals."

'Initiate Aggression'

Our answer to the Russian threat, Gen. Power said, must be a continued power of deterrence. He sees four major difficulties to maintaining this power:

- Rapid advances in technology.
- Improvement in Soviet aerial defenses.
- Vulnerability of SAC bases to attack.
- Decrease in warning time.

Already deep in the missile business, SAC's commander said it still is difficult to predict how long it will take for the integration of the new weapons into the Air Force arsenal. He added:

"If our current bombers—the B-47 and B-52—should become obsolete and, therefore, incapable of performing strategic missions against the odds created by advanced technology, before their places can be taken by well-proven missile forces, the resulting gap will weaken our military strength-in-being to such an extent as to actually invite aggression."

At the same time, the General discounted the strategic missile as the "ultimate weapon." He said it has yet to prove itself and that a mixed force of missiles and manned bombers will be used for the "foreseeable future."

Russian Air Defenses Called Threat to SAC

New York—Russian chances of neutralizing the Strategic Air Command rest with improving their air defenses rather than with IRBM and ICBM weapons, in the opinion of Walter Dornberger, former chief of German V2 development and other missile projects.

Soviet air defense system of fighters and missiles is currently a potent quan-

Solid Propellant Interest

Air Force has suggested that Phillips Petroleum Co. negotiate with a total of five companies regarding possible affiliation with Phillips' solid propellant activity. The suggestion stemmed from USAF's desire to have Phillips associate its solid propellant work with a firm housing an overall systems and manufacturing capability in the rocket field.

Phillips already is negotiating with North American Aviation's Rocketdyne Division. Other companies on the list:

- Aeronutronic Systems Inc.
- Olin Mathieson Chemical Corp.
- Goodyear Aviation Products Division.
- Thiokol Chemical Corp.

Agreement between one of these companies and Phillips probably would lead to the formation of a separate company owned jointly by both firms. Aerojet-General also was interested in negotiating with Phillips, but USAF reportedly considered the company sufficiently busy with solid propellant work.

tity and Dornberger estimates that its improvement rate is so rapid that within three to five years SAC will have virtually no chance of attacking Russian targets successfully with its present equipment.

Dornberger cites the great difficulties of launching ballistic missiles on a precise time schedule in his contention that it would be almost impossible to destroy all SAC bases and refueling stations simultaneously with these weapons. He believes that a large number of SAC bombers would become airborne after the first warning of such an attack and the Russians would have to depend on their air defense system to save themselves. Dr. Dornberger, who is presently technical assistant to the president of Bell Aircraft Corp., made his points at a recent luncheon at the Overseas Press Club here.

Dr. Dornberger agrees with many experts who have become vocal since the Sputnik launchings in that the greatest need of our missile program is to have strong leaders invested with complete authority over their projects.

He goes further in stating that we should have engineers and not scientists running the ICBM and IRBM projects because they are nothing more than engineering jobs. The necessary knowledge is available to carry them through to completion and the weapons are simply waiting on decisions in his opinion.

Dornberger also commented on the U.S. failure to offer European science a close and active partnership in our defense program. He said that several years ago the U.S. engaged in what was considered by Washington to be a strong attempt to enlist prominent



MB-1 Genie Loaded on F-89J

Practice Douglas MB-1 Genie atomic warhead air-to-air missile is shown before being attached to pylons on Northrop Scorpion F-89J at Vincent AFB, Yuma, Ariz. Genie has four fins with sloped leading edges, horizontal tips and vertical trailing edges for free flight stabilization. The MB-1 travels about 9,000 ft. under power, propelled by an Aerojet-General solid fuel rocket (AW July 29, p. 33). Note Canadian insignia on uniform of man at right.

European scientists and engineers for the U.S.-sponsored work. The proposed work required a low level of competency and allowed no exchange of ideas or data concerning the more advanced phases of weapon problems with U.S. scientists.

There was another equally disturbing aspect of the U.S. proposals, according to Dornberger. He found that the representatives of this government who tried to enlist the Europeans were 99% intelligence agents with no scientific background who were primarily interested in completing their dossiers on the foreign scientists.

World Speed Mark Set by F-101 Voodoo

Washington—Thompson Trophy, top U.S. aviation speed prize, was presented last week to a USAF pilot for setting a world record of 1,207.6 mph. over a measured course.

Winner was Maj. Adrian Drew, commander of the 481st Fighter Bomber Squadron, 27th Fighter Bomber Wing, Bergstrom AFB, Austin, Tex. His air-

craft was a McDonnell F-101A Voodoo powered by two Pratt & Whitney J57 turbojet engines. The record was set over a measured course at Edwards AFB, Calif.

Drew's flight toppled two old records. Previous world speed record of 1,132 mph. was set in March, 1956, by a British Fairey Delta research plane. The official U.S. record, which won the Thompson Trophy last year, was 1,015 mph. It was set by Comdr. R. W. "Duke" Windsor in a Chance-Vought F8U-1 also powered by the J57.

The USAF flight was made over a course measuring 10.1 mi. with a 65 mi. approach on either side. It was flown at an altitude of 39,000 ft. in a temperature of -63 degrees. There were two clocked runs, from west to east and east to west. On the first run, the speed was clocked at 1,212.8 mph. and on the second at 1,202.5 mph. for an average of 1,207.6.

Called "Operation Fire Wall," the test followed "Operation Sun Run," in which the F-101 set three new coast-to-coast speed records.

In addition to the Thompson Trophy, other awards presented last week at the

annual Wright Day Dinner of the Aero Club of Washington were:

- Collier Trophy to Charles J. McCarthy, chairman of the board of Chance-Vought Aircraft, and Vice Admiral James S. Russell, former chief of Navy's Bureau of Aeronautics. The prize was given for development of the F8U-1 Crusader, Navy's fastest fighter.
- Wright Memorial Trophy to Sen. Stuart Symington (D.-Mo.), former Secretary of the Air Force, for his continued service to the cause of airpower.
- Frank G. Brewer Trophy for contributions in the field of youth education and training, to Edwin A. Link of Link Aviation Inc. for his work on training devices.
- General Electric Aviation Trophy to Capt. Roger E. Sheridan, USAF, for the crew of a Boeing B-47 jet bomber that won "Le Prix des Trois Capitales" race held in connection with the Paris Air Show last May. The aircraft, from the 529th Bomb Squadron of the Strategic Air Command, flew 2,346 mi. in four hours, 12 minutes and seven seconds at an average speed of 558 mph. The course ran from Paris to Madrid and Rome and back to Paris.

AIR TRANSPORT

Executive Losses Pose Threat to Capital

Departure of Austin may disrupt sales structure; discouraging financial outlook is blow to morale.

By L. L. Doty

Washington—Capital Airlines is undergoing a major top-level staff shakeup that may result in the resignation of at least five of the company's highest-ranking sales officials.

The possible break in Capital's sales structure is the direct result of the recent resignation of James W. Austin as vice president-traffic and sales to accept the presidency of Northeast Airlines (AW Dec. 16, p. 41).

Within 24 hours after Austin's resignation, Nelson Fry, Capital's assistant vice president-traffic, announced his decision to follow suit and accepted an offer to join Northeast as vice president of traffic and sales.

At least three more of Austin's closest aides are known to be seriously considering offers to move into top-ranking positions within Northeast's sales department. Two other sales staff members have definitely declined to make the switch.

Austin Denies Rift

Austin categorically denies that any rift at management level is behind his decision to take a significant part of his staff with him to Northeast. He told

AVIATION WEEK that he accepted the Northeast post because the carrier needs a "real sales job" if it is to make a successful bid for a larger share of New England-Florida traffic.

Austin is well known throughout the industry for his effective sales and promotional campaigns and is credited with having spearheaded Capital's introduction of the first domestic aircoach service in the U. S. He was an active participant in the acquisition of Capital's fleet of turboprop Vickers Viscounts and directed the advertising and sales programs that accompanied the inauguration of regular Viscount service.

Management Breach

During the past year, strong differences of opinion within the carrier's top management group have caused sharp breaches between major departments, including sales. Discouraging financial prospects have intensified the strained atmosphere and at least one attempt was made by an executive within the past six months to capture a more powerful management position through a realignment of officer rank.

Although any such move has been successfully rebuffed and management has presented a unified front, internal

differences have filtered through to the outside, resulting in a lowering of personnel morale. The threatened departure of the sales staff members is symptomatic of a morale problem that began when it became evident the Viscount was not the panacea it was expected to be.

Austin's leaving probably will not cause any significant change in management structure, but it will have a deep effect upon the company's sales programs since he virtually dictated sales policy. As both a director and officer of the company, he has been a powerful force in Capital's growth pattern during the past 10 years.

However, present financial troubles have forced management to focus attention on steps toward increasing efficiency in operations and maintenance performance and to stress austere economy in other activities. The resultant de-emphasis on sales undoubtedly has had an effect on Austin's influence in the management group.

Financial Hazards

Capital ran into financial difficulty shortly after it began operation of its Viscounts in 1955. That year its net income before special items, including the gain on sale or exchange of aircraft, was only \$135,000; the following year, that figure had deteriorated into a \$3.7 million loss.

The airline now forecasts a \$7.5 million net loss for 1958, \$8.7 million in 1959 and \$10.9 million in 1960 if no additional equipment is added to its present fleet and the fare structure remains the same. There are no plans for the purchase of additional turbine equipment, although the airline would like to move into a program involving the acquisition of 18 turbojet transports.

An order for 14 de Havilland Comets was canceled last spring (AW May 13, p. 39) because of an unwillingness to take on additional debt obligations at its present unsatisfactory earnings rate.

Capital does not now intend to seek financing for the purchase of new equipment, although an attempt to renegotiate its Viscount loans with Rolls-Royce and Vickers-Armstrongs under more favorable terms is under way.

The airline would like to dispose of its 12 Constellation L-49s but has found no satisfactory market for their sale. However, proceeds from any such sale cannot be used for new equipment since, under the terms of its present loans, the funds would have to be applied to the reduction of current indebtedness.

In a move to help rescue Capital from its impending financial crisis, the board of directors last summer named USAF Maj. Gen. David Baker, retired director of procurement and production for the Air Materiel Command, as the airline's president (AW July 29, p. 39). Former President J. H. Carmichael was made chairman of the board.

Baker, thus far, has been unable to arrest the airline's downward financial trend and, since his appointment, Capital has been forced to request the Civil Aeronautics Board for a return to a subsidy status (AW Nov. 11, p. 39).

Baker is now directing all company activities. He has made no major changes in the airline's organizational structure and has successfully buffeted any individual bids for more power within the organization. Carmichael continues to guide policy but, in recent months, has taken a substantially less active part in the airline's operation. As yet, neither Baker nor Carmichael is prepared to make any statements on the reorganization of the sales department. It is unlikely that the sales department, once it is re-established, will carry the influence within the hierarchy that it bore under Austin.

Austin has consistently operated

under a rigid budget. For example, during the first six months of 1957, Capital spent .65 cents per passenger on advertising and publicity expense as compared with \$1.02 per passenger for American Airlines. The wide spread in expenditures held Austin to less desirable outlets than those used by American but he, nevertheless, was able to sustain a continuous impact in his promotional campaigns.

Since Northeast operates under a strict budgetary policy, Austin apparently plans to re-establish a program at Northeast similar to his Capital program, using personnel who have worked under his tutelage at Capital.

BEA, Industry Both Cool to Jet, Airline Will Soon Agree to Order

London—British European Airways decision on its 1964 short range jet transport is expected any day now after months of delay.

Choice will be made from among three final design proposals: Bristol 200, submitted by Bristol Aeroplane Co.; DH 121 from de Havilland Aircraft Co., and the Avro 740 from A. V. Roe and Co. Expected quantity of the order is about two dozen airplanes.

The prospective purchase presents a double paradox: BEA didn't particularly want short range jets and British manufacturers don't particularly want to build them for BEA alone.

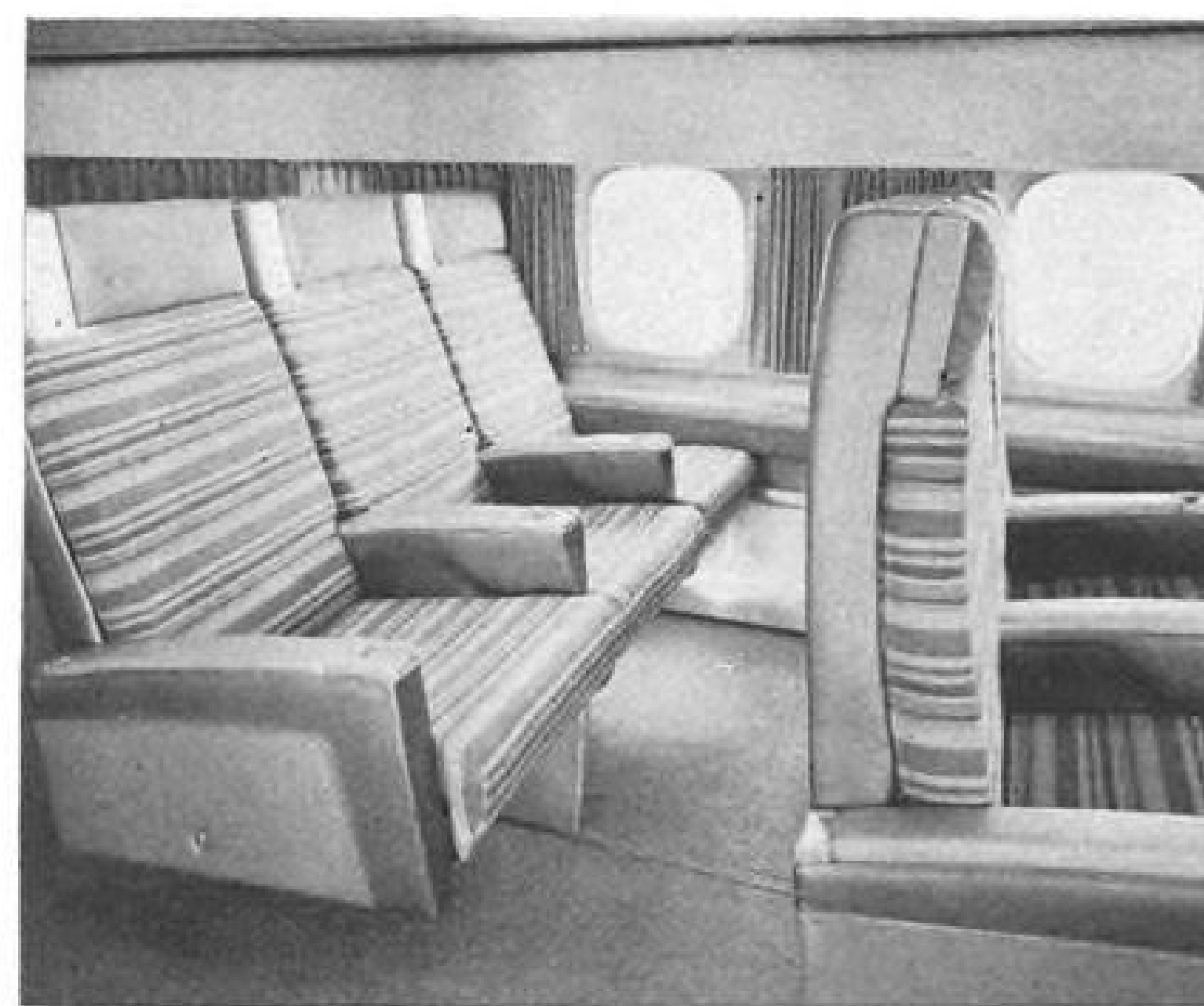
The airline has been firmly wedded to the turboprop airplane and BEA's Chairman Lord Sholto Douglas has said that at one time BEA hoped to go on indefinitely with the turboprop.

But BEA's hand was forced, first into preparing specifications for its own short range jet and circulating them, and second, into buying six de Havilland Comet 4Bs as a stop-gap purchase until jets designed for its own needs would become available.

The manufacturers, assured only that BEA might buy up to 24 airplanes designed specifically for the airline's network, were reluctant to tackle the job. Government refusal to subsidize the project meant that each company would have to invest about \$50 million in the development of the airplane and would have to sell about three times the possible BEA order to break even.

Other factors have dashed more cold water on the manufacturer's lukewarm attitudes:

- Capital Airlines cancellation of its



DC-8 Jet Stresses Passenger Comfort

Three abreast seats of Douglas DC-8 jetliner's first class configuration are as wide as two abreast first class seats currently in service, Douglas says. Mockup shows wide aisles, uncluttered overhead design. Cold air outlets, dining lights and stewardess call buttons are mounted on seatbacks in front of passengers. Utility table position remains level when adjustable seat is reclined. Passengers have reading lights set flush in seat headrests.



14 Comet 4s not only hit de Havilland hard, but tended to give all the companies some doubts about possible world-wide sales of short-range jets. Capital's financial position was not unique, some companies felt, and future financing might be a difficult task. • **Not all European operators** were convinced that short range jets were necessary even for competitive reasons. Nor were they in a rush to tie up places on some future production lines for an airplane still on paper.

BEA hopes to place these airplanes in service by January, 1964. The airline is demanding economy above all else, but at the same time is asking for seating capacity up to about 100 passengers, a cruise speed of Mach 0.95, a stage length of 1,000 mi. maximum and the ability to operate out of a 6,000-ft. length field on hot days.

Three airframe manufacturers tackled the manifold problems of the proposal. None of them has talked much about a final configuration, probably because it is not yet completely defined. But the common problem for all three has revolved around the type and number of powerplants.

First tendency of the designers was to look at four podded engines, either under the wings in the American style or at the fuselage tail in the new-fashioned French mode. Such engines would have to deliver about 8,000 lb. thrust each for takeoff and would have to be light, small and with low fuel consumption. Engines like that didn't exist, so Bristol and Rolls-Royce started work on their design.

New Powerplants

Bristol developed the B. E. 47 and specified it for one of their short range jet designs. Rolls turned out a proposal for the RB. 140 in about the same thrust category. Both these were new powerplants, in a development sense. It wasn't possible to adopt or scale existing company engines to do the job.

For this and operational reasons, the designers of the airframes looked again at the requirements. Instead of four engines, some of them considered three of higher thrust. Aside from the possible structural trickery needed to install three engines in asymmetrical airplanes, the powerplant became a more-attainable size. Bristol had an Olympus 553 variation that might do the job and Rolls was busy scaling its Conway down to the R. B. 141.

The three layouts took shape—around either three or four engines. Most informed observers believe that each final configuration submitted for BEA technical analysis showed three engines in a rear-fuselage mounting. Two of the engines are mounted on a short pylons at the

sides like the Caravelle, and the third is mounted at the base of the vertical fin rather than in the "runway-cleaning" position below the fuselage.

Opinion on the final choice by BEA has swung on a circular path from one company to the other. The reasons cited are many. By introducing the DH 121, say its proponents, BEA's jet fleet logistics would be simplified by the use of planes from a single manufacturer. Alone among the three companies, de Havilland has jet transport experience, gained the hard way.

Bristol Problems

Bristol has been having delivery troubles and teething troubles with the Britannia, and its financial position when all the returns are in for the year may be a bit tenuous. The company's production capacity is tied up with Britannias to a large extent, although phasing in the BEA transport could be a logical follow-on to Britannia production. Bristol engineers would also have a new project in detail design to work on at a time when Britannia detail design was phasing out.

Avro has had considerable experience, much of it bad, in the transport field. But it has not been alone, and to some extent also paid a price for pioneering. The company's recent experience with large multi-jet Vulcan bombers qualifies it for construction of large multi-jet transports in the same performance category. Avro also is the only company to have pronounced loudly its willingness to finance the whole program itself.

Chronologically, the program has had its cycles. Less than two years ago, BEA's chief executive A. H. Milward said BEA would rather do without jets. But second looks at the possible traffic patterns for the late 1950s and early 1960s was disturbing. European carriers would be competing against BEA's turboprops with jet airliners, first the Caravelle and later the big Boeing 707 and Douglas DC-8 series.

This was an unpleasant thought to BEA, and the corporation's technical experts retired to their offices to sweat out the details of a short range jet suited to their own route structure and traffic.

At that time, British Overseas Airways Corp. was still looking for a medium-range jet, and all the prospective manufacturers who received the BEA specifications tried to align them with the BOAC specifications for a maximum economy. But it wouldn't work. Vickers dropped out of the BEA field, preferring to concentrate on the BOAC jet and to leave the BEA problems to other manufacturers.

In the summer of 1956, Capital Airlines announced its order for short range Comet 4As, and this was followed immediately by prodding of BEA to do

the same to the continent. BEA didn't react.

But BEA did react when Scandinavian Airways System, route competitor of BEA in Europe, bought its Caravelles from France's Sud Aviation. BEA in a quick decision announced—in time for Farnborough this year—the stop-gap purchase of a fleet of six Comet 4Bs for operations beginning in 1960.

Since then, there has been nothing but silence from the airline. Sales and technical executives of the three companies concerned have had sleepless nights and harried days, waiting for the decision which was, in more or less the words of Avro's Sir Roy Dobson, expected any week now for months.

Biggest risk to the prospective manufacturer is financial. Lack of government subsidy in this project and the small quantity of the order makes it mandatory that the type be sold abroad. But meeting the specific requirements of BEA does not necessarily produce an airplane to delight other airlines.

Hawker-Siddeley group, parent organization of Avro, has officially stated that it would be willing to develop such a short range jet on company funds. Bristol might also be willing to take the same chance. De Havilland, being a smaller group than Hawker-Siddeley, has had some qualms about financing the development, particularly because of the loss suffered as one of the consequences of its pioneering with jet transportation.

De Havilland is trying another kind of pioneering on this job, according to informed sources. The company has proposed that the cost of the development be shared by component manufacturers. Rolls-Royce, for example, would in effect donate the powerplants. Other subcontractors would become partners in the risk with de Havilland, so that the load would be spread.

Regardless of the final arrangements for financing, it is almost a certainty that manufacturing these airplanes for BEA is going to be more productive of prestige than of profits.

ATA Board Members Named to Plans Panel

Washington—Members of the Board of Directors of the Air Transport Assn. last week were named as the Air Transport Panel of the Transportation Assn. of America. Chairman of the Panel is C. E. Woolman, president and general manager of Delta Air Lines.

The Air Transport Panel is one of eight groups in the Transport Assn. of America's national cooperative project, representing users, investors and six forms of transport. Purpose of the panel is to develop proposals for a national transportation policy.

New Routes Recommended for Mid-West

By Ford Eastman

Washington—Extensive additions and improvements in the local air service pattern in seven mid-western states have been recommended by Civil Aeronautics Board Examiner Curtin C. Henderson.

If the recommendations are adopted by the Board, it will fill a void in local service that has existed in North and South Dakota, Nebraska, Iowa, Illinois, Wisconsin and Minnesota, an area which the examiner terms the nation's "bread basket."

He added that the new pattern would cost an estimated \$2,506,503 "break-even pay" to local airlines.

Henderson also recommended that Frontier, North Central and Ozark airlines be authorized to provide the major portion of the service.

Examiner's Proposals

His complete recommendations are:

• **That Braniff Airways'** temporary certificate authorizing service to Lincoln, Neb., be made permanent.

• **That Braniff's services** should be suspended at Minot and Bismarck-Mandan, N. D.; Aberdeen, Huron, and Watertown, S. D.; Burlington, Fort Dodge, Mason City and Ottumwa, Iowa; Moline and Quincy, Ill., and St. Joseph, Mo., and also the airline's present route between Des Moines and Sioux City, Iowa.

• **That Braniff's service** at Rochester, Minn., should not be suspended, deleted or transferred.

• **That Frontier Airlines** be authorized to serve for a period of five years between Omaha and intermediate points at Columbus, Lincoln, Grand Island, Hastings, Kearney, North Platte, McCook, Imperial, Alliance and Sidney, Neb.; Sterling, Colo. and Scottsbluff, Neb., and beyond Scottsbluff to Denver; beyond Scottsbluff via intermediate points Lusk and Douglas, Wyo., and the terminal Casper, and beyond the Bismarck-Mandan terminal to Lemon and Spearfish, S. D., Newcastle, Wyo.; Rapid City, S. D.; Hot Springs, S. D.; Chadron, Alliance and Scottsbluff, Neb.; Cheyenne, Wyo.; Sidney, Neb.; Sterling, Colo., and the Denver Airport terminal.

• **That Frontier's certificate** be amended to authorize Minot, N. D., as an alternate intermediate point to Dickinson, N. D., on the airline's present segment between Williston, N. D., and Bismarck-Mandan, N. D.

• **That these route segments** should be authorized subject to the condition that Frontier be allowed to overfly any intermediate point on flights over all or part

of the Omaha-Denver-Casper segment and the Bismarck-Mandan-Denver segment if each intermediate point on the first segment are served by at least two daily round trips between terminals and the second by two daily round trips from Denver.

• **That Frontier may overfly Alliance, Scottsbluff, Sidney and Sterling** on flights over all or part of the Omaha-Denver-Casper segment or the Bismarck-Mandan-Denver segment provided that the points are served on at least two daily round trips to Denver whether operated over either segment of the route.

• **That Frontier may overfly Imperial, Nebr., on flights over all or part of the Omaha-Denver-Casper segment** provided it is served on at least one daily round trip to Denver.

• **That Frontier shall schedule service** to a minimum of two intermediate points on flights between Denver and Omaha and between Denver and Rapid City.

• **That North Central Airline's route No. 86** be amended as to authorize service: Between Minot, N. D., and Minneapolis/St. Paul via Bismarck-Mandan, N. D.; Aberdeen, Huron and Brookings, S. D.; between Sioux Falls, S. D., and Minneapolis/St. Paul via Mitchell, Huron and Watertown, S. D.; between Sioux Falls and Minneapolis/St. Paul via Worthington and Mankato; between Grand Forks, N. D., and Omaha via Fargo, N. D.; Watertown, Brookings, Sioux Falls, Yankton and Sioux City, S. D., and Norfolk, Neb.; between Bismarck-Mandan and Minneapolis/St. Paul via Jamestown and Fargo-Moorhead, N. D.; Fergus Falls and Alexandria, Minn.; between Minneapolis/St. Paul and Minot via Brainerd, Bemidji and Thief River Falls, Minn., and Grand Forks and Devils Lake, N. D.; between Minneapolis/St. Paul and Milwaukee, Wis. via Eau Claire, Marshfield and Appleton, Wis. Also, Ashland, Wis. should be added as an intermediate point on North Central's route between the cities of Duluth/Superior and Ironwood, Mich.

• **That the certificate held by Ozark Airlines** be amended to authorize service between Minneapolis/St. Paul and Davenport, Iowa/Moline, Ill., via Rochester and Austin/Albert Lea, Minn., Mason City, Waterloo and Cedar Rapids, Iowa; Sioux City and St. Louis via Des Moines, Ottumwa and Burlington, Iowa, and Quincy, Ill.; Omaha and the intermediate points Lincoln and Beatrice, Nebr., beyond Beatrice to Topeka, Kans., and Kansas City, Mo., and beyond Beatrice to St.

Joseph and Kansas City, Mo.; Chicago and intermediate points Rockford, Ill., Dubuque, Waterloo, Mason City and Fort Dodge, Iowa, and beyond Fort Dodge to Sioux City, Iowa, and beyond Fort Dodge to Omaha, Neb.; Des Moines and Iowa City and beyond Iowa City to Dubuque and Chicago and beyond Iowa City to Clifton, Iowa, and Chicago; Minneapolis/St. Paul and Des Moines via Rochester, Minn., Mason City and Fort Dodge, Iowa; Des Moines and Chicago via Ottumwa and Burlington, Iowa, and Peoria, Ill.; Chicago and Kansas City, Mo., via Davenport, Iowa/Moline, Ill., Burlington, Iowa, and St. Joseph, Mo.

• **That these route segments** on both Ozark and North Central's system should be authorized on the condition that after each intermediate point has received two daily round trips it may be overflown on flights over a part or all of the segment—except that on flights between the local carrier's terminal points that are served by a single trunk airline, a minimum of two intermediate points shall be served.

• **That Northwest Airline's service** at Jamestown, N. D., be suspended.

• **That United Air Line's service** at Iowa City, Iowa, Grand Island, North Platte and Scottsbluff, Neb., be suspended.

• **That the service of Western Air Lines** at Alliance, Chadron, Scottsbluff, Neb., Brookings, Hot Springs and Spearfish, S. D., and Mankato and Rochester, Minn., be suspended by the airline.

Area's Growth

Examiner Henderson added that the area has experienced a substantial and dynamic growth in manufacturing and commercial productivity within the past decade as well as impressive rises in population per capita wealth and buying power.

On the other hand, he said, the area may well be characterized as considerably isolated because of the great distances between the cities and their primary communities of interest centers and traffic gateways, inadequate surface transportation and inaccessible highways caused by snow and ice.

Henderson said the Seven States Area represented the largest void in local-service air transportation in the U.S. when compared with many areas where local service routes have been operated for more than a decade. Under his recommendations, air transportation would be authorized to many cities for the first time in the Dakotas and Nebraska where existing transportation facilities are inadequate.



Indian Airline Tests Noratlas

Noratlas 2508 which currently is undergoing tests in India is powered by Pratt & Whitney R2800 CB 17s developing 2,500 hp. Usually the Noratlas is powered by Bristol Hercules engines built in France by Snecma. The 2508 also uses Hamilton Standard 43E60 three-bladed propellers. Because of its use in areas where landing altitudes are substantially above sea level, the 2508 also is equipped with wingtip Turbomeca Marbore jets developing about 880 lb. thrust each. The 2508 in photo is being tested by private Indian airline, Kalina, which hopes to establish a route between Calcutta and Lhasa, Tibet. An agreement approving this link already has been worked out between the Indian and Red China governments. Route will have to be flown at altitudes of 21,000-23,000 ft. with requirement that 19,000 ft. altitude can be held on one engine. If tests prove satisfactory, Kalina probably will buy from four to six Noratlas 2508s.

Night Coach Fare Cut Proposed by National

Washington—National Airlines last week petitioned the Civil Aeronautics Board for a 20% reduction in night coach fares between five northern cities and six Florida points on its route. The proposed fares would be applicable only on certain days of the week.

Walter Sternberg, senior vice president traffic and sales, said the plan was made in an effort to broaden and balance Florida vacation travel demand. He pointed out that demand for space is high during weekends and lower during weekdays.

National asked for an experimental excursion coach fare for departures after 10 P.M. from Boston, Philadelphia, New York, Newark or Washington on Sundays, Mondays and Tuesdays to Jacksonville, Orlando, Tampa, St. Petersburg/Clearwater or Miami.

Return trip under the excursion fare would have to be completed within 16 days using night coach service from Florida on Tuesdays, Wednesdays or Thursdays. Effective dates would be from Jan. 13 to May 30, Sternberg said.

"Based on our experience," Sternberg said, "we believe that National's plan will effectively level traffic and give those who can do so an inducement to travel on other than weekend days. This in turn will help tourist attractions and accommodations in the areas which we serve to level out their guest bookings and thus improve their mid-week status."

Sternberg added the proposed fare is in no way related to the various fare proposals now before the CAB in which domestic airlines are seeking a fare increase. He added however, that National believes part of the problem of rising costs can be met with efforts to increase revenues when that can be done by selling seats that would otherwise be flying empty.

Subsidy No Solution, Smith Tells Forum

New York—Government subsidy should no longer be available to domestic trunklines, American Airlines President C. R. Smith told insurance company executives at a recent transportation investment forum here.

Smith said the trunks would be better off in the long run if the government adopted a non-subsidy policy for them and spelled out the policy clearly and unequivocally.

Trunkline operations, the American official said, have reached a point where, with sound management and sound regulation, self-sufficient operation should continue to be possible for the future. Reduction of subsidy in all areas of air transportation should be encouraged, but availability of subsidy to overseas carriers and local service airlines should be retained in the public interest.

Subsidization of one carrier on a route served by several carriers would seriously change the competitive situation, Smith said. Carriers who formerly competed among themselves on an equal basis would find themselves competing

against a carrier partly underwritten by the treasury of the federal government.

Some lenders of capital might consider the risk less if repayment is guaranteed through the need section of the Civil Aeronautics Act, Smith said, but this may not be a sound view. Lenders deal with many airline companies, and guaranteeing one loan would be of little comfort if other loans were damaged by subsidized competition.

Regarding local service carriers, Smith said it would be difficult for them to make a living in serving smaller cities without federal help. Because they provide a useful service, reasonable aid should continue.

Subsidy should not be provided, however, to underwrite local service competition on routes adequately served by subsidy-free carriers, according to Smith.

New Stock Program Proposed for Hughes

Washington—Settlement of the Hughes-Trans World Airlines-Atlas-Northeast Airlines possible common control case appeared probable last week following a new proposal involving Hughes voting stock.

The proposal—that the parties involved, including the CAB staff, indicated was acceptable—would permit Hughes to retain his stock in Atlas, which holds a 51% interest in Northeast, but a designated bank or trust company would vote the stock in matters concerning the airline. Hughes also controls TWA through his interest in Hughes Tool Co.

An earlier agreement was turned down by Civil Aeronautics Board Examiner Paul N. Pfeiffer on the grounds it did not establish an irrevocable voting trust for Hughes Atlas stock. Pfeiffer said that, under the previous proposal, Hughes would have been free to revoke the voting trust at will as a matter of law. The CAB began the proceeding to determine if Hughes' Atlas stock had given him control of Northeast without prior Board approval.

Burton Named to Head Washington National

Washington—L. W. Burton, director of the Civil Aeronautics Administration's Office of Plans and Development, was named director of Washington National Airport last week by CAA Administrator James Pyle. Effective date of the appointment is Feb. 1.

Burton, who has operated airports at Orlando, Fla., and San Juan, Puerto Rico, will succeed Bennett Griffin, who is retiring from CAA after 26 years of government service, the last 10 as director of Washington National.

SHORTLINES

► American Airlines will begin nonstop service between Chicago and Mexico City on Jan. 5—the first nonstop service between the two points by an American carrier. The daily flight will be made by a Douglas DC-7 in combined first class-tourist configuration. The airline plans to accommodate 32 "Mercury" passengers and 38 "Royal Coachman" passengers on the same aircraft. American plans to schedule the daily Chicago departure at 12:20 P.M., with arrival at Mexico City at 6:15 P.M. Departure from Mexico City will be at 11:55 P.M., arriving in Chicago at 5:40 A.M.

► Flying Tiger Line and the Military Air Transport Service have renewed a contract under which Flying Tiger has been providing basic commercial airlift between the U. S. and Japan. During the last six months, the airline has provided nearly \$7 million in transportation, made a total of 184 round trips, flown nearly 25,000 passengers a total of 336,250,000 passenger-miles and carried approximately five million lb. of cargo. The new contract extends the service for another six months.

► Trans World Airlines claims a new record for pounds of mail carried overseas in one day. TWA flew 61,000 lb. of mail to Europe on Dec. 13, including 23,000 lb. of Christmas mail to Army personnel in Frankfurt which was flown in an all-mail Lockheed Super-H Constellation. The remaining 38,000 lb. was carried on nine regular passenger flights to London, Rome, Madrid, Zurich, Geneva, Milan and Athens.

► Universal Airlines and United States Overseas Airlines, supplemental carriers, were granted permission by the Civil Aeronautics Board to operate 10 extra flights each between New York and Miami and Chicago and Miami to handle holiday traffic from Dec. 18 to Jan. 5.

► Trans World Airlines will begin regular scheduled flights to Bangkok and Manila Jan. 1. With the opening of the new route, round-the-world flights through connections with Northwest Airline at Manila will be possible.

► Convair has awarded a \$250,000 contract to Burton Rodgers-Technical Training Aids Inc. to build a cockpit procedure trainer for the 880 turbojet transport.

► Airline business settled through the International Air Transport Assn. Clearing House at London during the first nine months of 1957 showed a 32% increase over the same period last year.

AIRLINE OBSERVER

► Available seat-miles on domestic scheduled carriers will hit a new high during the year 1957. As of November, available seat-miles for the year had increased 18.1% over the same period last year when the increase was only 12.2%. Airline load factors dropped 3.52 percentage points during November as compared with the same period of 1956. Load factor for the month was 55.33% as compared with 61.6% for the year. The monthly decline follows a downward trend that has been evident since a reversal first took place in April, 1956. Indications are that the increase in revenue passenger-miles will reach about 12% over that of last year.

► American Airlines reports declines in all traffic categories during November as compared with the same month of 1956. Passenger-miles flown dipped over 4% and air freight showed a 12% drop. Mail was down 4.4%, and express fell 19% below the November, 1956, ton-mile figure.

► United Air Lines will purchase an additional 40 Boeing 720 jet transports to bring its total to 51. In addition to the Boeings, United has 40 Douglas DC-8 turbojets on order.

► Pilots of five scheduled airlines were in the process of taking strike votes last week. Pilots at American, Central, West Coast and Western Airlines are in conflict over pay rates and working conditions. Pilots of Eastern Air Lines are voting on the crew composition issue, a controversy over whether flight engineers or pilots shall serve as crew members on jet transports (AW Dec. 2 p. 45).

► Edward Slattery, Civil Aeronautics Board information chief, has been moved into the CAB library on special research assignment which has all the earmarks of a second attempt to strip him of his present title. Slattery was returned to his present position when James Durfee was made chairman after having been removed from the office several months earlier. At the Civil Aeronautics Administration, Levings Willis, chief of the press branch has been relieved of duty after his position was abolished. Raymond Nathan, press and information officer, has resigned after refusing to accept a transfer to Kansas City. Charles Planck, a senior staff member in the Washington press office, accepted a transfer to Anchorage, Alaska, as a press and information officer.

► Soviet Union is especially pleased with the comparison of Moscow-Copenhagen service by Aeroflot's Tu-104 turbojets and Scandinavian Airline System DC-6s because it will give the prestige-conscious Russian carrier a larger flying time advantage over SAS than it has enjoyed. Russians say their Il-14s made the trip in about five hours. Now, the Soviets claim, "our Tu-104s will fly from Moscow to Copenhagen in 2 hr. 25 min., compared with 4 hr. for the SAS DC-6s."

► Prospects are bright for a closer alignment of U.S. and British performance requirements for transport aircraft. In a special meeting at Washington, aviation representatives of both countries agreed on basic steps to be taken toward establishing similar performance codes to permit each country to validate the other's aircraft certificates without requiring special conditions or costly flight testing.

► New York Airways entire fleet of three Sikorsky S-58 and five S-55 helicopters is being offered for sale as a \$1.5 million package with spares, tools and advisory service. The airline last week signed an agreement with William C. Wold Associates, New York brokers, to handle the sale. New York Airways is considering a switch to Vertol 44B equipment (AW Dec. 16, p. 40).

► Despite last-minute delivery delays necessitated by a wiring system modification, the long-range Bristol Britannia last week made its first commercial appearance in the U. S. Aeronautes de Mexico was forced to fly its New York-Mexico City inaugural schedules Dec. 16 with a Constellation leased from TWA but had the Britannia on the route by Dec. 18. British Overseas Airways Corp. was scheduled to begin Britannia London service later last week. Both airlines postponed press flights because of the delay.

Airline Income and Expenses — Third Quarter, 1957

(IN DOLLARS)

| | Passenger Revenue | Mail Revenue (U. S.) | Property Revenue | Charter Revenue | Federal Subsidy | Total Operating Revenue | Total Operating Expenses | Net Income (Before Taxes) |
|------------------------|----------------------|----------------------------|---------------------|--------------------|--------------------|-------------------------------|--------------------------------|------------------------------------|
| DOMESTIC TRUNK | | | | | | | | |
| American | \$70,022,262 | \$1,557,675 | \$6,268,034 | \$101,839 | \$11,111 | \$78,224,796 | \$72,161,991 | \$6,259,748 |
| Braniff | 12,900,166 | 310,940 | 697,703 | 113,664 | | 14,074,952 | 12,941,447 | 953,367 |
| Capital | 23,911,379 | 512,468 | 890,150 | 14,538 | | 25,488,494 | 25,094,072 | —478,920 |
| Continental | 6,154,491 | 135,175 | 268,975 | | | 6,636,028 | 6,303,304 | 329,143 |
| Delta | 17,079,305 | 371,471 | 1,058,874 | 195,381 | | 18,794,871 | 18,215,527 | 466,329 |
| Eastern | 52,622,831 | 812,669 | 2,137,756 | 3,794 | | 55,982,545 | 55,621,183 | 297,423 |
| National | 9,334,041 | 209,268 | 582,250 | 30,531 | | 10,384,173 | 10,623,800 | —259,150 |
| Northeast | 4,613,650 | 58,935 | 181,124 | 4,919 | 270 | 4,885,397 | 5,764,947 | —867,553 |
| Northwest | 14,434,255 | 378,235 | 1,078,517 | 8,126 | | 15,990,363 | 14,275,059 | 1,818,076 |
| Trans World | 52,595,254 | 930,417 | 2,173,420 | 52,080 | | 56,563,486 | 53,694,997 | 2,928,997 |
| United | 68,401,015 | 2,268,673 | 5,120,368 | 469,706 | | 76,880,535 | 67,279,653 | 9,168,305 |
| Western | 10,854,120 | 242,461 | 422,494 | 16,158 | | 11,595,244 | 9,336,667 | 2,060,481 |
| INTERNATIONAL | | | | | | | | |
| American | 1,352,223 | 16,126 | 212,441 | | | 1,643,285 | 1,421,890 | 221,194 |
| Braniff | 2,052,842 | 30,354 | 213,999 | | 20,000 | 2,353,414 | 2,165,592 | 156,626 |
| Caribbean-Atlantic | 446,250 | 5,426 | 15,669 | 9,376 | | 491,383 | 432,870 | 58,547 |
| Delta | 1,618,085 | 13,361 | 107,798 | | | 1,746,549 | 1,428,083 | 301,609 |
| Eastern | 5,219,681 | 96,546 | 174,863 | 102,439 | | 5,605,061 | 4,880,013 | 895,071 |
| National | 706,011 | 13,229 | 40,635 | 11,701 | | 772,866 | 771,467 | —1,746 |
| Northwest | 5,635,220 | 1,363,034 | 863,348 | 33,467 | | 8,171,136 | 6,347,472 | 2,944,132 |
| Pan American | | | | | | | | |
| Alaska | 1,478,945 | 59,334 | 196,882 | 41,662 | | 1,782,814 | 2,113,602 | —326,358 |
| Atlantic | 35,274,113 | 1,620,620 | 2,990,164 | 896,556 | | 41,232,632 | 32,816,684 | 8,384,239 |
| Latin America | 19,767,831 | 537,562 | 4,212,442 | 616,195 | | 25,819,189 | 24,644,137 | 1,556,957 |
| Pacific | 16,821,048 | 1,218,261 | 2,155,199 | 1,130,866 | | 22,119,872 | 19,073,391 | 3,096,863 |
| Panagra | 3,804,849 | 116,089 | 641,145 | 66,704 | | 5,229,004 | 4,900,393 | 819,480 |
| Trans World | 19,853,188 | 1,227,969 | 1,209,889 | 353,586 | | 23,277,591 | 19,209,787 | 3,916,949 |
| United | 4,470,426 | 99,579 | 65,922 | 12,000 | | 4,695,401 | 3,370,068 | 1,298,877 |
| Western | 285,716 | 1,455 | 2,237 | | | 290,639 | 425,400 | —68,142 |
| LOCAL SERVICE | | | | | | | | |
| Allegheny | 1,567,534 | 32,531 | 82,725 | | 502,520 | 2,197,039 | 2,244,265 | —56,428 |
| Bonanza | 507,009 | 7,365 | 19,649 | 21,050 | 332,432 | 892,048 | 947,084 | 96,000 |
| Central | 408,000 | 11,000 | 22,000 | 29,000 | 572,000 | 1,049,000 | 1,148,000 | —102,000 |
| Frontier | 989,000 | 26,000 | 93,000 | 18,000 | 546,000 | 1,683,000 | 1,587,000 | 8,877 |
| Lake Central | 433,212 | 12,128 | 24,000 | | 455,716 | 925,801 | 907,416 | —142,931 |
| Mohawk | 1,453,701 | 15,980 | 76,391 | 22,874 | 341,422 | 2,431,435 | 2,185,170 | 175,128 |
| North Central | 2,227,858 | 57,124 | 58,923 | 62,761 | 443,073 | 2,858,333 | 2,935,422 | —87,995 |
| Ozark | 1,174,367 | 29,099 | 61,465 | 17,955 | 673,003 | 1,960,146 | 1,970,186 | —26,915 |
| Piedmont | 1,483,900 | 25,599 | 51,723 | 14,868 | 625,338 | 2,246,146 | 2,085,810 | 203,043 |
| Southern | 592,406 | 23,390 | 18,666 | 15,975 | 493,459 | 1,147,518 | 1,153,564 | —7,792 |
| Southwest | 1,080,868 | 27,983 | 25,121 | 43,532 | 447,285 | 1,630,304 | 1,470,723 | 138,232 |
| Trans-Texas | 875,557 | 28,757 | 53,821 | 16,131 | 745,362 | 1,738,147 | 1,644,470 | 95,725 |
| West Coast | 709,179 | 12,617 | 20,892 | 6,025 | 390,014 | 1,142,010 | 1,120,689 | 14,772 |
| HAWAIIAN | | | | | | | | |
| Hawaiian | 1,557,268 | 8,259 | 199,369 | 11,339 | | 1,816,294 | 1,580,948 | 209,563 |
| Trans-Pacific | 756,621 | 3,025 | 33,522 | 5,579 | | 824,948 | 728,521 | 92,486 |
| CARGO LINES | | | | | | | | |
| Aerovias sud Americana | | | 439,762 | 38,442 | | 491,276 | 481,112 | 1,131 |
| Flying Tiger | | 20,333 | 2,149,710 | 7,195,036 | | 9,466,631 | 8,969,188 | 1,319,516 |
| Riddle | | 22,852 | 1,416,370 | 62,452 | | 1,489,215 | 2,077,037 | —564,095 |
| Seaboard & Western | | | 849,362 | 4,411,815 | | 5,255,314 | 5,575,359 | —366,615 |
| Slick | | 47,229 | 1,941,625 | 3,133,395 | | 5,159,488 | 5,456,650 | 478,222 |
| HELICOPTER | | | | | | | | |
| Chicago Helicopter | 98,180 | 17,051 | 1,252 | | 233,689 | 351,878 | 415,362 | —81,492 |
| Los Angeles Airways | 52,571 | 29,373 | 20,488 | 1,067 | 238,807 | 342,987 | 298,783 | 42,879 |
| New York Airways | 160,931 | 14,195 | 15,333 | 18,405 | 527,506 | 760,605 | 655,560 | 99,578 |
| ALASKA | | | | | | | | |
| Alaska Airlines | 495,351 | 136,948 | 226,919 | 263,285 | 278,940 | 1,416,840 | 1,505,033 | —180,408 |
| Alaska Coastal | 252,628 | 26,487 | 34,695 | 44,252 | 95,259 | 462,005 | 378,575 | 80,780 |
| Cordova | 43,460 | 27,773 | 23,854 | 321,332 | 45,489 | 467,455 | 427,540 | 26,936 |
| Ellis | 203,166 | 14,828 | 24,055 | 286,611 | 65,524 | 339,926 | 284,431 | 54,789 |
| Pacific Northern | 2,219,444 | 182,439 | 293,940 | 18,296 | 228,372 | 2,966,253 | 2,585,840 | 336,305 |

* Not available.
Compiled by AVIATION WEEK from airline reports to the Civil Aeronautics Board.



THE ROOT OF THE MATTER

Orenda is pioneering many new concepts in jet engine design. The IROQUOIS supersonic turbojet, now producing over 20,000 lbs. (dry) thrust in its early development, incorporates several. The outstanding performance of the IROQUOIS, combined with inherent low weight, is the reason it has been selected for the Avro Arrow, Canada's new supersonic interceptor.

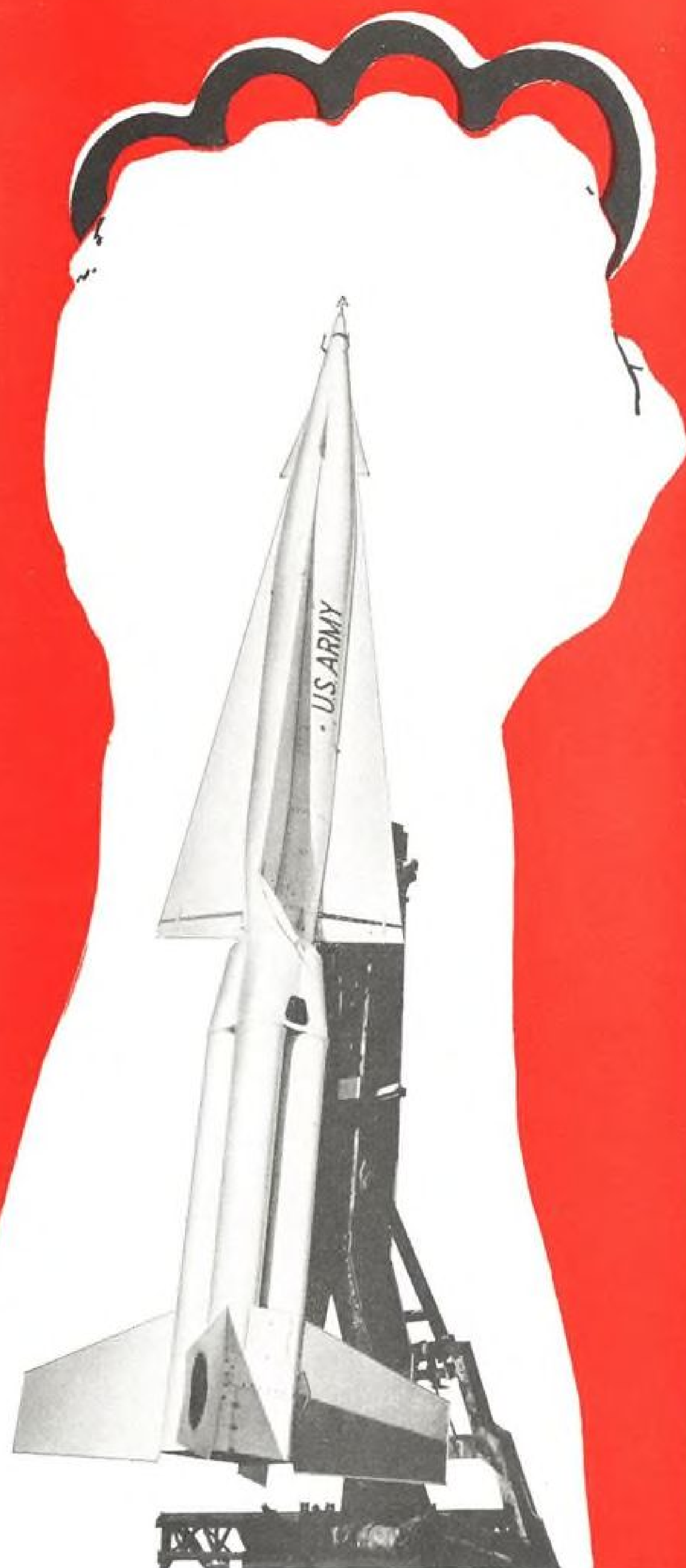
Illustration shows stress patterns in a jet engine blade root under load, using color photography and photo-elastic stress analysis.

 **ORENDA** *ENGINES LIMITED*
MALTON, CANADA

MEMBER: A.V. ROE CANADA LIMITED & THE HAWKER SIDDELEY GROUP

A SUNDAY PUNCH FOR DAILY USE!

Army's Nike-Hercules



An Army missile with a lethal wallop, the Nike-Hercules will deliver a knock-out blow to enemy air aggression—Sunday and every day, around the clock. Nike's knuckle-duster is its warhead—loaded and tested, developed and delivered by Aerojet-General's Explosive Ordnance Division.

Aerojet-General

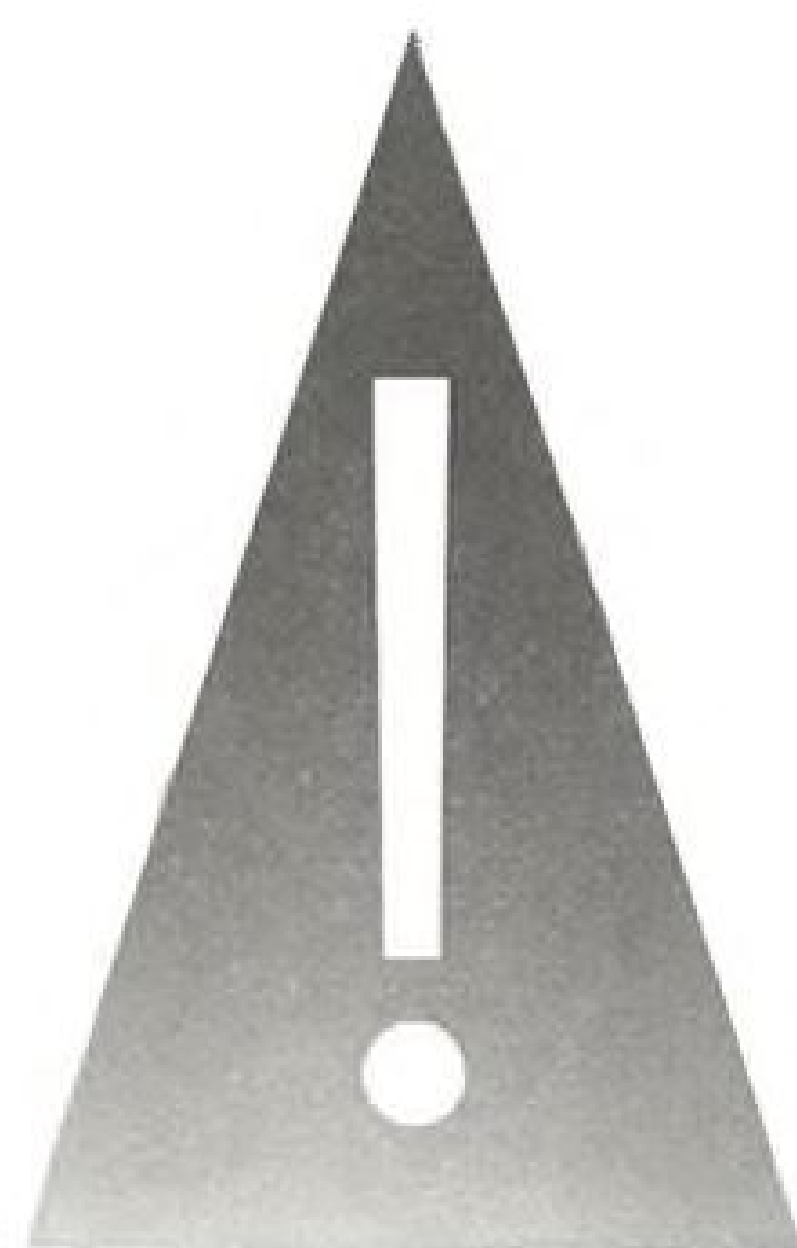
CORPORATION

A Subsidiary of
The General Tire
& Rubber Company



AZUSA AND
SACRAMENTO,
CALIFORNIA

U.S. ARMY PHOTOGRAPH



MISSILE ENGINEERING

Solid Fuels May Claim Big-Missile Field

By Russell Hawkes

Redlands, Calif.—Solid fuel rockets will play an important, if not dominant, role in the large-missile field, according to staff members and officials of Grand Central Rocket Co. here.

H. L. Thackwell, assistant president, points out that the only limit to the size and power of a solid propellant rocket is set by the means of transport from factory to pad. Even this limit could be overcome by building the case and casting the charge in the launching area, since relatively little manpower or floor area is needed.

Despite the ease with which big solid propellant motors can be built, Thackwell reports that multiple stages or clusters of rockets are a more probable response to demands for range, altitude and speed. Since growth factor in a rocket is the cube of an increase in payload (to a powerplant designer, payload is anything not connected with propulsion) rather than a linear function as it is in aircraft, designers welcome the chance to drop off expended motors, thereby increasing the ratio of propellant weight to weight of inert parts in the later stages of powered flight.

Bucking a Trend

According to Charles E. Bartley, president of the company, Grand Central will buck the current trend in the industry to develop "systems capability" covering design and production of every component in the missile. The company's attitude is that formulation of its own propellants would cause prejudices that would limit freedom to pick the best fuel for the job regardless of its origin.

To go into the airframe or guidance businesses would be to compete with their own customers. Bartley regards this as a useless risk since the company is doing quite well as a powerplant supplier. At the moment, Grand Central is not seeking contracts for the design of a whole missile unless it is nearly all engine with only rudimentary airframe or guidance.

Estimating progress of the rocket design art, Thackwell said that with solid propellants it would be possible to put an American rocket on the moon within a year. In five years, a manned satellite could be in its orbit and an unmanned rocket could hit Mars. A manned, solid fuel rocket could be on the moon in 10 years.

A trend toward solid propellants for big rockets is beginning to mature. Chief reasons for this are the military advantages offered by:

- **Reliability.** Once through its development program, a solid propellant rocket can be expected to give virtually 100% reliability.

- **Economy.** The result of good reliability is a cut in the number of rockets which must be produced to destroy a target.

- **Ease of handling.** This simplifies logistics due to a smaller list of ground equipment required, smaller manpower requirement, fewer parts to be maintained, etc.

- **Short count-down.** A solid fueled rocket stands on the pad in firing condition; it can retaliate within minutes or seconds of the first detection of an attack. This minimizes the danger of its being destroyed on the pad. Storable liquid propellants intended to have the same advantage are making progress in the laboratory but are not expected to reach an operational stage for some time.

Less well known than these advantages is the fact that solid propellants can at least compete in performance with liquid propellant rockets if not ex-

ceed them. Thackwell points out that solid fueled rockets hold the speed and altitude records this side of the Iron Curtain.

It is true that liquid propellants have a margin of specific impulse in their favor but this gap has narrowed in recent years. Also, when the proportion of payload to propellant weight is small (10% or less), performance is more responsive to changes in the mass ratio (propellant weight to gross weight minus propellant) than to changes in specific impulse.

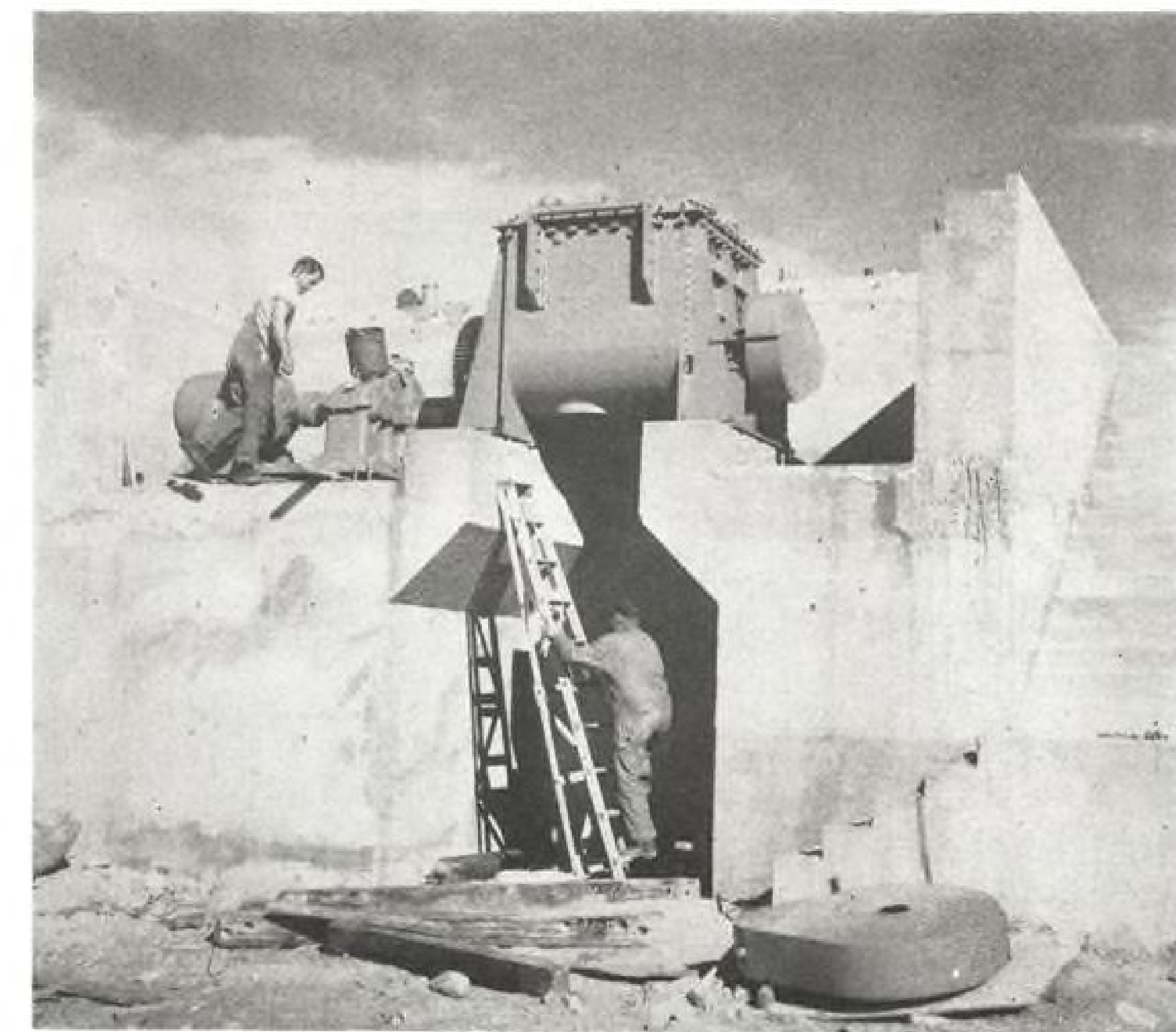
The reason for this is evident in the formula for drag-free burnout velocity in horizontal flight:

$$V_b = I_{sp} g \log (1 + W_p/W_c)$$

The burnout velocity, V_b , is a direct function of I_{sp} , the specific impulse, and a logarithmic function of W_p/W_c , the mass ratio.

Ratio Advantages

The advantage of solid fuel rockets in mass ratio is due to two things: solid propellants are usually about 70% more dense than liquid propellants, and the inert weight of powerplant accessories like fuel pumps and controls and coolant systems is not needed. Thackwell predicts that the biggest strides in solid



BRAMLEY-BEKEN propellant mixer being installed at Grand Central's Redlands plant cost \$100,000, is said to be largest in country. Unit will be in operation by mid-January.