

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

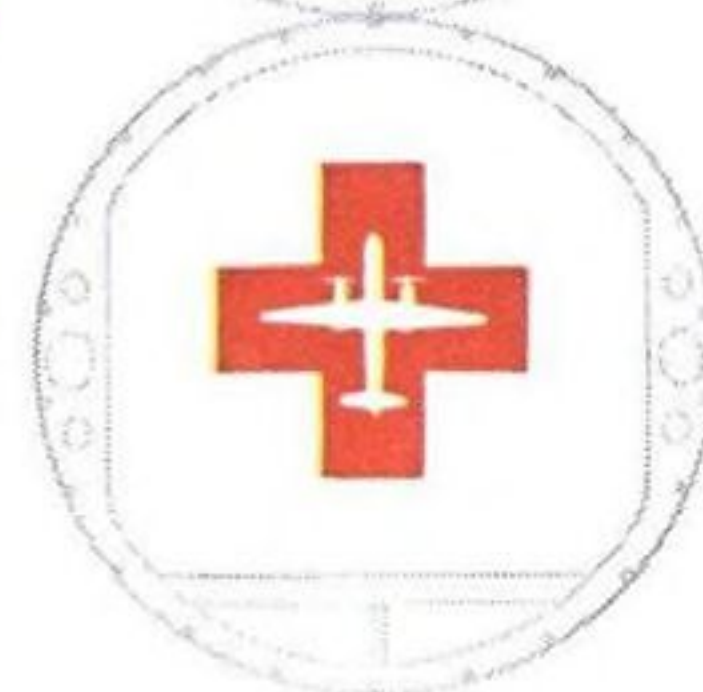
DEC. 19, 1955

50 CENTS

VERSATILITY...



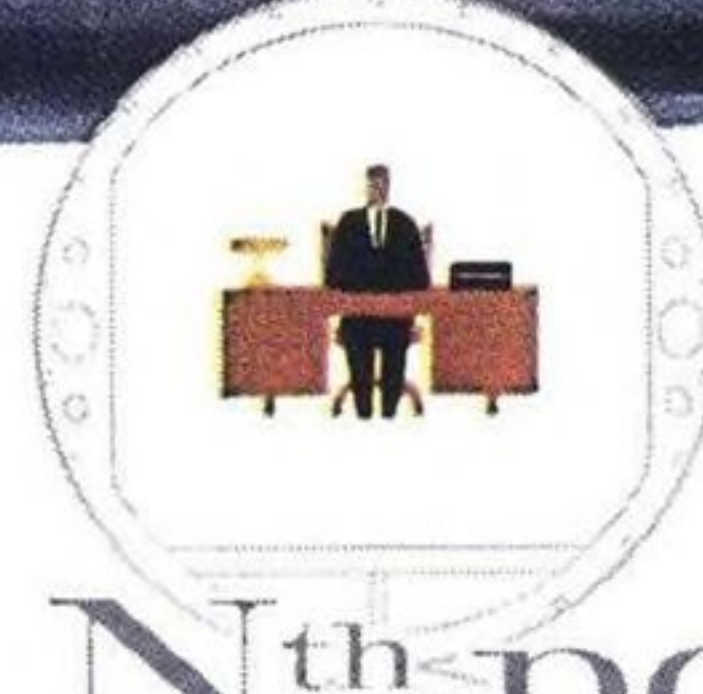
Commercial Airliner



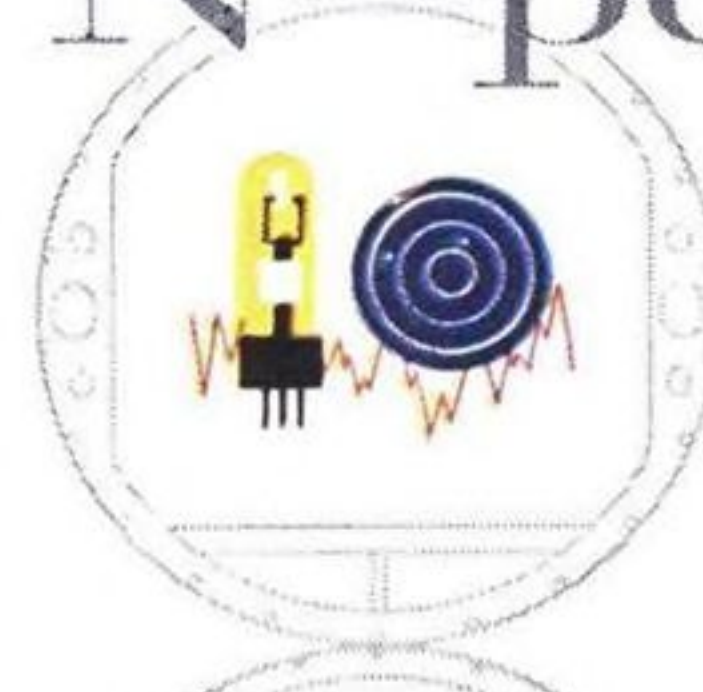
Flying Hospital Ship



Cargo Plane



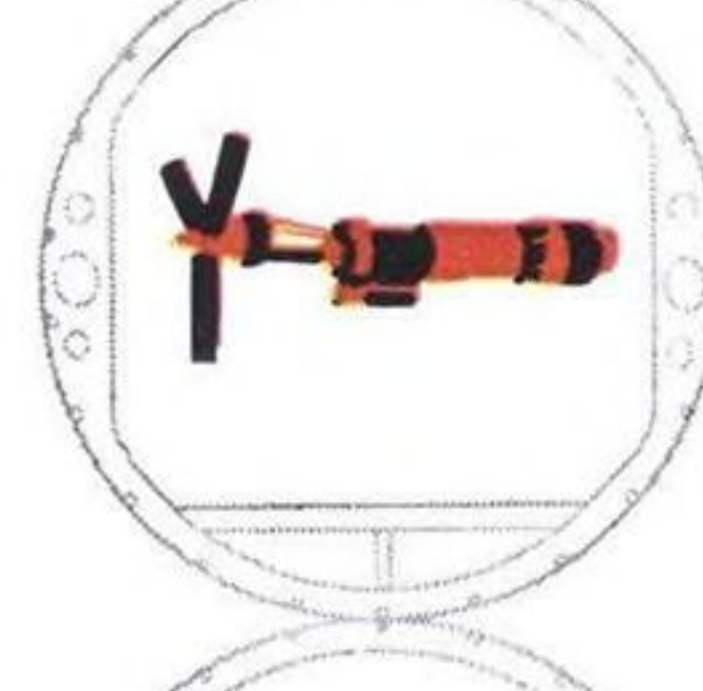
Executive's Flying Office



Electronic Test Plane



Military Transport



Turboprop Transport



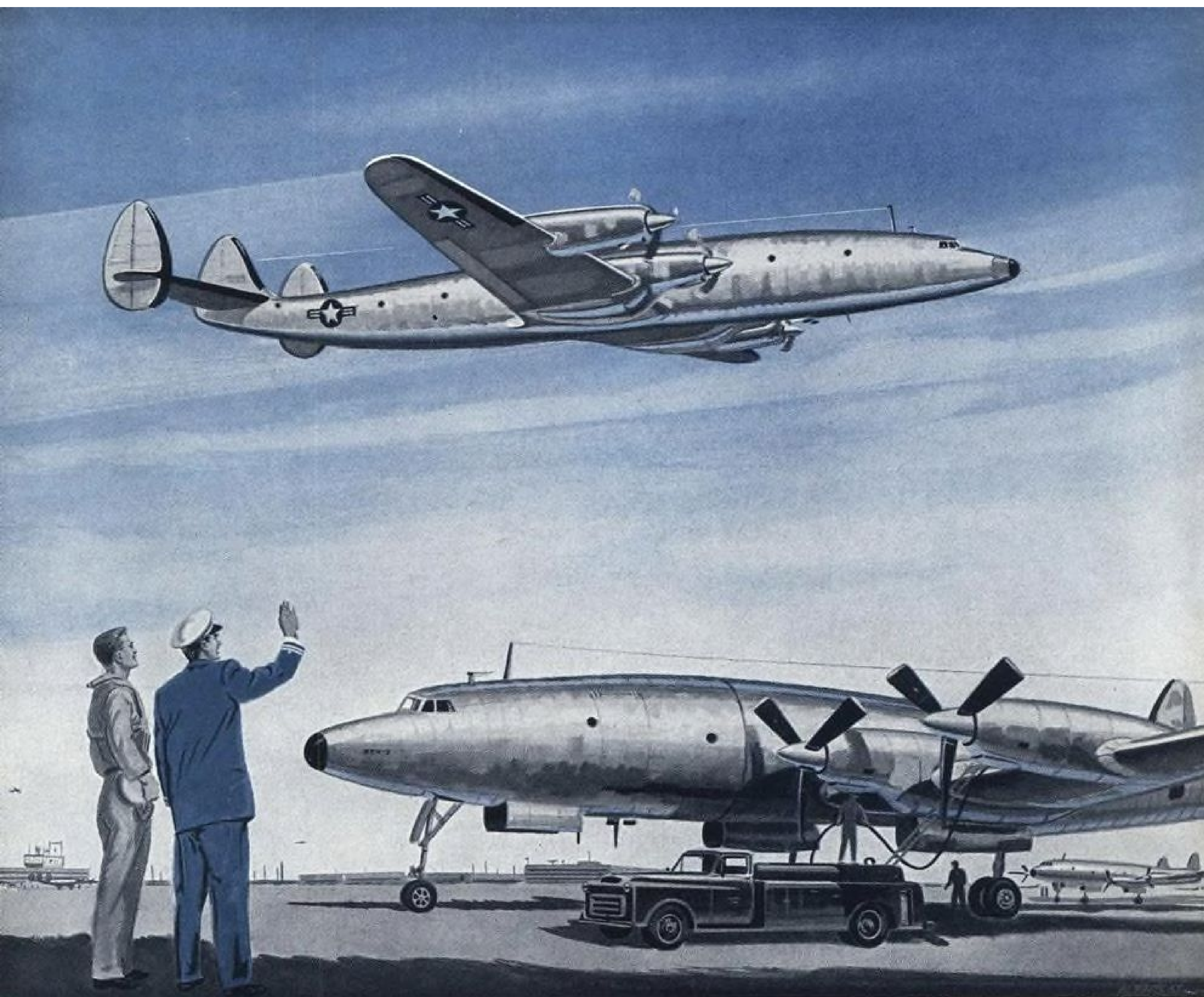
Navigator-Bombardier Flying Classroom

thru engineering to the Nth power

Unmatched in its flight range for speed, efficiency, and economy of operation... unexcelled for reliability — the Convair is now flown by thirty-five leading airlines throughout the world! It performs scores of tasks for the U. S. Air Force and the U. S. Navy! It serves science as a flying electronic laboratory. And it's the choice of leading corporations as an executive transport. The Convair continues to set new records for versatility and performance — evidence again of Convair's *engineering to the Nth power!*

CONVAIR

A DIVISION OF GENERAL DYNAMICS CORPORATION



New Holley turboprop power control installed in Lockheed R7V-2

One hundred and six passengers or 36,000 pounds of cargo cruise at speeds up to 440-miles-per-hour in the Navy's new Lockheed R7V-2 turboprop Super Constellation. Four Pratt & Whitney Aircraft axial flow T-34 propeller turbine engines develop a total of 22,000 horsepower for take-off. Each of the four is automatically controlled by a new Holley gas turbine power control.

High performance turboprop engines like the T-34 demand

extreme accuracy in fuel metering to maintain their high performance ratings and at the same time control operation within satisfactory limits. Through a system of accurately measuring four separate senses, the Holley control automatically meters corrected fuel flows to the engine in accordance with the engine operating requirements.

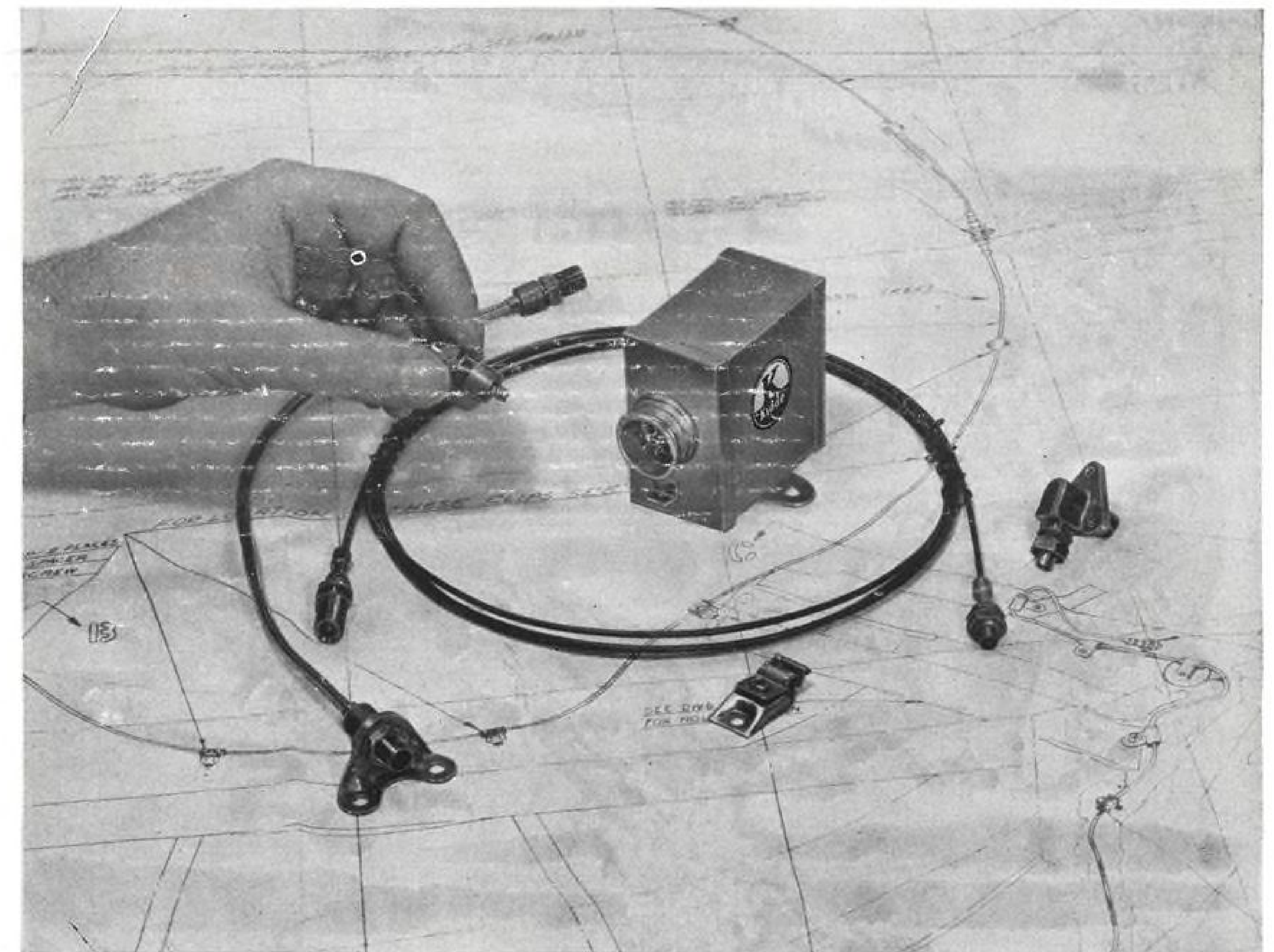
The Holley gas turbine control is the result of intensive research and development to provide a

light weight, compact means of accurately metering fuel consistent with engine requirements.

This and other Holley developed fuel metering devices have played an important role in our country's undisputed leadership in the design, development and manufacture of superior aircraft.



Leader In The Design, Development, and Manufacture of Aviation Fuel Metering Devices.



Tested, proven, and in production... the only double-duty aircraft fire detector!

Consisting essentially of a heat-sensing element and a transistor-triggered control unit, the Kidde Aircraft Fire Detector is the first to give both an immediate nacelle overheat danger signal and a fire alarm when temperature reaches a critical degree. Its hermetically-sealed control unit needs no shock or vibration isolation, has no vacuum tubes, and the entire unit requires no resetting after a fire. Here's how it works:

Located in the engine nacelle, the fire-sensing element—a long, wire-like unit—transmits nacelle temperature changes to the control unit, which is pre-set so as to remain on standby throughout the normal nacelle temperature range.

When the nacelle temperature rises above maximum normal, the control unit recognizes "potential trouble," and triggers an ABNORMAL TEMPERATURE signal.

However, if there is a sudden flash of fire in the nacelle, the control unit interprets the *rapid* rise

in temperature as a definite danger condition, and a FIRE ALARM is actuated. The pilot then operates the nacelle fire extinguishing system to put out the blaze.

During any gradual temperature rise above maximum normal, the ABNORMAL TEMPERATURE signal remains operative all through the rise, and is replaced by the FIRE ALARM when a predetermined fixed fire temperature has been reached.

Lightweight and compact, the Kidde Aircraft Fire Detector can be adapted to meet the needs of all aircraft produced today. For more information, write Kidde now.

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Phillips 66
PRESENTS

MILESTONES IN AVIATION

Squadron of Aces

In World War I, the famous "Hat in the Ring" 94th Pursuit Squadron, U. S. Air Service, chalked up many milestones in American military aviation.

Its members flew the first U. S. patrol over enemy lines in March of 1918. From April 14, 1918, through November 11, 1918, pilots of the 94th Pursuit Squadron scored 66½ victories over enemy aircraft. This figure does not include Major Raoul Lufbery's 17 victories, which were all scored while he was attached to the French Army. Personnel of the 94th included six "Aces," and commanding officer Captain "Eddie" Rickenbacker, with a total of 26 enemy planes to his credit, became America's "Ace of Aces."

It's Performance that Counts!

Phillips Petroleum Company has performed outstandingly as one of the country's largest suppliers of aviation fuels for military and commercial use. Phillips now produces enormous quantities of 115/145 grade aviation gasoline, and also furnishes the most modern fuels for the latest designs in turbo-props and jets.

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AVIATION DIVISION
PHILLIPS PETROLEUM COMPANY
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Phillips
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AVIATION PRODUCTS

"ACES" of the "HAT IN THE RING" 94th PURSUIT SQUADRON

Captain Edward V. Rickenbacker	26 victories
Captain Reed Chambers	7 victories
Captain Douglas Campbell	6 victories
1st Lieutenant Harvey W. Cook	7 victories
Captain Hamilton Coolidge (killed in action)	8 victories
Major Raoul Lufbery* (killed in action)	17 victories

*Major Lufbery, first commanding officer of the 94th, was the first pilot wearing the American uniform to shoot down an enemy plane (April 12, 1918), but never received official confirmation of this victory. He was killed in action on May 19, 1918, while in command of the 94th.

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AVIATION WEEK, December 19, 1955

5

FACTS

about

NEW DEPARTURE

STEEL BALLS



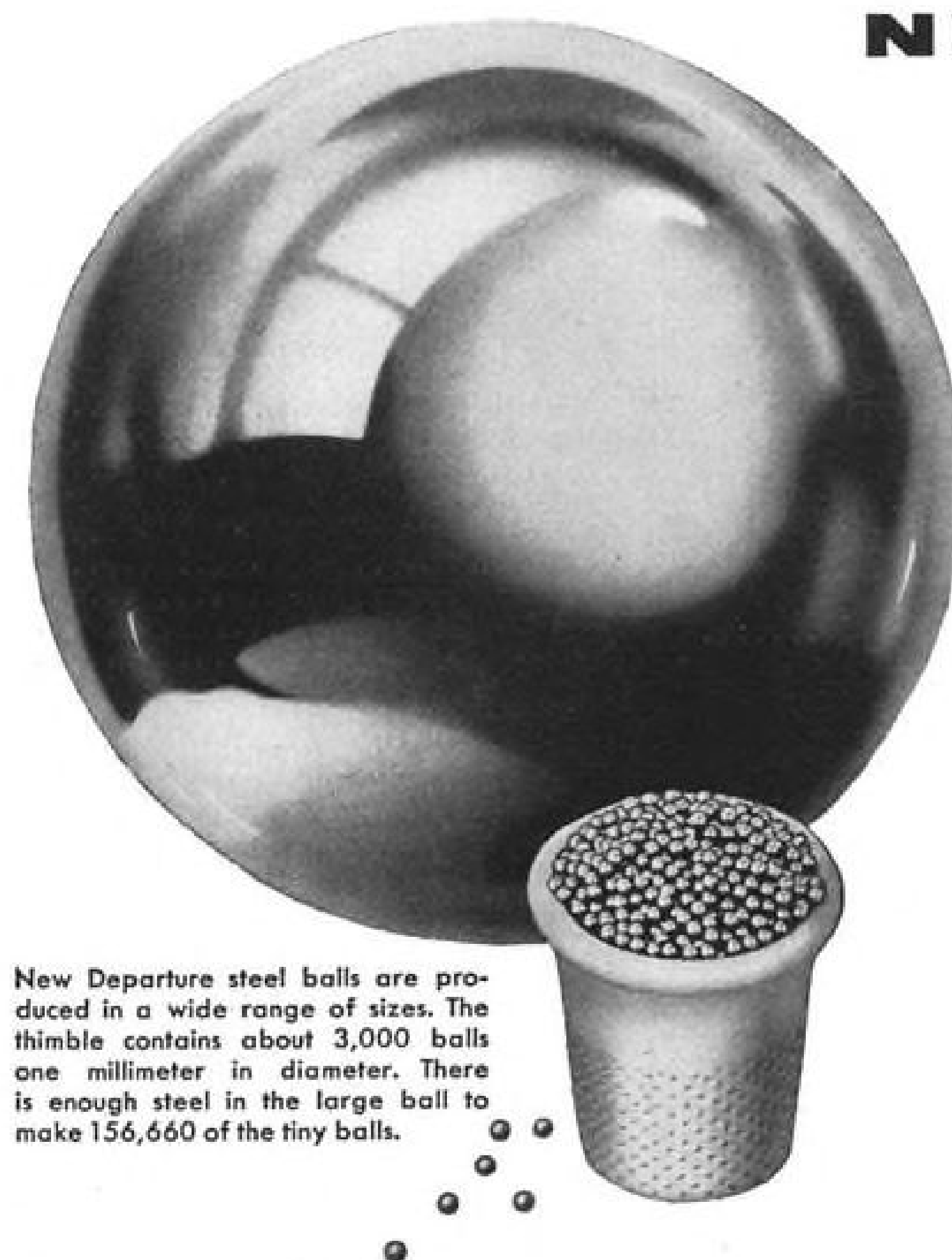
**Available in any quantity
to fit your specifications
for grade, size and accuracy!**

When industry wants steel balls of proven accuracy and dependability, it is only natural that they turn to New Departure, leading producer of ball bearings and therefore thoroughly experienced in the manufacture of precision balls. Today, New Departure provides industry with high-carbon chrome and stainless steel balls in a wide range of sizes and specifications.

New Departure balls are produced from the finest high-carbon chrome steel. AISI Type E51100 steel, specially made for New Departure, is heat-treated to achieve the proper hardness and toughness for maximum strength and life in the finished product. Stainless steel, AISI Type 440C, used by New Departure results in balls of much improved hardness and load-carrying ability.

In addition to producing the finest steel balls available, New Departure will fill volume orders for balls of special materials such as high-nickel or cobalt-base alloys, tool steel and others.

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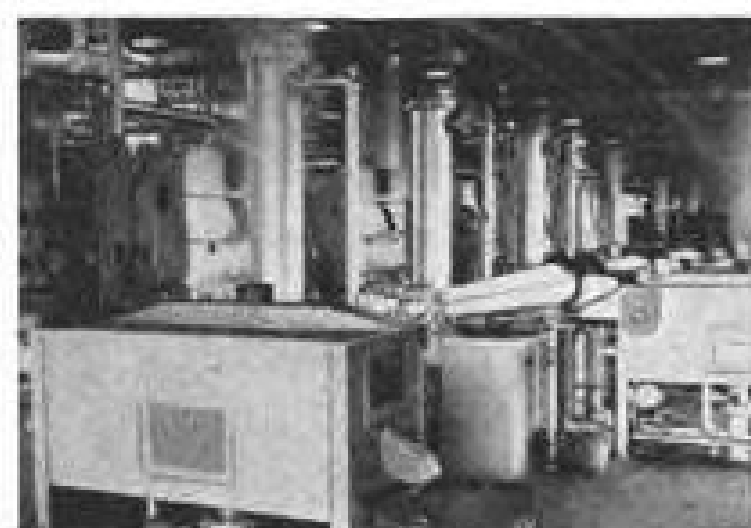
New Departure steel balls are produced in a wide range of sizes. The thimble contains about 3,000 balls one millimeter in diameter. There is enough steel in the large ball to make 156,660 of the tiny balls.



Steel ball wire is drawn through dies to assure uniform diameter and roundness.



Precise control of grain flow is obtained with these Ball Heading Machines.

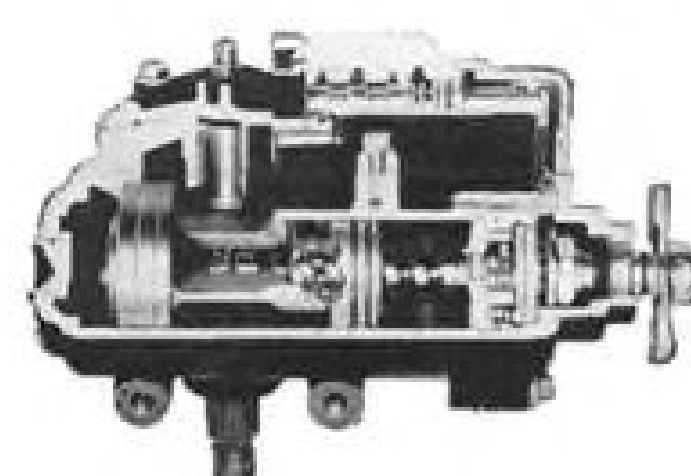


Balls are heat-treated, quenched in oil or water, then tempered in electric furnaces.



These gauges sort balls into lots according to required diameter limits.

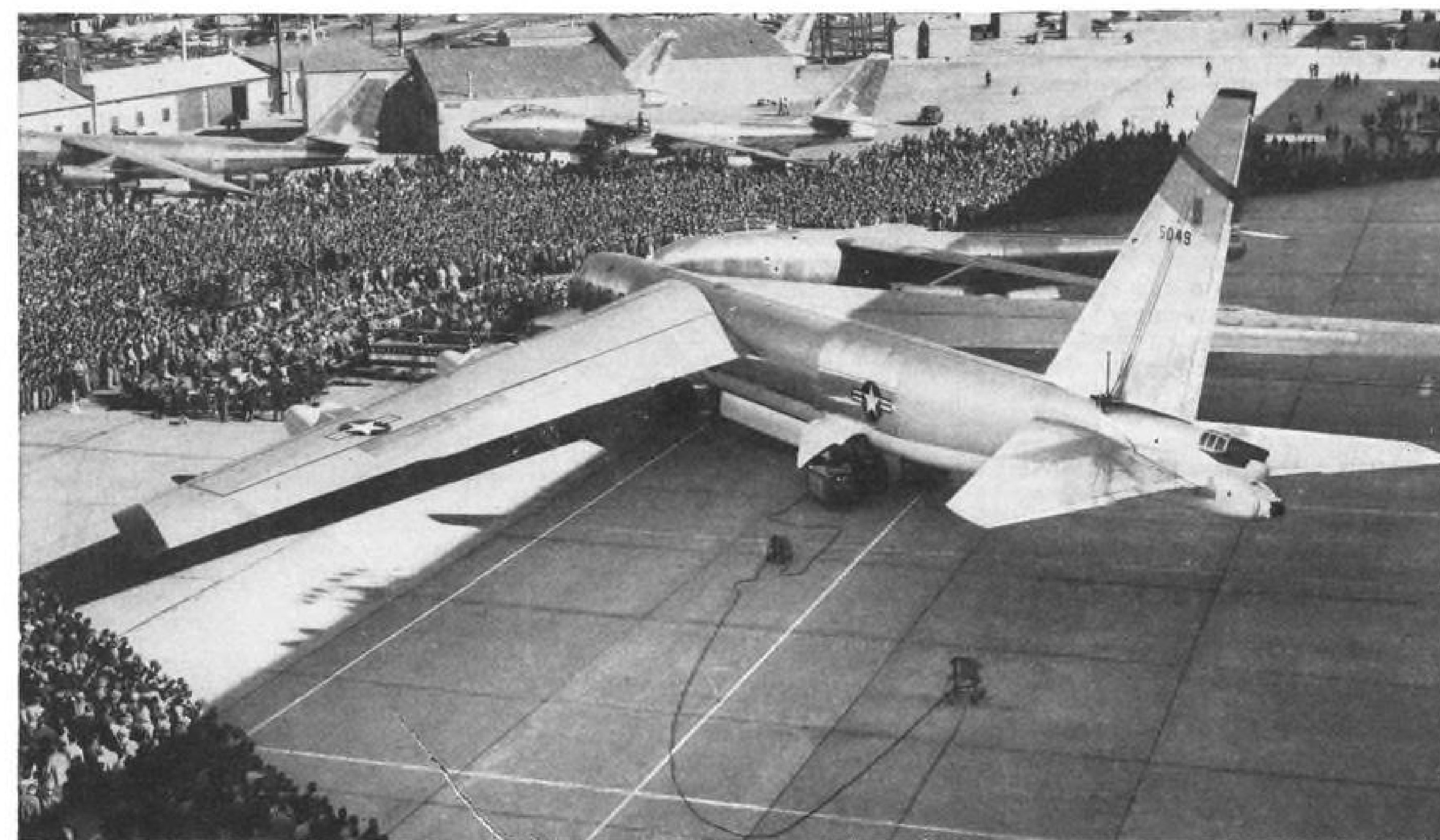
*Applications range from power steering to pencils



The unique advantages of New Departure steel balls are utilized in many applications ranging from heavy-duty bearings to the new liquid lead pencil. To accommodate these applications, New Departure steel balls are offered in sizes ranging from .025 inch to 1 1/2 inches in diameter.



NEWS DIGEST



New Tail Armament For B-52

Wichita's first B-52 shows a new tail armament, probably the fourth different system to be incorporated in the Boeing Stratofortress series. The jet bomber's battery appears to be four cannon mounted around a tracking radar antenna. Above the turret is a larger search radar, and above that, an optical gunsight for the tail gunner.

Stuart Tipton Elected President of ATA

Stuart G. Tipton was elected president of the Air Transport Association last week at a board of directors meeting in Washington. Tipton, who has been general counsel of ATA for the last 11 years succeeds Harold Pearson who decided not to stand for re-election after his policies were rejected by ATA directors.

Charles J. Lowen, Jr., was sworn in as Civil Aeronautics Administrator last week succeeding Fred B. Lee (AW Dec. 12, p. 132).

Lowen's appointment immediately was attacked by Sen. Mike Monroney (D.-Okla.), chairman of the Senate Commerce Committee's Aviation Subcommittee, who challenged Lee's resignation under Administration pressure. He has threatened to conduct an investigation of the Lee resignation as "an attempt by the Commerce Department's ground-minded clique to seize control of all civil aviation."

Chance Vought's F8U-1 Crusader has flown 1,050 mph. in tests at Edwards AFB, Calif. The Navy fighter is

powered by a Pratt & Whitney J57 engine. Defense Secretary Charles E. Wilson recently refused permission for the Navy to make an official attempt to break the world speed record in the F8U (AW Dec. 12, p. 7).

United Air Lines announced a settlement with its striking AFL-CIO flight engineers, ending a seven-week walk-out. The engineers, whose strike failed to disrupt United's service, walked out to protest a company ruling that all newly hired engineers be qualified pilots. One provision of the agreement provides that non-pilot flight engineers already employed by United will be given flight training to bring them up to the level of the new employees.

Air Force has awarded Ford Motor Co. a \$265,776,509 contract for J57 jet engines. The engine was designed by Pratt & Whitney.

New bombing-navigation system for supersonic bombers will be produced by International Business Machines Corp. under an \$11.6 million Air Force contract. The system, developed by the company's Airborne Computer Laboratories, presumably employs the new digital techniques.

Air Force awarded \$1,253,880 contract for five mobile training units for the F-102A fighter plane to Convair Division of General Dynamics Corp. The trainers will be built by Burton-Rodgers, Inc., of Cincinnati as subcontractors to Convair.

Mohawk Airlines carried 26,505 passengers last month for the best November total in its history.

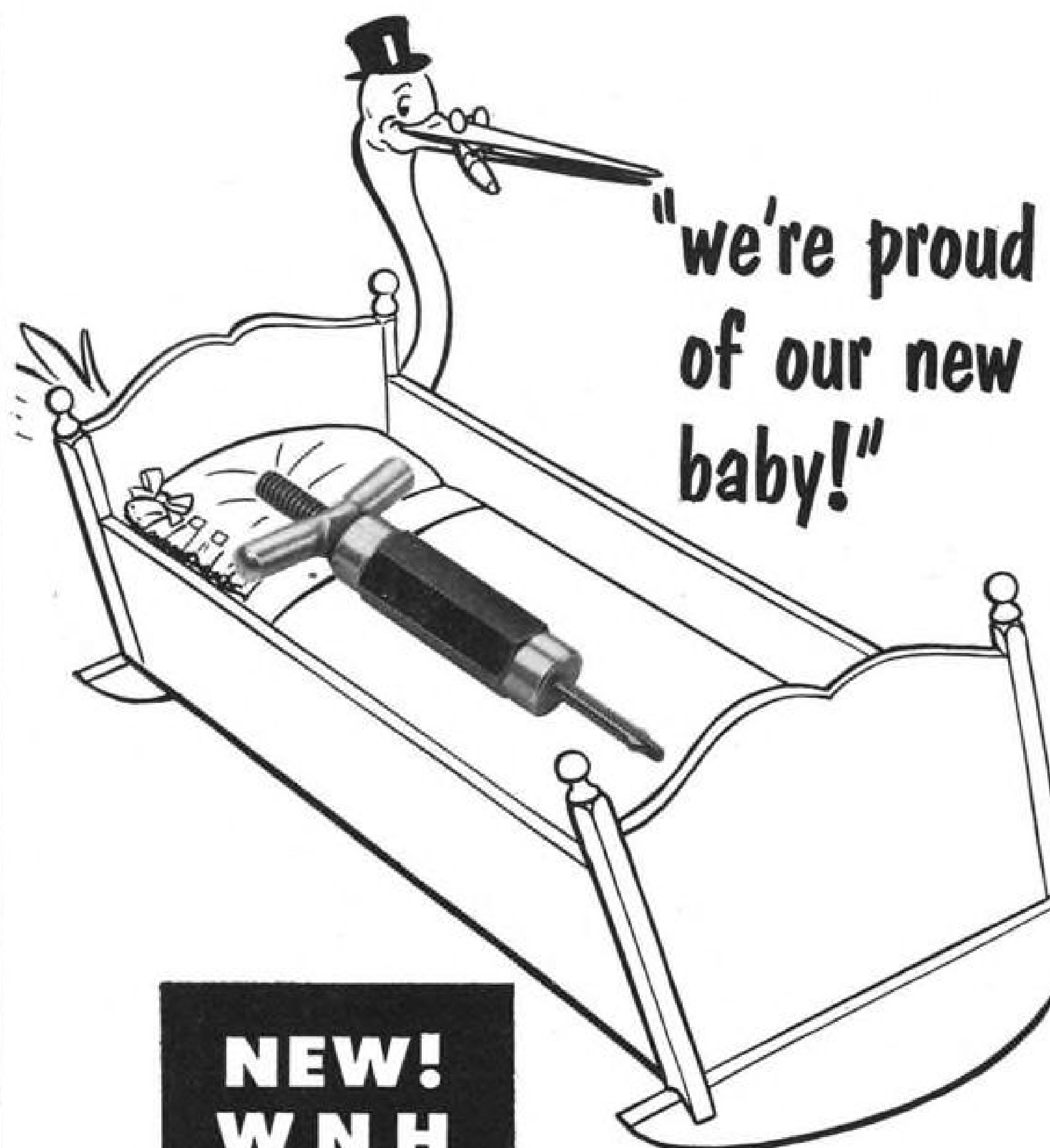
Foreign

Despite official denials, Australia's Qantas Empire Airways will place an order for long-range jet transports early next year. The government-owned airline probably will turn to either Boeing or Douglas, although British political and economic pressure is being brought to bear for the purchase of de Havilland's Comet 4.

Bristol Orpheus turbojet engine will power the Fiat G-91 light fighter being produced for the North Atlantic Treaty Organization. Under the contract signed by Fiat and Bristol Aero Engines Ltd., Fiat also gets exclusive rights to the manufacture and sales of all Bristol turbojet engines in Italy.

AVIATION CALENDAR

- Jan. 9-10—Second National Symposium on Reliability and Quality Control in Electronics, sponsored by Institute of Radio Engineers, Hotel Statler, Washington.
- Jan. 10-11—Yankee Instrument Fair & Symposium, sponsored by Instrument Society of America-Boston Sec., Sherry Biltmore Hotel, Boston, Mass.
- Jan. 9-13—Society of Automotive Engineers, Annual Meeting, Sheraton-Cadillac and Statler Hotels, Detroit.
- Jan. 12—Conference on Airport Financing Problems in California, sponsored by Institute of Transportation and Traffic Engineering & University Extension, International House, University of California, Berkeley, Calif.
- Jan. 19-21—National Simulation Conference sponsored by Dallas-Fort Worth Chapter of Institute of Radio Engineers' Group on Electronic Computers, Dallas, Tex.
- Jan. 23-26—Institute of the Aeronautical Sciences, 24th annual meeting, Sheraton-Astor Hotel, New York, N. Y. Jan. 23—Honors Night Dinner.
- Jan. 23-26—Plant Maintenance & Engineering Show and Conference, Convention Hall, Philadelphia.
- Feb. 2-3—National Symposium on Microwave Techniques, sponsored by Institute of Radio Engineers' Antenna & Propagation Group and Theory & Techniques Group, Philadelphia.
- Feb. 7-9—Society of the Plastics Industry, 11th annual Reinforced Plastics Div., conference, Chalfonte-Haddon Hall, Atlantic City, N. J.
- Mar. 19-21—Society of Automotive Engineers, national production meeting and forum, Hotel Statler, Cleveland, Ohio.
- Mar. 19-22—Institute of Radio Engineers, national convention, Waldorf-Astoria Hotel & Kingsbridge Armory, New York, N. Y.
- Apr. 9-12—Society of Automotive Engineers, national aeronautic meeting, aeronautic production forum and aircraft engineering display, Hotel Statler, New York, N. Y.
- Apr. 10-11—Symposium for Management on Applications of Analog Computers, sponsored by Midwest Research Institute, University of Kansas City, Kansas City, Mo.
- Apr. 22-26—American Association of Airport Executives, 29th annual convention, Hotel Carter, Cleveland, Ohio.
- May 2—Society of Aeronautical Weight Engineers, 14th annual conference, Fort Worth, Tex.
- May 14-17—First Design Engineering Show, Convention Hall, Philadelphia. Managed by Clapp & Poliak, Inc., 341 Madison Ave., New York, N. Y.
- June 3-8—Society of Automotive Engineers, summer meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.
- June 11-15—Society of the Plastics Industry, Seventh National Plastics Exposition, New Coliseum, New York, N. Y.
- June 17-21—American Society of Mechanical Engineers, semi-annual meeting, Hotel Statler, Cleveland, Ohio.
- June 17-22—American Society for Testing Materials, 59th annual meeting and 12th apparatus exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J.



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WHO'S WHERE

In the Front Office

A. P. Fontaine, vice president-engineering and a member of the administrative committee, Bendix Aviation Corp., Detroit, Mich. William A. Uline, staff assistant, general manager, Pioneer-Central Division, Bendix Aviation.

Mark Shepard, Jr., promoted from assistant vice president to vice president-Semiconductor Products Division, Texas Instruments, Inc., Dallas.

Robert B. Anderson, former Deputy Secretary of Defense, has joined Dresser Industries, Inc., Dallas, Tex., as a member of the board and the executive committee.

Herbert Patchel, Jr., assistant to the president, Babb Co., Phoenix, Ariz. He was previously in charge of F-100 simulator development at Rheem Manufacturing Co.

Harvey S. Vincent, vice president-sales, Tammen & Denison, Inc., Chicago, Ill., consulting engineers.

Honors and Elections

Frederick Davis, assistant to Civil Aeronautics Board member Chan Gurney, has been named director of the Air Traffic Conference Enforcement Office, effective Jan. 1.

Walter J. Short, Allegheny Airlines vice president-treasurer, elected president of the Airline Finance and Accounting Conference of Air Transport Association of America.

T. F. Walkowicz, aeronautical engineer on staff of Laurance Rockefeller, and H. A. Sosnoski, aviation adviser to president of Olin Mathieson Chemical Corp., have been elected to the enlarged board of Marquardt Aircraft Co., Van Nuys, Calif.

Changes

George H. Stoner has been given overall responsibility on program planning for Pilotless Aircraft Division, Boeing Airplane Co., Seattle, Wash. He formerly directed the division's guidance and test section. C. M. (Buck) Weaver, facility manager, pilotless aircraft.

Dr. Richard Vogt, German aircraft designer and formerly with Wright Air Development Center, has joined Aerophysics Development Corp., Santa Monica, Calif., as staff engineer.

Al Mooney, lightplane designer, Lockheed Aircraft Corp., Marietta, Ga., as design specialist in the Special Projects Division.

Thomas B. Spoehr, general manager, Aviation Division, Pheoll Manufacturing Co., Chicago, Ill.

Gordon J. Staub, treasurer, Curtiss-Wright Corp., Wood-Ridge, N. J. M. E. Jordan, Jr., former secretary-treasurer, retains his duties as secretary.

Warren C. Dunn, assistant manager, General Apparatus Sales Department, Union Switch and Signal Division, Westinghouse Air Brake Co., Pittsburgh, Pa.

Everett M. Patterson, executive engineer, Standard-Thomson Corp., Dayton, Ohio, formerly vice president-engineering, Avien, Inc., N. Y.

(Continued on page 88)

INDUSTRY OBSERVER

► Watch for Military Air Transport Service to buy a substantial quantity of Boeing C-135 jet transports. MATS has completed evaluating the Boeing and Douglas jet transport designs. Major factors favoring the Boeing transport are prior USAF commitment on the KC-135 tanker and earlier delivery dates. MATS is anxious to get into the jet transport picture as soon as possible.

► General Electric's J79 turbojet, which is in the 12,000 lb. thrust class, completed its 150-hr. type test. The engine has a thrust-weight ratio approaching six, a 40-in. diameter and is designed to use a minimum of critical materials. GE is phasing out production of its J47 and moving toward volume production of the J79. The company produced approximately 35,000 J47 turbojets. The J47 production program will be terminated early in 1956.

► Convair is organizing an extensive test program for its B-58 sub-systems prior to first flight of the supersonic bomber at Ft. Worth, Tex., next fall. Present plans call for a fleet of two B-36s, three C-131Bs, an F-89, F-86 and a B-47. Initial sub-system flight tests have already been started in a B-36.

► Roll-bonded sheet for aircraft skin, developed by Olin-Mathieson, is being studied by Lockheed and McDonnell as a possible solution to thermodynamic problems at high speeds. Sheet is fabricated with integral channels through which fuel or a coolant could be circulated (AW Nov. 29, 1954, p. 37). Transport manufacturers are studying the possibility of using the material as a fuel-carrying skin.

► Navy is convinced that production bugs have been worked out of Tacan short range air navigation system and has ordered Federal Telecommunications Laboratory to begin production of the improved models.

► U. S. Army is considering a proposal by Camair, Galveston, Tex., to convert its L-17 liaison planes to a twin-engine configuration. Camair, a major producer of Twin Navions, recently received approval from the Civil Aeronautics Administration to increase the gross weight of its Model 480 from 3,930 lb. to 4,323 lb., providing a 1,373 lb. useful load.

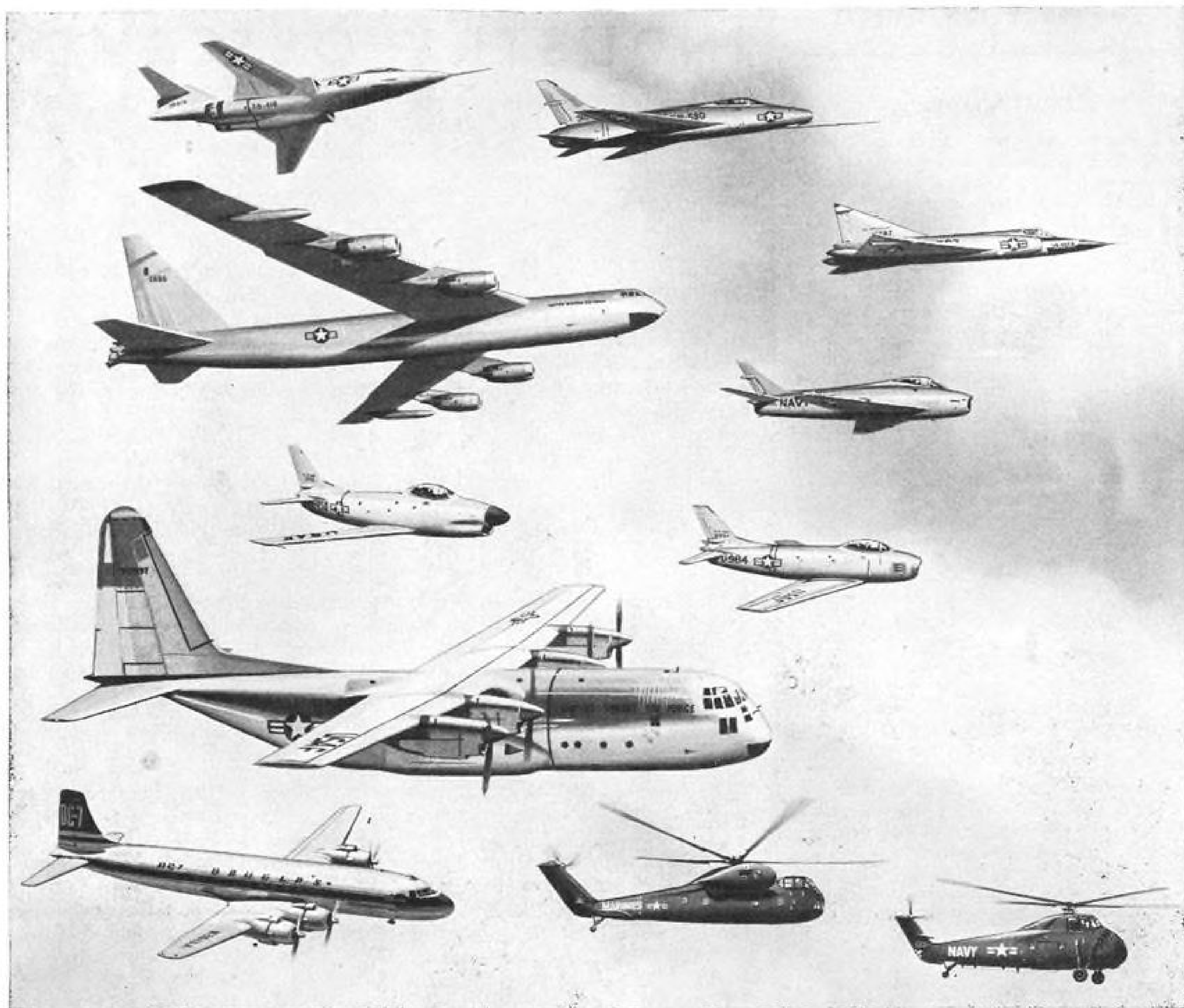
► Lockheed Aircraft is constructing a new facility at its Marietta, Ga., plant to check radiation patterns of aircraft structures and equipment subjected to atomic exposure. Transportation and handling of the materials under test will be done by remote control.

► Corning Glass Works is developing a new radome and canopy glass highly resistant to thermal and mechanical shock for flight speeds of Mach 2 and faster.

► Lockheed is considering the Bristol BE25 turboprop engine for eventual installation on its 1649 Super Constellation. Decision hinges on whether Curtiss-Wright builds the engine.

► American Airlines faces a problem of where to maintain its recently ordered Boeing 707 jet transports. Tulsa, site of its main overhaul base, is unsuitable because the aircraft will not be making regular scheduled stops there. To deadhead the jets would be uneconomical. American probably will establish its 707 maintenance base at New York International Airport because of its proximity to Hartford, home of Pratt & Whitney Aircraft, makers of the plane's engines. Idlewild has also ample room for future expansion.

► First turboprop propeller to receive authorization for a 1,000 hr. overhaul period by the USAF is Aeroproducts Model A6341-FN-198. One of these propellers was recently removed from a T-56 engine installed on a USAF Convair YC-131C after 1,001 hours of operation. The same basic propeller, which also has a CAA type certificate, probably will be installed on Lockheed's Electra turboprop transport.



Left to right, from top to bottom: McDonnell F-101; North American F-100; Convair F-102A; Boeing B-52; North American FJ-4, F-86D, and F-86H; Lockheed C-130; Douglas DC-7; Sikorsky S-56 and S-58.

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Washington Roundup

Honaman Out

R. Karl Honaman has resigned as Deputy Assistant Secretary of Defense for Public Affairs, as predicted by AVIATION WEEK (Oct. 3, p. 11). He will return to Bell Laboratories, but the aircraft industry probably will find itself with security review problems that get worse instead of better. Mantle as top arbiter of security questions appears to have been taken up by Lee M. Hargus, Deputy Director of the Office of Security Review. Immediate result was an order that, in effect, takes away all prerogatives of military service representatives in the security review office, forces them to go to Defense Department for any decision of the type sought by aircraft industry representatives. Hargus usually makes these rulings, traditionally with no regard to previously released information. Before Honaman left, the Security Review Branch received verbal orders putting a ban on release of performance data before a new plane or weapon has been in service for a year. Actually, exact performance data never is disclosed and the existing handbook on "Releasable Information by U. S. Air Force Aircraft" was drafted with this policy in mind.

CAB Scramble

Scramble for the Civil Aeronautics Board chairmanship is in full swing with the prospect that Ross Rizley will vacate the post as soon as he is nominated for a Federal judgeship in Oklahoma early in January (AW Dec. 12, p. 11).

Present Administration plans are to announce Rizley's resignation from CAB, his appointment to a judgeship, and his CAB successor simultaneously.

Three leading candidates for the post are:

- **Franklin Stone**, 45, general counsel of the Civil Aeronautics Board. Stone, who came to this post from a private law practice in Waseca, Minn., served as Waseca County Chairman of the Republican Committee. He is a former FBI agent, served with the Office of Strategic Services during World War II.

- **Warren Baker**, 41, general counsel of the Federal Communications Commission. Baker is a former CAB hearing examiner who served as executive assistant to former CAB chairman Oswald Ryan, a Republican. He is from Indiana.

- **Earl Kintner**, 43, general counsel of the Federal Trade Commission. Kintner, also an Indiana Republican, joined FTC in 1948 as a trial attorney. He served in the Navy during World War II.

These three candidates meet the broad qualifications for the post laid down by the Republican National Committee. The committee wants a young man presently in Government so that there will be no delay in his immediate appointment because of security clearances.

Defense Operations

Department of Defense is moving more strongly into the operating business of the Army, Navy and Air Force. Manifestations are the edicts issued by Assistant Defense Secretaries Frank Newbury (Applications Engineering) and Thomas P. Pike (Supply and Logistics) and Deputy Secretary Reuben B. Robertson. The reason is legitimate because it seeks economy, full utilization of technical resources and a curb on inter-service rivalry. However, there are men in uniform and in industry who feel that

a lumping of requirements and rules pays too little attention to individual service requirements. Full-fledged alarmists warn that the trend may lead to abolition of the three armed services, establishment of a single uniform and military establishment. This idea has received first-hand support from Viscount Montgomery but he did not press the concept on his recent tour of the U. S.

Pay Limit Reason

Manufacturers who accepted large overpayments on incentive-type contracts and invested the money in Government bonds while waiting for the Navy to redetermine the price were responsible for the 105% limitation placed on payments by the Defense Department. In a frank statement to the National Association of Manufacturers, Rear Adm. Robert L. Swart, Vice Chief of Naval Materiel, said he understood industry's objections but under the old system the Navy had too much in idle funds, actually working for someone else. He promised action to speed settlements under revised Defense Directive 4105.7 (AW Dec. 12, p. 15).

Sandia Mountain Crash

Last word hasn't been written yet on the Civil Aeronautics Board accident report covering the Trans World Airlines crash on Sandia Mountain near Albuquerque Feb. 19 (AW Nov. 28, p. 80). This will probably be the second CAB accident report re-opened by industry pressure pointing out facts neglected in the final report. First was the Northwest Air Lines Sandspit accident during Korean war contract operation on which a revised report was recently issued by CAB (AW Nov. 28, p. 115, Dec. 12, p. 101).

Seaboard Bid

Latest entrant in the bidding for operating contract of the proposed Austrian National Airlines is Seaboard & Western Air Lines, recently certificated for an all-cargo transatlantic route. Seaboard has the inside track on an Austrian deal for a New York-Vienna run. The all-cargo line has picked up the negotiations at the point they were dropped by the domestic non-scheduled carrier group, North American Airlines.

Seaboard sees a number of advantages to an operating contract with the Austrians as an adjunct to its own scheduled overseas all-cargo services which will start soon. Equipment is no problem for S&W, which is what forced North American to abandon its plans. Seaboard is operating a mixed fleet of DC-4s and Super Constellations, of which two of the latter are on lease to British Overseas Airways Corp. until April 1956. An additional order for 1049H Constellations was placed by Seaboard with an assist in the financing from a new company which includes NAA officials.

Pearson Job Hunting

Harold "Pete" Pearson, recently fired as president of the Air Transport Assn. (AW Dec. 12, p. 11), is actively seeking appointment as an Assistant Secretary of the Army. His chances are slim. Pearson previously served with the Department of the Army as an assistant to Earl Johnson, Pearson's predecessor as ATA president.

—Washington staff

U.S. Plans to Launch 12 Earth Satellites

1957-58 launchings probably will be staged in Florida. Satellite observation a major problem.

By Philip J. Klass

New York—The U. S. plans to launch 12 earth satellite vehicles during the 1957-1958 International Geophysical Year providing Congress produces the necessary supporting funds.

The satellites probably will be launched from the Air Force Missile Test Center, Patrick AFB, Fla., although the Australian Woomera missile range is another possible site.

First figures on the number of satellite-vehicle launchings planned, plus other heretofore undisclosed details on the U. S. satellite program, were revealed here by Dr. James Van Allen and Dr. Martin Summerfield at the joint meeting of the American Rocket Society and the Institute of Radio Engineers.

Van Allen, head of the State University of Iowa's Physics Department, is a member of the Upper Atmosphere Research Panel. Summerfield, former head of rocket propulsion at the California Institute of Technology's Jet Propulsion (missile) Laboratory, is now professor of jet propulsion at Princeton University.

Dr. Van Allen revealed that:

- Keeping the satellite under observation and recovering its vital telemetered data, is expected to be "more difficult than getting the satellite up there into its orbit."
- Balloon-launched satellites, using existing two-stage rockets as an alternative

to an untried three-stage rocket launched from the earth, are under consideration by Australian authorities as well as by some U. S. scientists (AW Oct. 10, p. 45).

- U. S. scientists, who made up the original satellite proposal for the Geophysical Year, got no advance indication of top-level approval prior to the official White House announcement (AW Aug. 8, p. 14).

- Satellite orbit probably will be a diagonal flight path, a compromise between a polar and an equatorial orbit. The lay-out of the launching range itself will be a determining factor on the direction of launch and hence the orbit. USAF's Florida range is inclined about 45 degrees from north and points in an easterly direction, an advantage since the satellite would gain a portion of the earth's rotational velocity.

Satellite Life

The useful life of the satellites before they slow down and orbit into the earth's atmosphere where they will disintegrate will depend upon the initial orbiting altitude achieved. In estimating the useful satellite life at different altitudes, Summerfield and Van Allen came up with slightly different figures.

Summerfield predicted a satellite life of about one year if the initial orbit altitude reached is 300 miles.

The life span would drop to 15 days at 200 miles altitude and less than one hour at 100 miles, Summerfield said.

Satellite Award

Contract for the second stage of the three-stage rocket vehicle to be used in the Project Vanguard earth satellite program was awarded by the Navy Department to Aerojet General Corp., Azusa, Calif.

The Glenn L. Martin Co. earlier was awarded the contract for a launching vehicle, first stage of which will be an improved Viking rocket. General Electric Co. is building a more efficient rocket motor for the Viking. Contract for the third stage of the launching vehicle, which will contain the instrumented satellite, has not been awarded.

Van Allen calculated that the satellite life would be "several weeks" at an initial orbit altitude of 136 miles, and about a week at approximately 100 miles.

The final velocity of a three-stage rocket required to put the satellite into an orbit 400 miles above the earth was estimated by Summerfield to be between 27,100 and 29,500 ft./sec., depending upon the technique to be employed.

This compares with the classical "escape velocity" of 36,700 ft./sec., or the 24,200 ft./sec. needed for an intercontinental ballistic missile with a 7,000-mile range. (The German V-2 achieved a burn-out velocity of 5,000 ft./sec.)

Ballistic Ascent

The higher velocity (29,500 ft./sec.) is needed if a direct ballistic ascent path to orbiting altitude is used. The lower velocity would be sufficient, Summerfield said, if the rocket employs a tangential approach path to its orbit altitude.

It will not reach this altitude, however, until the satellite is half way around the earth, 12,500 miles away.

Because a last-minute burst of energy is needed to kick the satellite free of the third stage rocket and into its orbiting path, the control of this critical operation would be extremely difficult if the rocket is half way around the earth from its launching site. Summerfield suggested as an alternative a modified ballistic ascent in which the vehicle would coast for a while between burn-

out of the second stage and the firing of the third stage.

He presented the results of his own calculations as to the performance which might be achieved by each stage of the satellite rocket based on characteristics of the Viking 11 and expected advances in the state of the art since it was designed by Martin in 1951 (see table page 12).

Scientific Exploration

Dr. Van Allen emphasized that the U. S. satellite program "definitely is not a smokescreen to cover up military uses." The project, he said, will be under civilian control and every country in the world "will be dealt in on the results." (Some of the findings, however, undoubtedly will be useful to intercontinental ballistic missile designers, which explains why the Defense Department is supporting the venture until Congress reconvenes and authorizes a supporting appropriation.)

Van Allen called the satellite program "a logical extension of present geophysical studies," which previously have been carried out with high-altitude sounding rockets such as the Viking. Such explorations, however, are so brief they provide only "an occasional and infrequent peek" into the upper atmosphere, Van Allen said.

The satellite will enable scientists to make much more comprehensive measurements and determinations of such things as:

- Cosmic ray energy level, which is greatly attenuated by the time the rays pass through the earth's atmosphere. The vehicle also will enable scientists to measure the variation of cosmic ray intensity at different latitudes.
- Correlation between solar ultra-violet radiation and the changes which take place in the ionospheric "E" and "F" layers, which in turn often seriously affect long-range radio propagation.
- Whether rare radioactive isotopes of lithium, beryllium and boron, which have been detected in previous rocket soundings, exist in the cosmic radiation as it arrives from outer space or whether they result from a reaction with the earth's atmosphere.
- Air density of the upper atmosphere. Very meager information is available on the density of air at altitudes beyond

180 miles. The rate at which the earth satellite decelerates will make it possible to calculate air density at its orbit.

- Severity and frequency of meteor fragments encountered in the upper atmosphere.

Scientists also are anxious to learn more about a new type of radiation, a sort of "soft X-ray" (15 to 20,000 volts) which appears to be concentrated at a latitude of about 65 to 70 degrees, in the region of the Aurora Borealis.

Big Enough to See

Satellite size will be determined partially by the smallest size which can be seen at night, Van Allen said. He reported that a 30-inch diameter vehicle, when located near the horizon at sunset, will reflect sufficient sunlight to appear twice as bright as the faintest star visible to the naked eye.

On this basis, Van Allen predicted that the satellite vehicle would measure two to three feet in diameter and weigh 20-30 pounds. Its shape might be "spherical, conical, or other," he said. The satellite skin thickness will be only 20 mils, Van Allen said, so that its disintegration will be assured when it hits the atmosphere.

Data Collection Problem

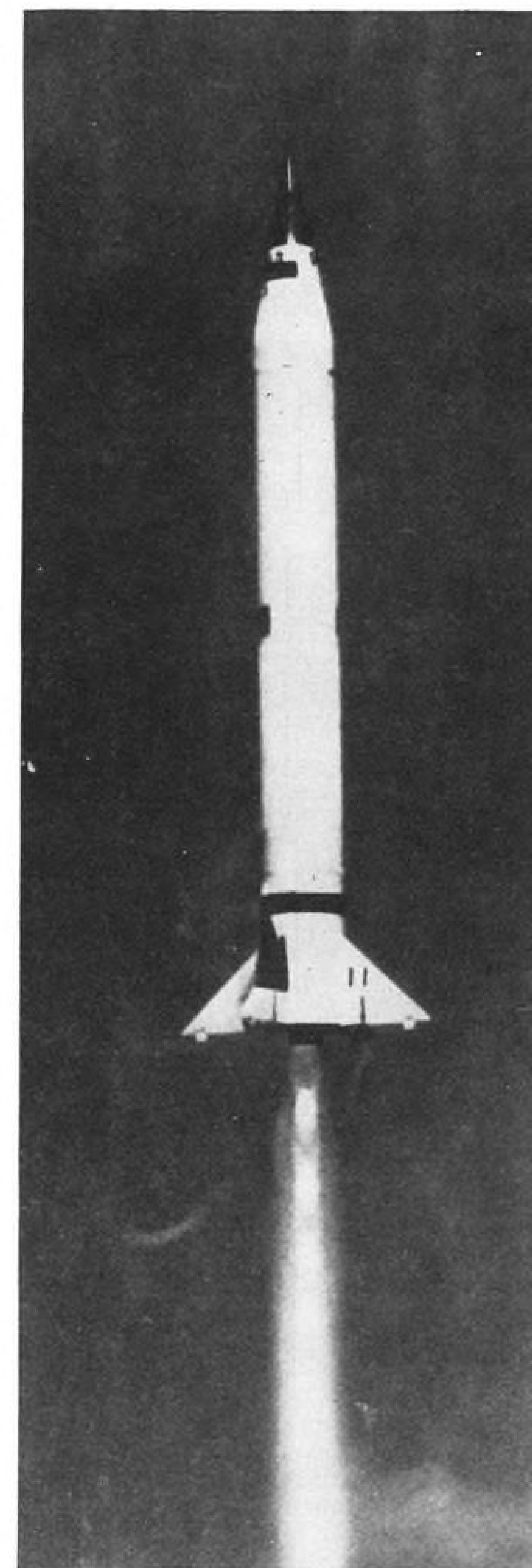
"A major portion of the entire satellite undertaking" is the problem of observation and telemetering of the satellite's vital scientific measurements, Van Allen emphasized. The satellite (as previously reported) will make one revolution around the earth every 90 minutes. However, because of the earth's rotation inside the vehicle's orbit, the satellite will sweep past a different portion of the globe during each successive orbit.

Because of the modest amount of electrical power available for the satellite to operate its telemetering transmitter, 200 ground receiving stations would be required for continuous global coverage.

The required number of ground stations could be greatly reduced by limiting radio contact with the satellite to once every 90 minutes, providing some lightweight means can be found to store satellite measurements between radio transmissions.

Solar batteries, made of silicon wafers which can generate nearly 5 watts per pound weight, appear to be the most promising source of electrical power, according to Van Allen. Some storage batteries will be carried, however, to provide power when the satellite vehicle is not exposed to the sun.

To conserve satellite power, its transmitter might be designed to transmit only when interrogated by an official ground station. The U. S., however, proposes to publish the vehicle's transmitting frequencies and schedule.



ADVANCED VERSION OF VIKING 11 (above) will be the first-stage of three-stage rocket that will push the U. S.'s earth satellite vehicle into its orbit hundreds of miles above the earth. The Martin rocket holds the altitude record for single-stage rockets, having climbed 158 miles above the Navy's launching site at White Sands Proving Ground, N. M. The satellite's second-stage rocket will be designed by Aerojet General Corp. The third-stage contract has not been announced.

Satellite Characteristics

Comparison of Viking 11 and Estimated Satellite Rocket Characteristics.

	Viking 11	Earth's Satellite		
		1st Stage	2nd Stage	3rd Stage
Specific Impulse	186 sec.	240 sec.	280 sec.	260 sec.
Gross Mass	15,000 lb.	15,000 lb.	2,000 lb.	200 lb.
Thrust	21,000 lb.	38,000 lb.	8,400 lb.	730 lb.
Burning Time	103 sec.	70 sec.	50 sec.	50 sec.
Structure Mass	2,200 lb.	1,800 lb.	300 lb.	30 lb.
Ratio of Structure to Gross Mass	14.6%	12%	15%	15%
Payload	825 lb.	2,000 lb.	200 lb.	30 lb.
*Δ Burn-out	6,000'/sec.	7,650'/sec.	11,200'/sec.	10,000'/sec.
Total Velocity at Burn-Out ...		7,650'/sec.	18,850'/sec.	28,850'/sec.

(Note: First and second stages use liquid fuel; third stage uses solid propellant.)

* Increment of velocity developed by each stage at burnout.

Russian Satellite?

"The Russians appear to be capable of putting up their own earth satellite vehicle, and they might even beat us"—Dr. James Van Allen, member of the Upper Atmosphere Research Panel at the joint meeting of the American Rocket Society and the Institute of Radio Engineers.



LONG BELTS OF 20MM. ammunition are loaded into F-100 (left) during Exercise Sagebrush maneuver, for which the 479th Fighter Day Wing managed to scrape together two F-100 squadrons with the necessary ordnance (right), spares and skilled maintenance men.



F-100 PILOTS feel maintenance pinch through loss of flying time, although they must have more cockpit talent than ever before.



SUPER SABRE pilots are enthusiastic about plane's performance, but its capability is hampered by lack of maintenance personnel.

Shortage of Maintenance Personnel Curbs

By Claude Witze

Foster AFB, Tex.—Operational capability of U. S. Air Force's first supersonic fighter, the North American F-100 Super Sabre, is seriously handicapped by USAF's lack of skilled maintenance personnel.

At headquarters here of the 450th Fighter Day Wing, AVIATION WEEK learned:

- Literally millions of dollars worth of our fastest and most potent weapon systems are idle on the runways in "flyable storage" status. This means they are given weekly runups to keep them ready for action; they are not "pickled" and can be put into action quickly, but there are not sufficient ground crew skills to keep them operational at all times.

- Pilots of the 450th, among the best in USAF, are not getting their full quota of flying time and are disgruntled with the situation. The training program, however, is considered satisfac-

tory at this stage. Flight personnel are shifting from the earlier North American F-86 Sabre to the F-100C fighter-bomber version of the supersonic aircraft.

- North American Aviation, manufacturer of the F-100, is seriously concerned over the grounding of its newest product. The company has 35 of its own mechanics here under contract with USAF to help train enlisted personnel in maintenance of the new plane.

- A similar but less severe situation exists at George AFB, Calif., where the 479th Fighter Day Wing, operates the F-100A day fighter version of the Super Sabre. The manufacturer has 17 mechanics at this base. The wing managed to pool its resources and talents to provide two squadrons of F-100s for service with the Aggressor's Sixth Air Army in Exercise Sagebrush, joint Army-Air Force maneuver held last month in nearby Louisiana.

- Tactical Air Command is putting intense effort into its maintenance train-

ing program, seeking to upgrade all personnel and improve their skills. The North American mechanics are working with TAC on Operation Toolbox, a stringent schedule of both classroom work and on-the-job training to improve maintenance capability.

New Complexities

Col. Joseph Mason, commander of the 450th, told AVIATION WEEK his wing is almost fully equipped with F-100Cs. Aircraft have been delivered on schedule since last July, which marks the point at which the unit started to feel the personnel pinch.

In replacing the F-86F, initial table of organization for the 450th has been revised in keeping with the increased complexity of the new aircraft. At the outset, it requires 3.9 men instead of 2.1 to keep each aircraft in flying condition. With experience, this ratio will decline.

Pilots of the 450th, including Lt. Col. Herbert Ross, operations officer

F-100's Operational Capability

for the 322nd Fighter Group, point out that in the shift from the F-86 to the F-100 the 450th acquired twice as much sheer weight and metal to take care of.

In addition, there is the added complexity of the new plane. All of the cockpit, fire control system, fuel controllers and even such details as the advanced gunsights lend to the vast new maintenance problem. The F-100's drag chute for landing, its Pratt & Whitney J57 jet engine with three turbines, two compressors and electronic controls create new problems for the ground crews.

At the Pentagon in Washington, the picture was completed by Brig. Gen. Albert G. Hewitt, USAF's Director of Maintenance Engineering.

Reasons for Problems

Gen. Hewitt emphasized to AVIATION WEEK that the problem of maintenance skills is one faced by USAF at all times, as the ground and flight crews go through transition to new equipment.

He said, however, that the problem has been especially critical in recent months. Here are some of his reasons:

- Fiscal 1956, which ends in June, is the period of peak attrition for USAF mechanics who were enlisted during the Korean buildup. Large numbers of fairly skilled men have been returning to civilian life and it will be some months before this year's intensified recruiting effort is felt. It will result in a leveling of strength and an overall improvement of the skill level.

- Industry is competing heavily for the services of skilled airplane, engine and electronic repairmen. North American mechanics working at Foster and George receive substantially higher salaries than enlisted men.

- In the post-Korea period there have been major gains in the state of the art. Gen. Hewitt points out that in World War II USAF could make good airplane mechanics out of farm boys with grade school educations. Now USAF must start with high school

graduates when it trains maintenance personnel for modern weapon systems. In addition, it takes longer to develop the skills.

- Increased complexity of the aircraft. For each hour of flight an F-100 probably needs about 50 hours of ground work. The corresponding figure for the F-86D was 46 hours and for the World War II F-51 Mustang, it was only 13 hours.

- In shifting personnel from unit to unit, USAF must consider priorities. Tactical Air Command does not rate as high as the Strategic and Air Defense Commands. Within TAC, units headed for overseas service have a priority over those based in this country.

- Fast rate of aircraft delivery in the past year, as USAF drives toward its 137-wing goal, has added to the maintenance personnel problem.

- The F-100, first of the century-series supersonic fighters, is drawing many mechanics from units that have flown

piston-engine planes. These men can be trained only on the F-100 and the program to give them proper skills had to be geared to deliveries, which started last summer.

Gen. Hewitt believes it would be possible to keep all F-100s flying at the present time, but that there would be sacrifices in economy and safety. He points out that the newly-equipped wings can fly one aircraft for 10 hours a great deal easier than they can two planes for five hours each.

TAC's training program, Operation Toolbox, is designed to lift the skill level of the mechanics at Foster and George Air Force Bases. Maintenance personnel operate under three grades: 3, 5 and 7. According to Col. Mason, the skill requirement on the F-100C is high enough that each crew chief should be a grade 7 man who is a technical or master sergeant.

Training such a specialist can take 3 to 4 years. Result is that it is a rare mechanic who reaches 7-level skill in his first 4-year enlistment. Most men of this grade are well into their second hitch with USAF.

Operation Toolbox is producing results, according to USAF, but some of the high-skill workers it produces are diverted to overseas assignments or other commands with a higher priority.

New Data Delays

Taking care of the F-100's more than 37,000 lb. of hardware is not the only difficulty encountered in introducing the plane to USAF crews.

There is a constant lag in technical data and orders. This results from the fact that both versions of the F-100, A and C, were put in the hands of operational units before all testing had been completed. The day fighter completed its operational tests in August and up until recently the stock level of spare parts had been based entirely on speculation.

This situation is being corrected as the logistics data become available for that version. The F-100C fighter-bomber version still has not completed these tests to determine logistics needs and the spares situation in most cases depends on figures provided for the F-100A version. However, the C model has its differences, particularly in the area of armament, where sound technical data is lacking.

The delays in providing this information is accompanied by slow revision of maintenance handbooks, which contain considerable outdated data. Operating units are forced to work out their own tentative charts to measure overhaul periods, spare part needs and combat capability.

In Washington, USAF spokesmen pointed out that "feast or famine" is routine with the introduction of new

equipment. In developing spares requirements for early operation of a plane such as the F-100, cost considerations force use of the most conservative possible estimates.

For a World War II airplane, lifetime parts were ordered with the aircraft. Today's expensive components make this policy impossible. By 1957, headquarters says, the spares situation will be on target and the domestic operations problem resulting from shortages will be eased.

Flight crews of the F-100C are enthusiastic about their airplane, but constantly emphasize that it calls for

more skill. This goes for pilots as well as maintenance men.

USAF's Training Command is being forced to improve the quality of its fliers, give them enough experience to qualify as professional fighter pilots before they are assigned to the F-100.

In their everyday work learning to operate as a group, they fly as fast as Col. H. A. Hanes, who set a world speed record of 822 mph. last summer in the F-100. This kind of operation, with landing speeds of 185 mph. that require use of landing chutes, calls for more cockpit talent than ever before in the history of USAF.

Lockheed Missile Scientists Quit

Los Angeles—Lockheed Aircraft Corp. last week announced that 15 scientists have resigned from its Guided Missiles Division in a policy disagreement over whether scientific personnel should have a controlling influence in projects fundamentally of a research nature.

Lockheed management said the resignations, most of which become effective January 1, will not impair the missile project.

"We are not making very much of this ourselves," a Lockheed spokesman said. "Work will continue just as before. It is a small point in our lives in view of the fact it involves only a small handful of people."

Meanwhile, informed sources here say there is a possibility that the Pentagon will step into the row.

Dr. Ernst H. Krause, director of the research laboratories branch, who headed the list of resignations, was in Washington to report on the dispute in the missiles department.

Krause's resignation followed by a month the resignation of Elwood R. Quesada to which the rash of current resignations can be tied.

The resignations are believed to have been the result of a company announcement of lines of authority on a new project. The scientists felt the new policies put them in a secondary role.

Dr. Louis A. Ridenous, former chief scientist for the Air Force and member of Lockheed's Missile Division for the past year, was appointed to succeed Krause, Lockheed announced.

The company released the names of six of the fifteen scientists:

Dr. Montgomery H. Johnson, director of nuclear laboratory; Dr. J. L. Barnes, director of computer and controls laboratory; Dr. Eric Durand, head of systems laboratory; Dr. H. H. Hall, assistant head of nuclear division; Dean Wanlass, laboratory head-computer and control laboratory; John Aseltine, research scientist, computer & control laboratory.

The resigning scientists plan to form a new company, with headquarters in

Van Nuys, Calif., to handle consultation work in guided missiles.

Lockheed has been swamped with applications for new people. By the middle of last week Lockheed already had received 138 to 140 applications from hopeful replacements. The company said it has more than 2,500 people in missile work and replacements will be made from both the California and Georgia plants.

Dr. Montgomery H. Johnson explained the resignations this way:

"The question involved is the manner in which the research laboratory should operate within the division. That is, what is its precise role? It amounts to whether the research laboratory should have a controlling influence in projects which are fundamentally of a research nature. Top management said: 'No.'"

"Essentially, this would make the research laboratory a kind of service organization to be called in for help when problems arise."

Johnson said there are two ways in which a complicated research and development project in missile systems work could be handled:

- **Projects managed by a group** other than the research laboratory and asking for research assistance when problems arise where the help is needed. This, Johnson said, is the way the Lockheed top management intends to run the division.

- **Control of progress** from the outset could be in the hands of the research group for those weapon systems in which the skill and technical know-how required is beyond the existing stage of the art. Johnson said the scientists felt so strongly in favor of this that they could not go along with management.

Another spokesman for the resigning scientists said that the highly acclaimed scientists are essential to today's and tomorrow's weapons which are revolutionary in character. Everyone knows, he said, uninhabited or unmanned weapons require a technical know-how outside of the straight aeronautical field.

Wrangle Looms Over Defense Budget

Washington—Defense Department's Fiscal 1957 budget battle is shaping up as the bitterest wrangle since former Secretary of Defense Louis Johnson slashed military funds after World War II.

Evidence indicates defense expenditures will be raised instead of lowered and the emphasis on air power will not be slackened in Fiscal 1957. Aircraft procurement will continue at a high rate. Research and development, particularly for missile projects, will get better support than ever before.

This time the nature of the conflict is different than in the pre-Korea days, but it has similar military, political and financial aspects. Feelings run higher, the times are more critical and the individual armed forces feel their peril is greater.

- **There are strong indications** that the defense expenditures will be larger than Secretary Charles E. Wilson's goal of \$34.5 billion. Despite pressure of Treasury Secretary George M. Humphrey, who wants the GOP to offer a balanced budget for political reasons in 1956, Pentagon experts believe it will be impossible to keep expenditures below \$35.2 billion.

- **House Speaker Sam Rayburn** was asked last week whether he thought the Administration is spending enough for defense. Reply of the powerful Texas Democrat was significant: "In all probability we will be." So far as the Air Force is concerned, reliable sources on Capitol Hill said its outlay will total \$17.2 billion, up \$700 million from Fiscal 1956. At the Pentagon, nobody will talk publicly about the program, but Defense Comptroller W. J. McNeil detected "a steady upward pressure on expenditures." Much as the GOP resist this pressure, Democrats are not expected to let them do it at the expense of the defense program.

- **Despite the official silence** of the military at this stage of budget discussions, there are "leaks" both covert and overt. The Army is fighting hard for its aviation and missile programs and claims it has been teamed with the Navy to push a ship-based ballistic missile of medium range. USAF is seriously concerned about pressure to stretchout aircraft deliveries at a time when its top staff members believe the present 137-wing goal is too low and perfection of the intercontinental ballistics missile has top priority.

Spurred by Army's obvious elation over the improved missile program, Secretary Wilson said the time has come in the long and intermediate-range programs where it is necessary to expand "development and testing facilities

and (establish) specific responsibilities for each of the services."

Secretary Wilson's statement was interpreted as a declaration that the Defense Department has been forced to budget manpower, knowhow and facilities as well as money. He is known to favor competition between the services but there are mitigating factors, including some pointed out in 1955 by the Hoover Commission when it spoke out against duplication of effort. An additional matter of concern to Secretary Wilson who has inter-service rivalries to contend with, is the Army's determination to stay in the missile picture, even when the range of their weapon appeared to invade USAF territory.

Secretary Wilson in some respects faces the same dilemma he had two months ago when he was being pressed to curtail spending from the Fiscal 1956 budget. He is pledged to buy airplanes at a pace that will assure a 137-wing Air Force by June 1957. He is under close scrutiny on Capitol Hill, where he has learned to respect the opinions and ability of some well-informed Democrats. Most recently he was forced to deny that any of the additional funds for missiles would come from curtailment of aircraft procurement.

Russian Threat

Gen. Nathan Twining, USAF Chief of Staff, is reported unhappy about the immediate 137-wing goal. In addition to a larger Air Force, he believes there is a serious crisis developing for lack of funds to maintain modern weapon systems. Without citing the case of the North American F-100 (see p. 14), Gen. Twining is reported to have said that USAF is not getting enough money to maintain more than 50 wings in good operational shape.

Action to increase missile money will answer at least partially the demand of Trevor Gardner, outspoken Assistant Secretary of the Air Force for Research and Development, for urgency in this area. Unlike some congressmen, Gard-

ner believes that the threat of global war has not diminished in the past year.

Gardner frankly fears that talk of a stalemate in our relations with Russia may be interpreted as an excuse for curbing research and development expenditures. Gardner cites increasing Soviet air strength, the improved capability of their planes and "a vast state of the art advancement in airborne radar capability." Industry sources, however, said that initial plans for accelerated production of new fighters had been cut back.

Stretchout?

There has been in recent weeks much speculation about an Air Force stretchout, resulting in a demand by Sen. Stuart Symington (D-Mo.) for an investigation of any failure to follow through on the accelerated procurement program (AW Dec. 5, p. 12). According to the office of Dudley Sharpe, Assistant Secretary of the Air Force for Materiel, this program has not been changed. The rumors grew out of USAF "budget exercises" designed to show what would happen if certain aircraft programs were curtailed.

In addition to continued steady purchase of "century series" fighters, jet bombers and missiles, there is strong Army optimism that its aircraft procurement program will continue in high gear. Helicopter interest continues high and there is some evidence that prices are improving while the tough maintenance record of rotary-wing aircraft is being improved. Basic price of the Piasecki H-21 Work Horse, for example, appears to be down to less than \$240,000 on the basis of the latest contract and aircraft availability during Exercise Sagebrush was reported excellent (AW Dec. 12, p. 9).

Army interest also is high in the Piasecki H-16, now powered by turbine engines, the Sikorsky H-34 and H-37. A new Bell utility helicopter has been designed for Army use. A mockup of the turbine-powered XH-40 was disclosed last month (AW Dec. 5, p. 18).

Aside from its pooling of talent with the Army on the medium-range missile, Navy is placing its bets on the nuclear-powered mobile fighting force. It announced last week it is preparing to let a study contract to Allison Division of General Motors for work on nuclear power for Navy purposes (see box).

Work will continue toward establishment of a mobile fleet capable of launching missiles. Utility of the seaplane, particularly with nuclear power, will be explored for its advantages in delivering atomic weapons without dependence on land bases.

Nuclear Power Contract

Allison Division of General Motors Corp., soon will have a contract with U. S. Navy calling for a study leading to "application of nuclear power systems to Naval requirements."

The study is related to two other contracts, with the Glenn L. Martin Co., and Convair, for development of seaplanes to be propelled by atomic power.



LOW-ALTITUDE night photograph of Dayton, Ohio, residential section. Only illumination used in the experiment was three mercury arc lamps mounted in nose of a C-47.

ARC Lamp Utilized In Night Air Photos

A new night aerial photography system which produces continuous, high-intensity illumination has been developed by the Air Research and Development Command.

The new method developed by ARDC's Wright Air Development Center utilizes a commercial-type high-intensity mercury arc lamp to provide a narrow, directed beam of continuous light. Present night photography systems use flash bombs or flare cartridges that provide intermittent light.

Standard flash bombs and cartridges produce a brilliant flash lasting only a fraction of a second, and dissipate light in all directions. Use of the mercury arc lamp enables Air Force reconnaissance aircraft to "sweep" light along the ground beneath the aircraft.

Air Force engineers in WADC's Aerial Reconnaissance Laboratory pointed out that use of the light eliminates the need for heavy, bulky equipment used with pyrotechnic illuminants, is much less expensive, and also safer, since no explosives are necessary.

Although the active element of the mercury arc lamp is no larger than a cigarette, it provides adequate light for aerial photography. The lights are difficult to see from the ground because of their narrow beam and blueish hue. On an approaching aircraft, the light appears as a distant star to ground observers.



ENGINEER HOLDS tiny bulb used in mercury arc lamp night photo illumination system shown here installed in C-47 nose.

XH-17 'Flying Crane' Testing Completed

Culver City, Cal.—Three years after its first flight, the Hughes "Flying Crane" has completed its test program and "proved the feasibility of pressure-jet, single-rotor helicopters for heavy-duty cargo carrying," according to an announcement by the Aircraft Division of Hughes Tool Co.

Built under an Air Force contract and designated the XH-17, the huge

copter has picked up a trailer van, largest object ever lifted by rotary wings, the company said. It did not announce how heavy the van was, but said a helicopter of the XH-17 design could carry loads of more than 10 tons.

For military use, the company says an aircraft of this type could be used to lift a pod with 75 troops and their combat equipment, a 155 mm. howitzer, a 24-ton truck, a bulldozer or an assembled bridge.

Hughes engineers found they could increase blade life and reduce stresses by as much as 50% by building weights into the blade at strategic points. Blades on the XH-17 are 130 ft. in diameter.

In the recent Hughes tests, they were flown in excess of 70 miles an hour, lifting a gross weight of more than 46,000 lb.

The XH-17 is powered by two modified General Electric J35 turbines, forcing gas under pressure to tip burners on the rotor blades.

Second SeaMaster Ready for Taxi Tests

Second prototype of the Martin XP6M-1 SeaMaster, jet seaplane which exploded in mid-air recently (AW Dec. 12, p. 7), will be ready for taxi tests in late December.

Navy Under Secretary Thomas S. Gates Jr., said last week the Navy is going ahead with the program and retains "every confidence" in the aircraft.

Gates and Rear Adm. J. S. Russell, Chief of the Bureau of Aeronautics, inspected the second SeaMaster at the Martin plant and salvage operations for the first plane, which crashed in the Potomac River.

No explanation of the accident has been announced, pending reconstruction of the wrecked aircraft.

Air Force, Navy Obligations Slump

Air Force contract cancellations during October for aircraft and related items amounted to \$194 million more than new contracts let. Navy had net obligations only \$7 million in the same month.

Total obligations for both services since the start of Fiscal 1956 on July 1 is \$64 million. Air Force shows a minus obligation of \$224 million.

USAF now has an unobligated balance of \$10.8 billion and the Navy has \$3.9 billion.

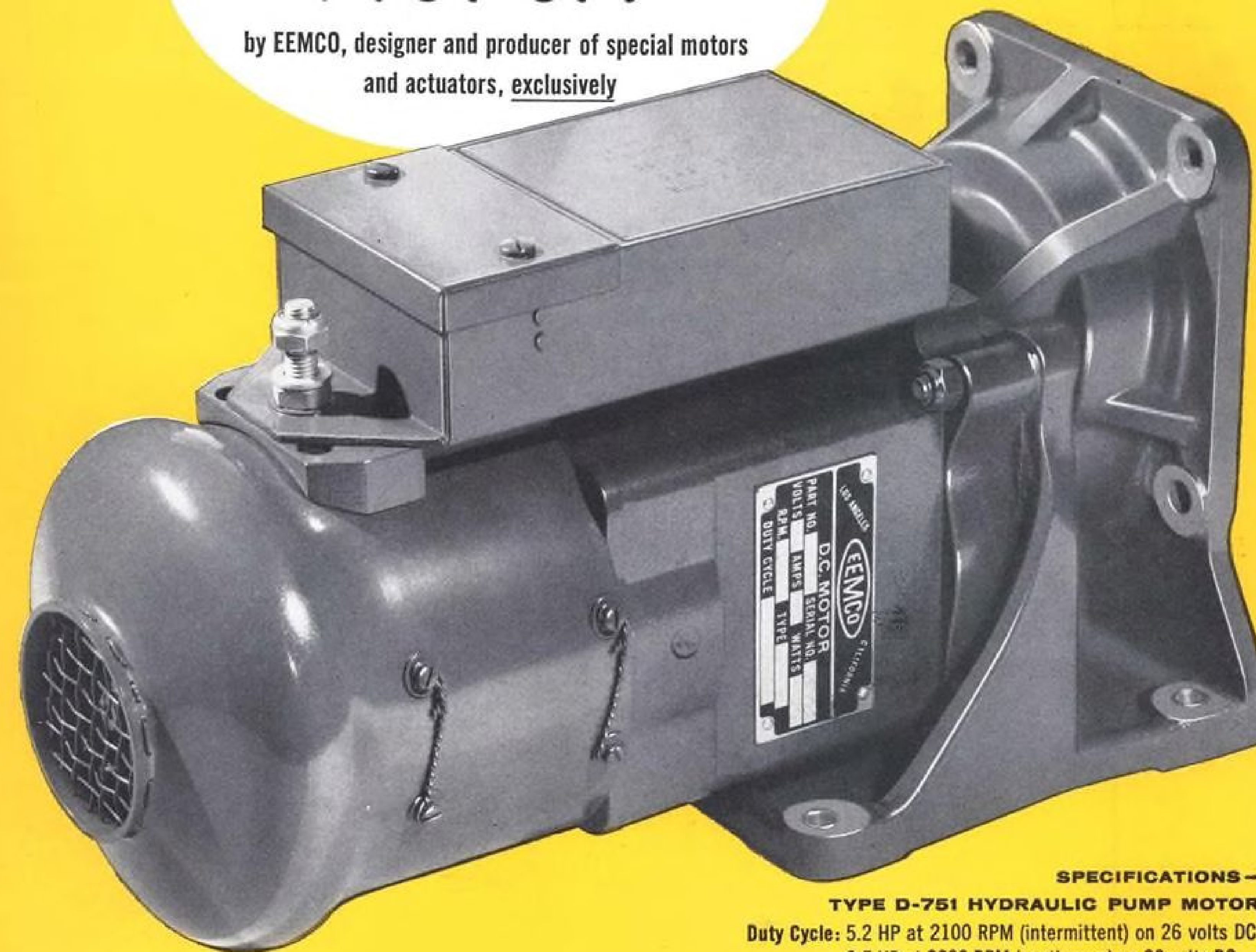
Expenditures during October were \$494 million for the Air Force and \$134 million for the Navy. Expenditures by both services since July 1 amount to \$2.5 billion.



technical bulletin

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Weight: 20 pounds

Military Specifications: Meets MIL-M-8609

EEMCO Type D-751 is a rugged hydraulic pump motor used in activating the nose wheel assembly and other vital units in Northrop Scorpion F-89 long-range interceptors. It was specially designed by EEMCO to operate unfailingly in the severe arctic cold encountered by the U.S. Air Force in Alaska, Greenland and other far north areas. EEMCO motor Type D-751 delivers 5.2 HP, intermittent, at 2100 RPM and 3.5 HP, continuous, at 2200 RPM on 26 volts DC. It was designed to meet Specification MIL-M-8609 for electric motors. This efficient product is being produced on a tight production schedule by EEMCO, whose complete design and production facilities are devoted to the manufacture of special motors and rotary and linear actuators.

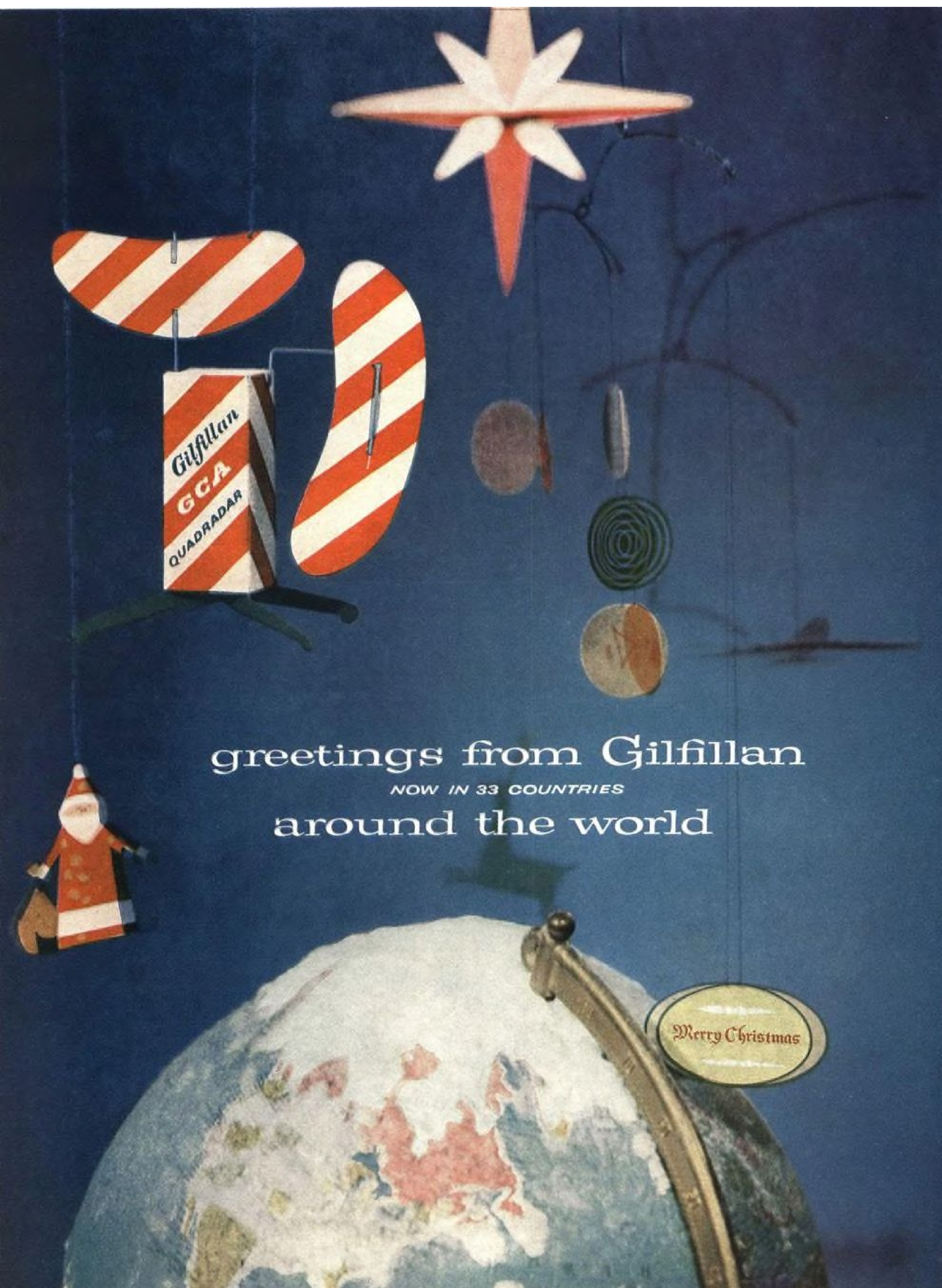
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Lockheed Special Projects Group Speeds Airframe, Systems Design

To meet the fast-growing demand for rapid development of prototype aircraft designs and special systems, Lockheed Aircraft Corp.'s Marietta (Ga.) Division has established a Special Projects Engineering Division within the Engineering Branch.

Starting with about 30 engineers and designers drawn from other phases of Lockheed's engineering activities, the new division will add another 100 mechanical, structural and systems specialists within the next year, as the types required for this initial design work become available.

New Projects

The importance placed on the Special Projects Division is indicated by the

work already assigned there:

- Experimental design development of an advanced landing gear applicable to future assault and cargo aircraft.
- Research and development of refueling systems, fuel protection approaches and multi-purpose fuel tanks.
- Design of operational aids for special missions planned for the C-130 Hercules.

Lockheed's Georgia Division was established early in 1951 to operate Government Aircraft Plant No. 6, at Marietta. Initial work was the "demothballing" and modification of 120 B-29 bombers which had been in long-time desert storage at Pyote, Tex.

Then a production contract for B-47 Stratojets was obtained, which still en-



Bell 47 helicopter recently saved the Swedish government \$300 and a week's time by ferrying a prefab four-man barracks to a Lapland power project.

Helicopter Airlifts House

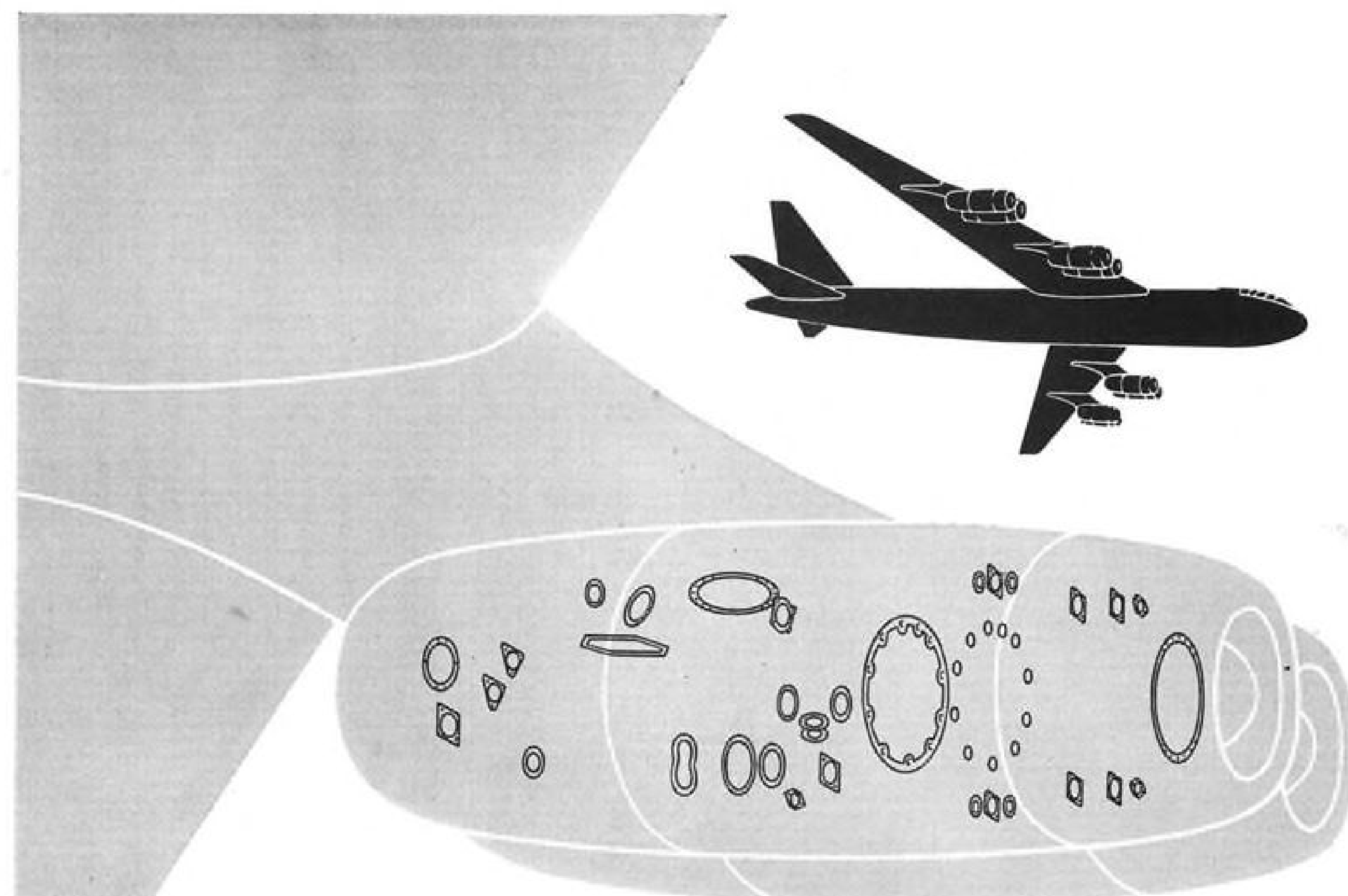


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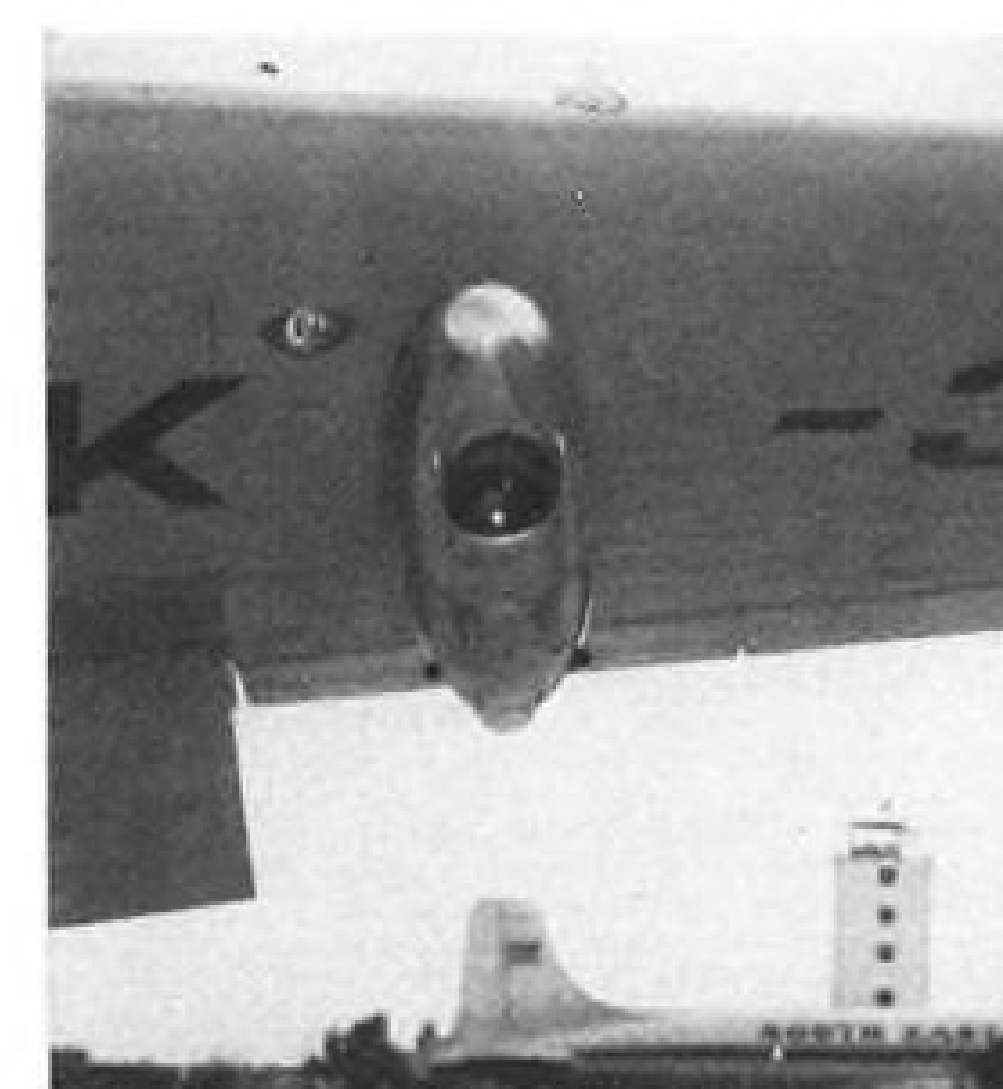
gages about half the division's 19,000 employees. Since early 1954 Lockheed has performed an IRAN (inspect and repair as necessary) and modification program on B-47s. This has included some special project type of work, where only a few planes were affected for specific modifications.

Lockheed-Marietta's development has been in a sequence somewhat different from similar build-ups of other major aircraft manufacturers. First the plant was engaged in the modification and production of aircraft designed elsewhere; then came the production design and manufacture of the C-130, which was initially designed by Lockheed-Burbank, which also built the prototype.

Now the division has developed full engineering capabilities, including line and staff organizations for project design, structures, dynamics, production design, test laboratories, flight test, aerodynamics, operations research, preliminary design and special projects.

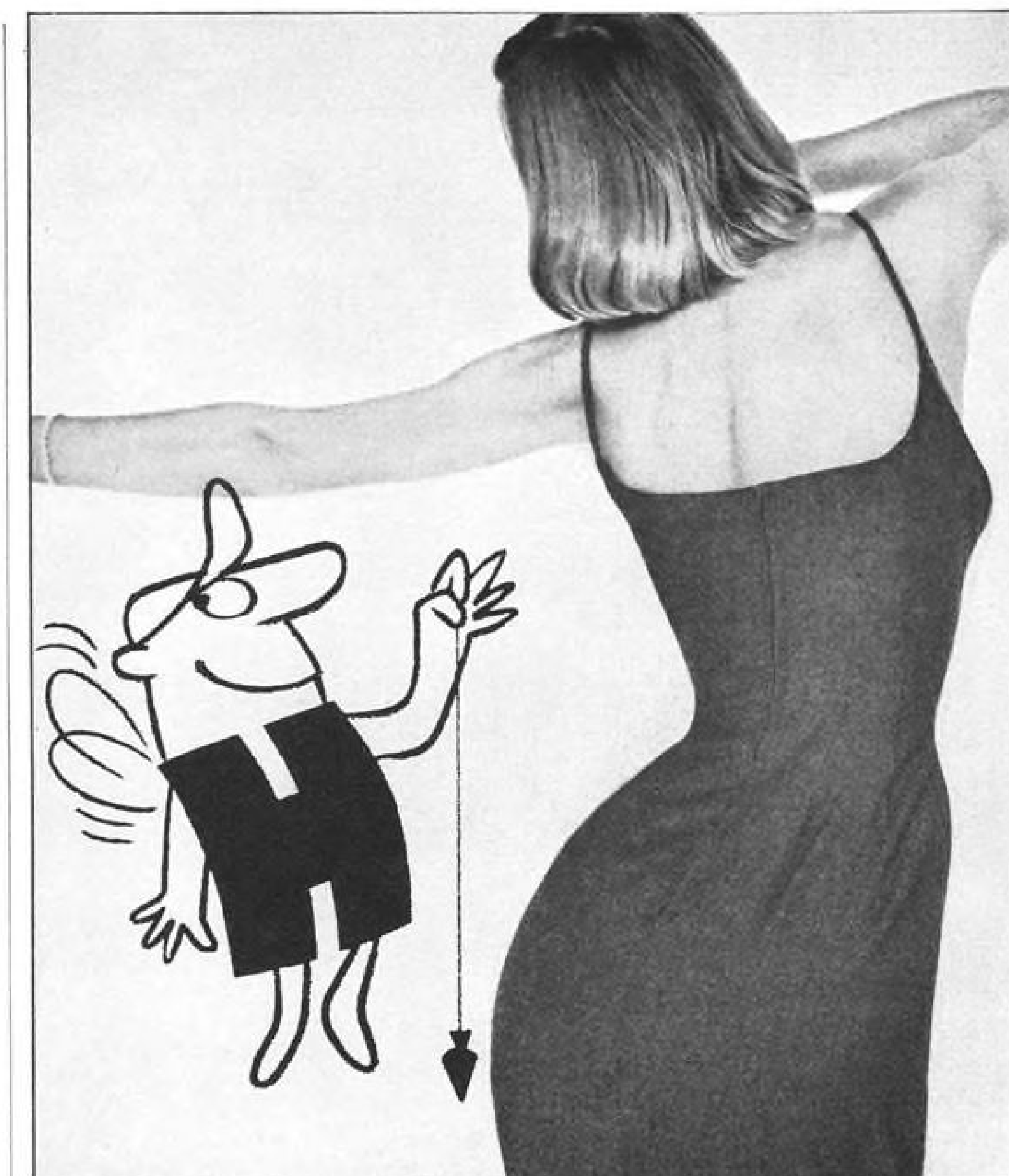
Broad Capability

The function of Special Projects Engineering is broad. Although primarily charged with design of experimental aircraft and components, it has the capability for basic development in systems, structures and mechanical devices. The



Palas Jet on C-46 Wing

Turbomeca Palas turbojet assist engine is shown mounted on the wing of a Lloyd Aero Colombiano C-46. This is the first time an installation of this type has been made for passenger service by a U. S. modification base, according to L. B. Smith Aircraft Corp., Miami, which did the job. The turbojet's flush intake nacelle was developed by the French firm, Sncaso, to prevent engine's compressor from windmilling in flight. L. B. Smith is installing the Palas units on three C-46s which it is modifying to passenger configuration for the intra-Colombian airline. The assist units, together with the plane's regular P&WA R2800 engines give the C-46 a total of 2,400 hp. for takeoff at 8,200-ft.-high Bogota, Lloyd's headquarters in Colombia.



No Flat Spots, says Hy Trol

Let's get away from contemplation of the fuselage a minute. You'll probably hate us for it, but we want to discuss the one thing that dame doesn't have—airplane tires.

You just don't get flat spots on tires when Hy Trol's around. In one year's scheduled airline operation, the record showed that Hy Trol saved 50 premature tire removals for this cause on aircraft that relied on Hy Trol consistently during landings. (Northwest Orient, 1953).

Worth thinking about? O.K., now you've thought about it you can go back to your study of the streamlined shape.



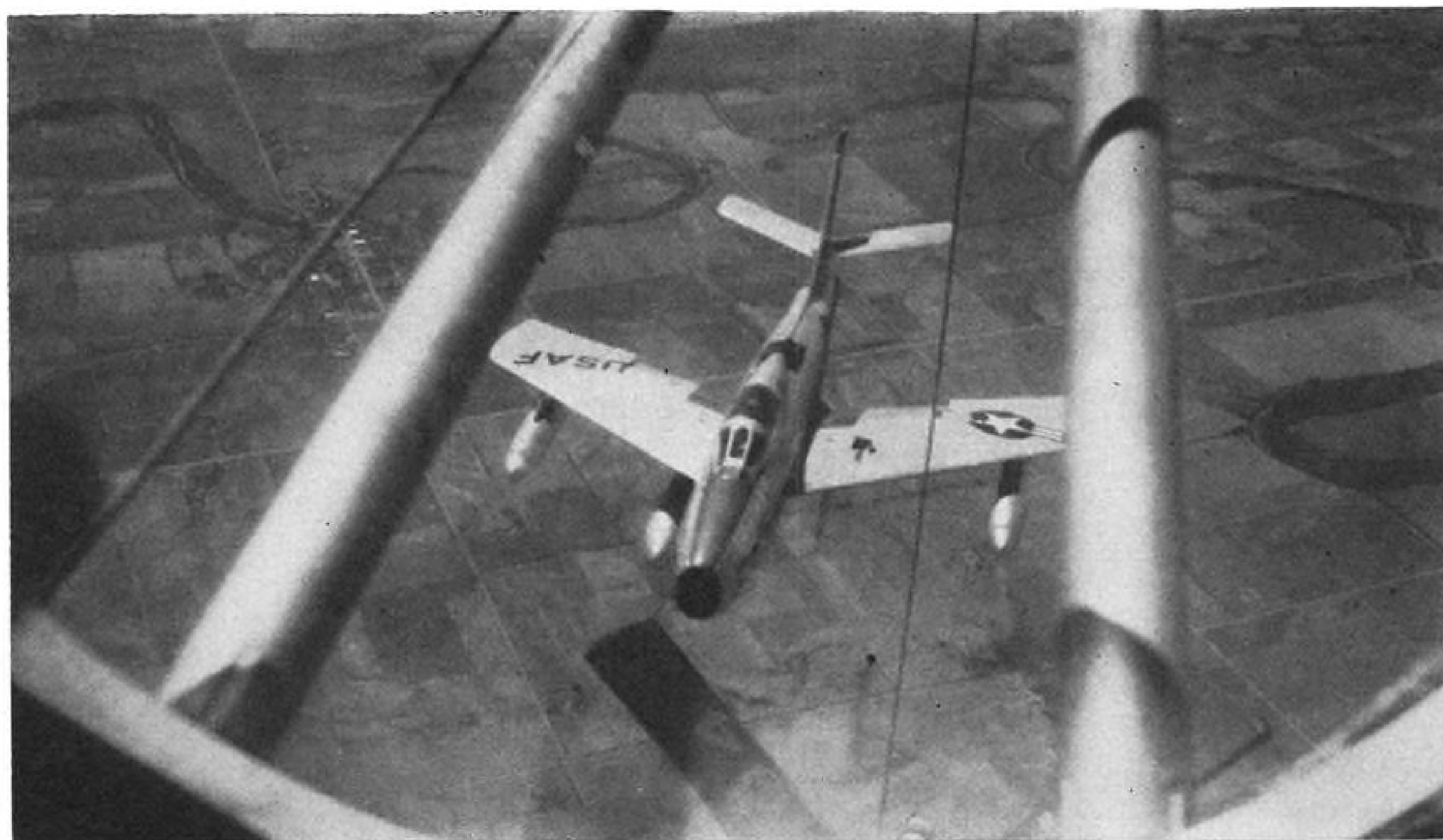
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Hungry F-84F Thunderstreak

In Exercise Sagebrush training maneuver, Republic F-84F Thunderstreak slides into position behind KB-29 tanker plane.

objectives of the organization require the capability to:

- **Design prototype installations** and components which will be tested and evaluated for subsequent application to production aircraft.
- **"Subcontract" design work** required by staff and research groups for their development programs.
- **Undertake independent research** and development assignments concerning design studies and/or hardware when not initially a part of a specific weapon system.
- **Indoctrinate, train and develop engineers** who, for background and workload reasons, are not immediately required in other line divisions.
- **Modify production aircraft** for special task requirements.

Special Projects-type operations produce significant economies in the design of prototype models or small production lots, Lockheed says. These economies result from use of a simplified drawing system, which does not require compatibility with IBM parts listing and production control methods; elimination of engineering checkers as such, by utilizing small design teams and the "buddy" approach on individual assignments; and by close integration of structural analysis and staff contributions with the design effort.

Follow-up of experimental manufacturing and laboratory testing work is performed by the individual designers,

eliminating planners, liaison engineers and other "middle men." In addition, the isolation of Special Projects from the pressure and formalization demands of a large, active manufacturing organization enables supervisory and staff direction to be concentrated on design problems rather than administrative and procedural matters, Lockheed says.

How It Works

These informalities and economies do not mean a lack of schedule control and project coordination. Work on special projects is initiated by a Project Schedule Plan. Technical scope and ground rules are laid out by a Special Projects Division Memo, which is developed as soon as this basic approach is "frozen." Weekly project meetings between all designers on a given special project review assignments, coordinate design philosophy and plan detail work assistance that may be needed. Schedule control is maintained by a job-day system that reports on a bar chart the days ahead or behind schedule position for each job.

The division is headed by F. B. Johnson, who joined Lockheed's California Special Projects organization 10 years ago.

Johnson was educated in mechanical engineering at the University of North Carolina. For 20 years he has been engaged in the prototype development and design of all sizes of aircraft.

At Lockheed, he has had various project and special project assignments, most recently as manager of the Preliminary Design Engineering Dept.

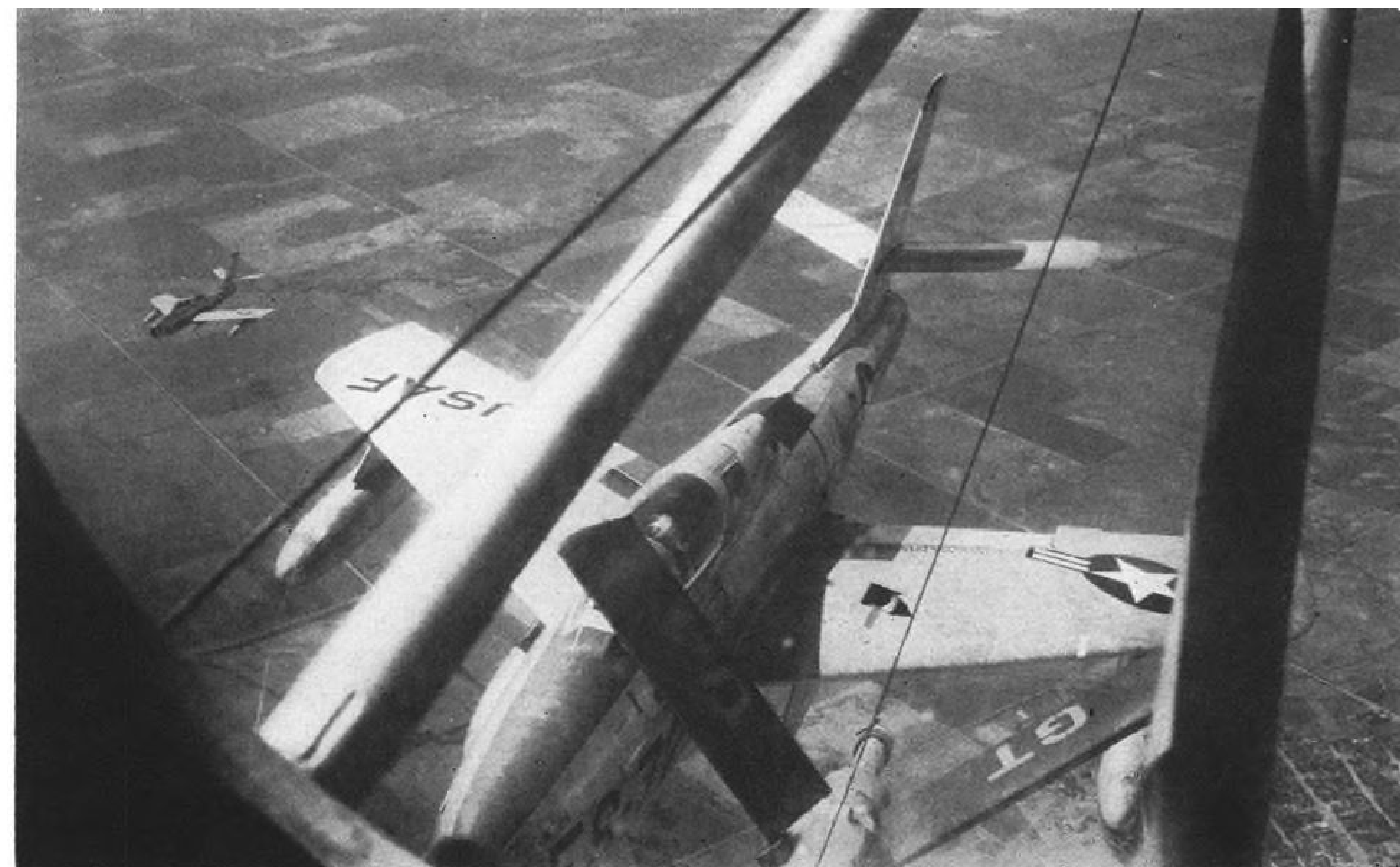
The senior designers and group engineers average 14 years active design experience. Some of the men have had extensive experience with European manufacturing and research organizations. A favorable combination of talent for special project design results when European and American approaches are married, Lockheed says.

Convair-San Diego Spares' Sales High

Sales of aircraft and missile spare parts by Convair-San Diego during the last 10 months came close to \$26 million, according to E. F. Sherrod, chief of parts sales. Customers included the military, commercial airlines, individual aircraft operators and vendors.

The shipments, weighing 9 million lb., represent some 75,000 items, from F-120A interceptor wings to small bolts and fittings. The largest receiver of parts was the Air Materiel Area at Kelly AFB, Tex., which is USAF's prime supplier to units operating the F-102, the T-29 trainers, and other versions of the Convair 240 and 340.

Other big customers included Edwards, Holloman and Patrick AFBs and the Naval Air Test Center at Patuxent.



AS TACTICAL TRAINING COMMAND F-84F approaches flying boom (above), pilot opens wing fueling point. Boom operator strikes home (below). TAC's KB-29s will soon be replaced by probe-and-drogue KB-50s, and Thunderstreaks will be modified to conform.





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* T. M. applied for

JACK & HEINTZ *Rotomotive*



POWERS CONVAIR F-102A



These photos taken on the F-102A production line at the Convair Div. of General Dynamics Corp. show the three Jack & Heintz a-c system components in process of installation. The

generator (left) mounted with a Sundstrand constant-speed drive is located in the aft fuselage. The control panel (center) and voltage regulator (right) are mounted in the ship's nose.

★ ★ ★

OPPORTUNITIES FOR ENGINEERS

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AIRCRAFT EQUIPMENT

AERONAUTICAL ENGINEERING

Fairchild Builds Short-Take-off Transport

By Robert H. Cushman

Fairchild Aircraft Division has revived a 40-year-old concept to provide a relatively fast, short-take-off transport designed to meet the needs of nuclear warfare.

In the event of such a war, the need for flexible movements of troops and rapid evacuation of civilians would call for a load carrying plane as fast as a modern transport and almost as versatile as a helicopter.

Fairchild's first step in providing such a transport is the financing of the M-232 test vehicle, which has been 80% assembled at Hagerstown, Md. This experimental craft will demonstrate to what extent certain improvements on wing deflected propeller-wash aircraft developed by William E. Hunt can be realized in a modern army support plane. The Aircraft Division is licensed for use of this patent (No. 2,650,045, Aug. 25, 1953) by the owners—Hunt, the Wiggins-Hunt Engineering Corp., of Norwood, Mass., and Eugene A. Blomquist, of New York City.

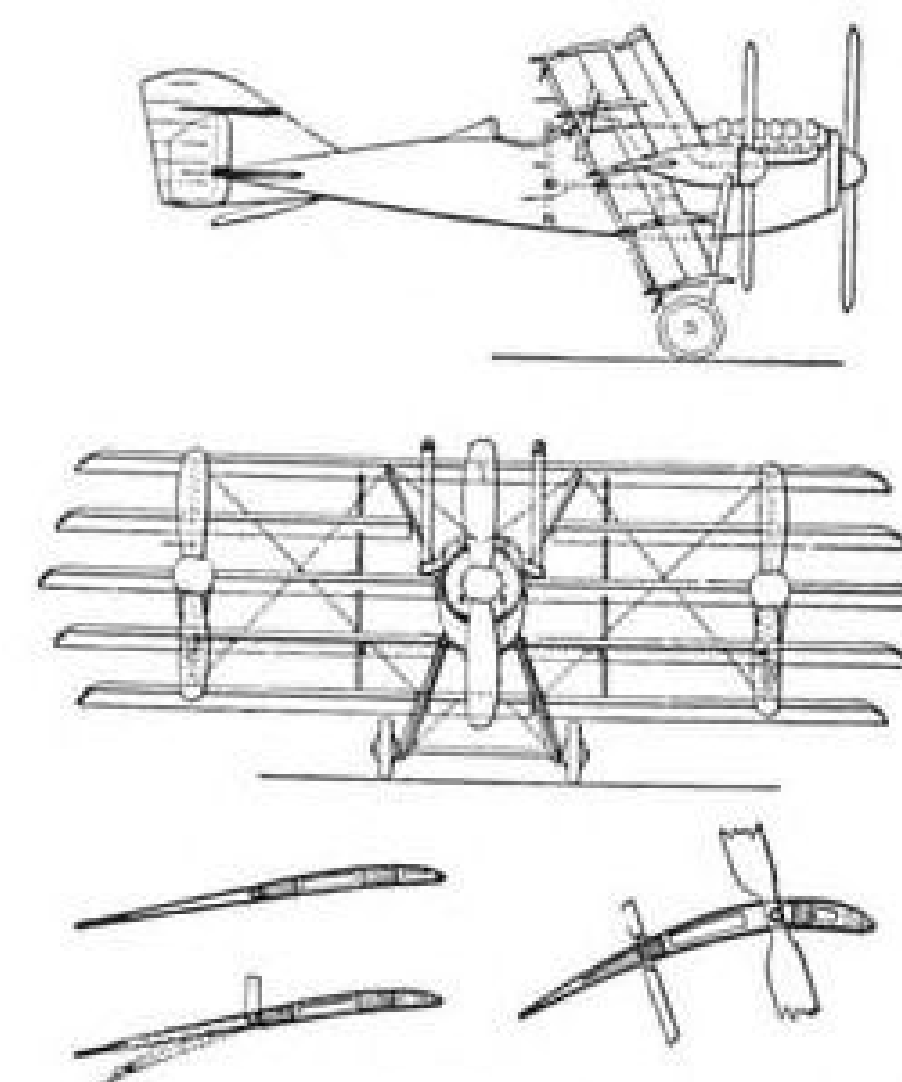
Performance objective for the M-232 project is to produce a plane that can get in and out of a 500 ft. clearing over a 50 ft. obstacle and then cruise at a speed comparable to similar-sized transports. For the M-232 demonstrator this will be 242 mph., but Fairchild hopes their future STOLs (short takeoff and landing) will go over 290 mph. The M-232 will carry an underslung belly pod capable of carrying eight men or four litters.

While this particular STOL resembles Fairchild's C-119 in appearance, it weighs only 7,000 lb., and its relatively larger propellers are boomed out well ahead of the wing. Even at low airspeeds, the 800 hp. power-pack-driven propellers (twin Lycoming SO-580s) maintain a slipstream over most of the wing. At the same time, the trailing edge flaps can bend this flow down, converting into considerable lift the same propeller accelerated mass of air which ordinarily produces forward thrust.

Turning-Vane Wings

The wings, therefore, act as conventional airfoils for forward high speed flight, but they are mechanically adjusted into something more like turning vanes for hovering and up and down flight.

Although Navy pilots, in high-speed propeller-driven planes, have been an-



EARLY SEMI-HOVERING model was incorporated in 1917 patent of Dr. A. Zahm.

ticipating this for a number of years by using engine power to shorten their carrier landings, the conscious attempt to cover the entire wing and flap with propeller blast has had only limited application. This design is another U.S. attempt (along with the Robertson Skylark and Prof. Otto C. Koppen's Helio-plane designed to overcome some of the objections to STOLs).

While Fairchild is withholding most details of the M-232 until after the flight test evaluation, many of its principle features may be deduced from the inventor's patent and a recent lecture first given before the Washington section of the Institute of the Aeronautical Sciences by R. A. Darby, preliminary design engineer of Fairchild Aircraft Division. They include:

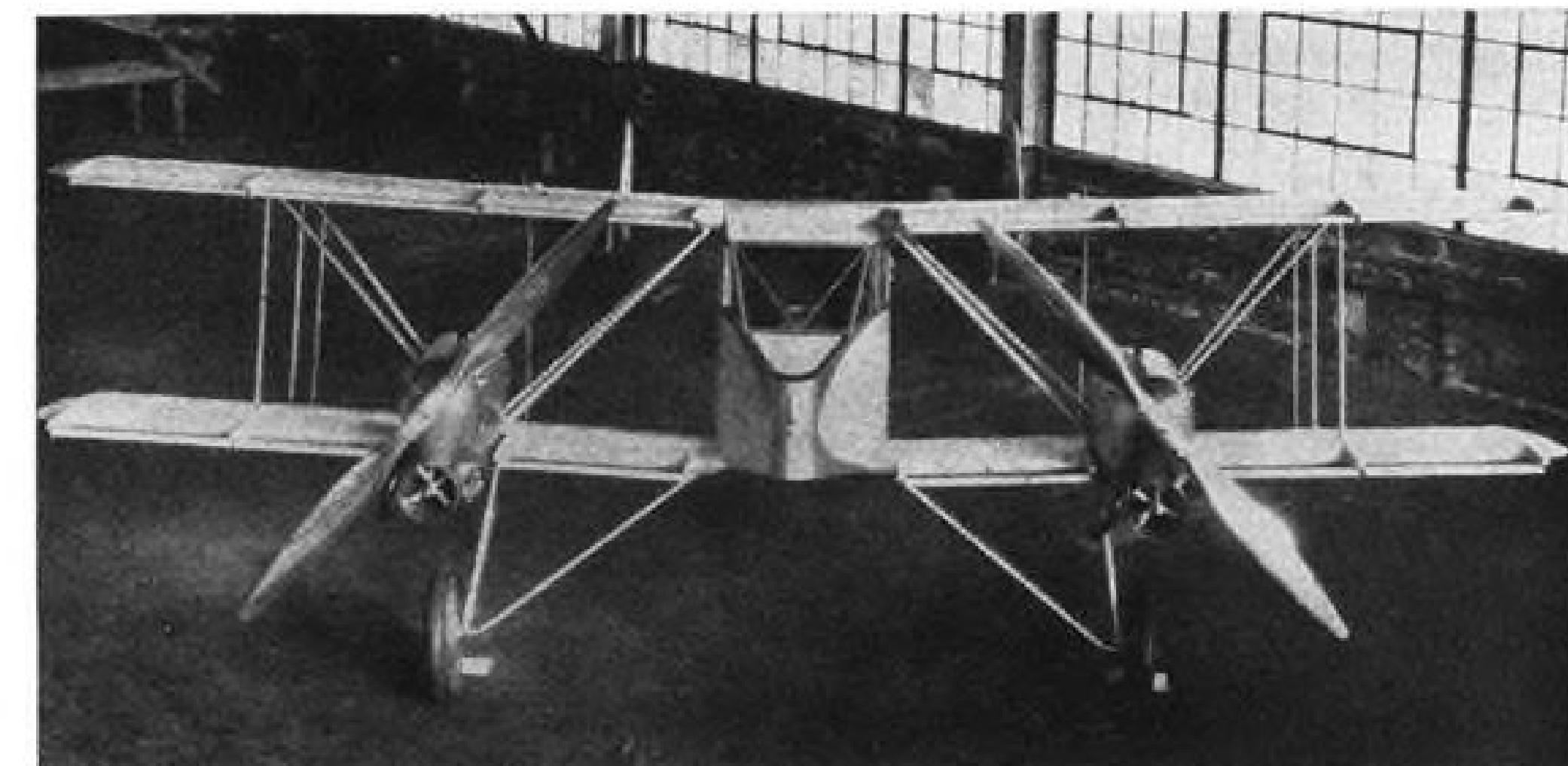
- Propellers placed well ahead of wing and tilted down.
- Large propeller blades which are both variable in pitch and flappable after the fashion of helicopter rotors.
- Interconnected propeller drive shafting with over-running clutches.
- Full span trailing edge flaps.
- Full span leading edge slats.
- Spoilers for slow-speed lateral control.

These features inter-relate to increase the aerodynamic efficiency of the thrust bending process and, more importantly, to eliminate critical stability and control weaknesses during the "low and slow" take off and landing phases.

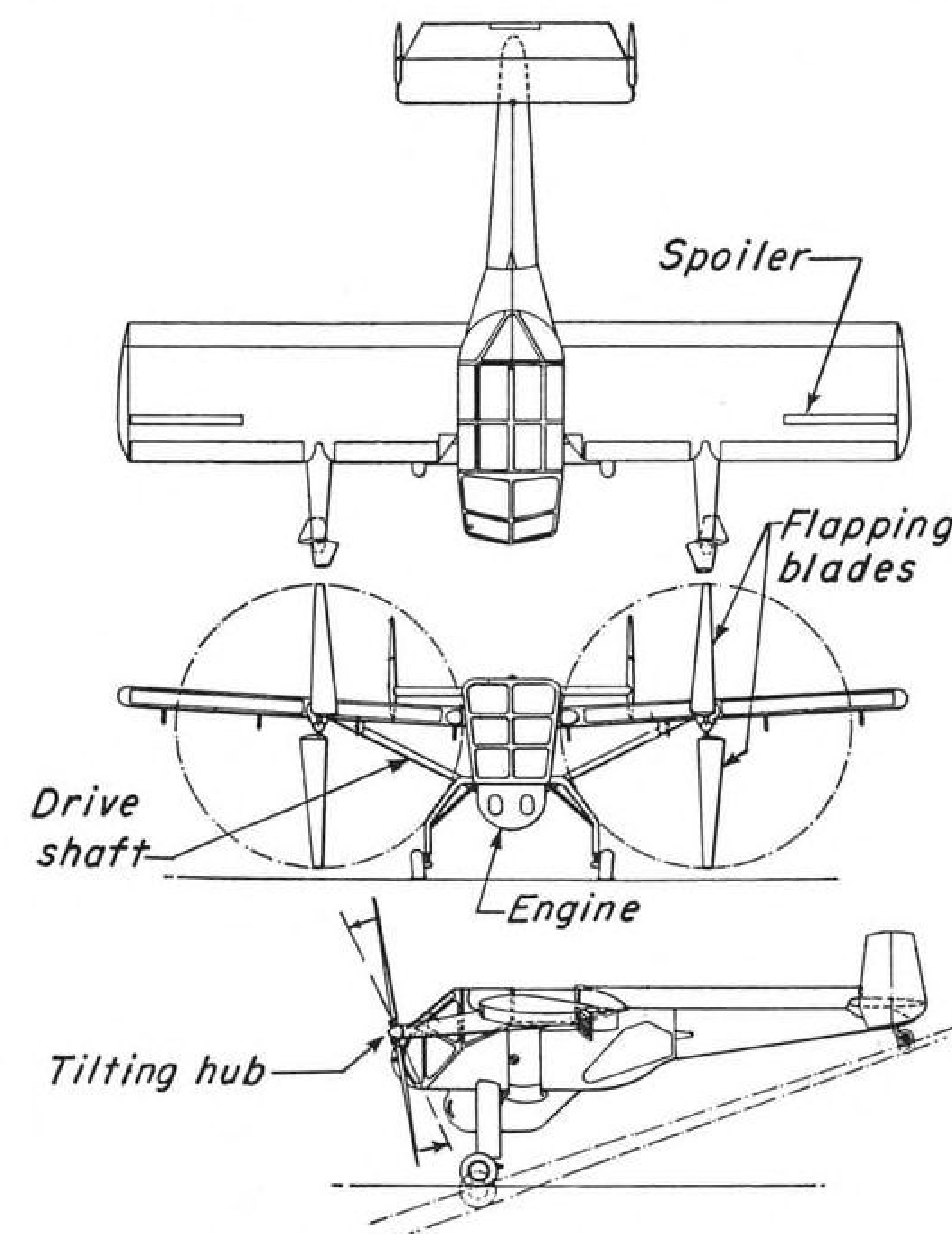
Hunt's Contribution

Hunt, who is serving as consultant on the M-232 project, says in his patent that he has made certain improvements over the Dragonfly, the Crouch-Bolas STOL-type of the early 1930s.

Hunt was an engineer on the Dragonfly and has since bought out its patent. Despite eventual failure because of lack of interest, the project was actually a success in that the Dragonfly could make 30 ft. ground-run take-offs and landings. Observers say that, while flying as slow as 16 mph, the aircraft



CROUCH-BOLAS DRAGONFLY (above) made successful short take-offs in the early 1930s.



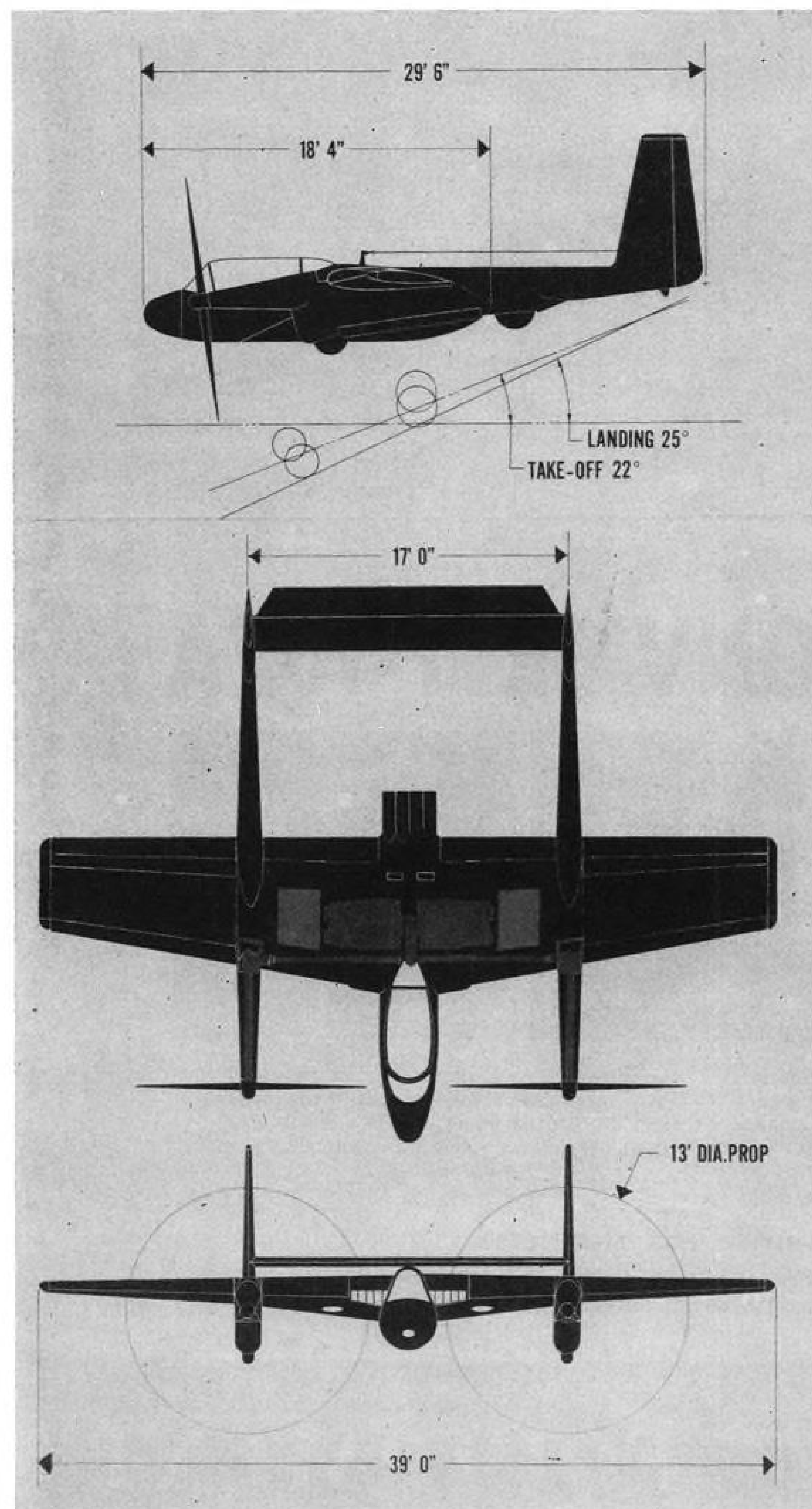
PATENT DRAWING (above) by William E. Hunt was basis of M-232 design.

could go up and down at 50 and 70 degree angles.

The power transmission layout of the M-232 is based upon three considerations. One, is that of avoiding a sudden lop-sided thrust while operating nose up, STOL. Two, is the necessity for keeping engine weights concentrated near the plane's center of gravity for quick, low-inertia response to controls.

The third is the aerodynamic desirability of placing the propellers at least one chord length ahead of the center of pressure of the wing.

Since the low-speed propeller air inflow angle causes the up-and-down moving blades to go through the air at different speeds in much the same way as helicopter rotor blades do when the helicopter is moving ahead, a similar



FAIRCHILD M-232 test vehicle designed for short take-offs and high cruise-speeds.



FLY WEATHER-WISE

These weather items prepared in consultation with the United States Weather Bureau

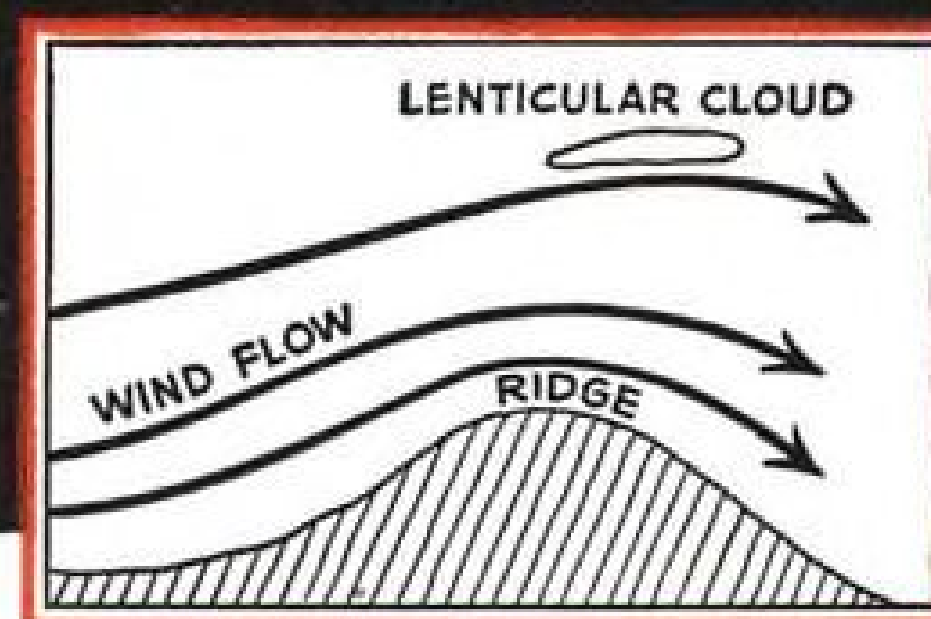
TERRAIN

THE VARIOUS TYPES of terrain surfaces have a significant effect on the air masses flowing over them—with a consequent effect on the weather and plane performance.

One of the most spectacular effects of terrain on air currents is the Mountain Wave—a high-reaching deflection of the winds when a range of hills blocks a strong flow of air. This sets up a “wave” which may reach high altitudes and extend in a chain of waves for several hundred miles downstream. The Lenticular-Type Standing Wave Cloud identifies these large waves. Even small ridges may cause air waves and produce dangerous downdrafts on the lee side (see diagram at right).

Care should be taken in approaching a ridge into the wind, because in a low-powered plane the downdraft may make it impossible to maintain enough altitude to clear the top. Also, when taking off on a runway towards a hill, be prepared for a decreased rate of climb if the wind is coming over the hill.

When flying in the vicinity of mountain tops, the possibility of altimeter error is important. Two primary factors can cause altimeters to indicate *higher altitudes than actual*: Lowered pressures created by disturbed flow on the lee side and abnormally cold temperatures. Combined, they can produce errors in excess of 1000 feet.



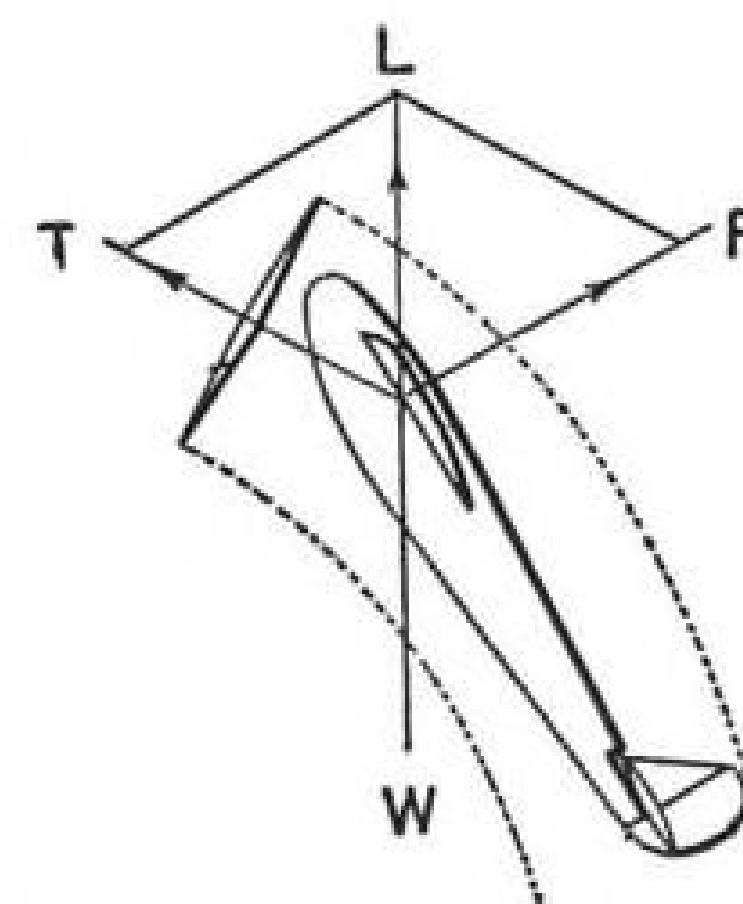
Best Pair to Get You There!



Flying over rough terrain, shifty air currents and sudden downdrafts can call for extra-quick engine response. Here's where insisting on the right fuels and lubricants can pay off.

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SOCONY MOBIL OIL COMPANY, INC., and Affiliates:
MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION



STOL FORCE VECTORS explain need of steep floor angle. Dotted lines show propeller-slipstream boundaries.

flapping freedom has been provided. The patent shows a spring-dashpot damping system to restrain the blades about their flapping hinge.

Propeller Shaft Axis

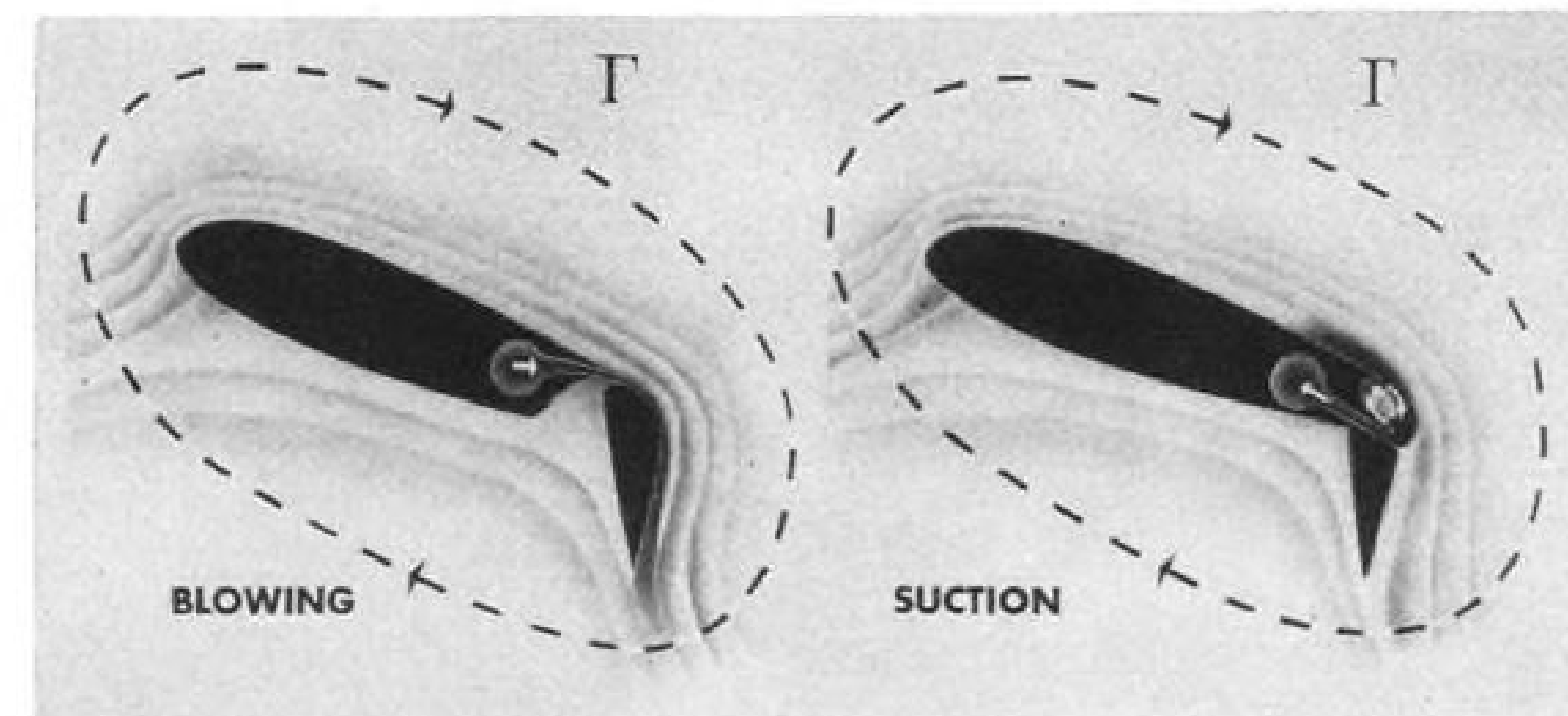
The propeller shaft axis angle which must satisfy the two widely-divergent modes of flight proved so important in previous attempts that the Bolas patent provided for a pivoting engine nacelle and Hunt's improvement called for a complicated tiltable propeller hub.

For the time being, the M-232 probably will operate with fixed propeller axis; however, one of its designers says, there is room for a tilting hub should flight tests indicate such a need.

One reason for the negative pitch to the propeller axis becomes obvious when the relative positions of the propeller, wing and tail control surfaces are compared—as was done by Bolas in the Dragonfly patent—to the configurations of earlier semi-hovering craft. The problem is how to get enough propeller-wash past the tail control surfaces at low speeds when most of the propeller blast is being deflected sharply down by the special wings.

In the expired 1921 patent of Dr. Albert F. Zahm (See Fig. 3), the proposed solution was to leave the section of the wing in the wake of the center propeller unchanged. Slow speed lift was sacrificed so that some propeller-wash could reach the empennage. In an early article on the subject, Professor F. H. Norton, who became interested in STOL from the study of birds, suggested a hinged fuselage so that the tail could be swung down into the deflected blast. (AVIATION Sept. 1, 1920, p. 80.)

To understand how propeller axis placement can solve the STOL control problem, the forces acting on the plane while in the STOL regime must be considered. Unlike the other two inventions, hovering in this case occurs when the STOL craft is nosed sharply up, with flaps down, until propeller thrust (t) and wing-flap reaction (r) cancel each other in the horizontal direction



FORCED CIRCULATION, such as the proposed blowing and suction methods illustrated above, may provide better performance in future STOL aircraft.

and add in the vertical to equal the aircraft weight (w). Thus, negative propeller axis pushes more wake past the tail, but at the cost of an uncomfortable cabin floor angle.

Safety Features

This juggling of the propeller pull against the wing-flap reaction has not appealed to pilots in the past, who felt it lacked the fail safe characteristics of the ordinary power-idle glide-in landing. One pilot said the feeling derived from a combination extreme nose-up and slow-speed attitude was that of being right on the edge of a stall, without altitude.

Although the STOL's safety is basically dependent upon the powerplant, leading edge slats, spoilers and adequate flow past the tail are expected to give positive low-speed control.

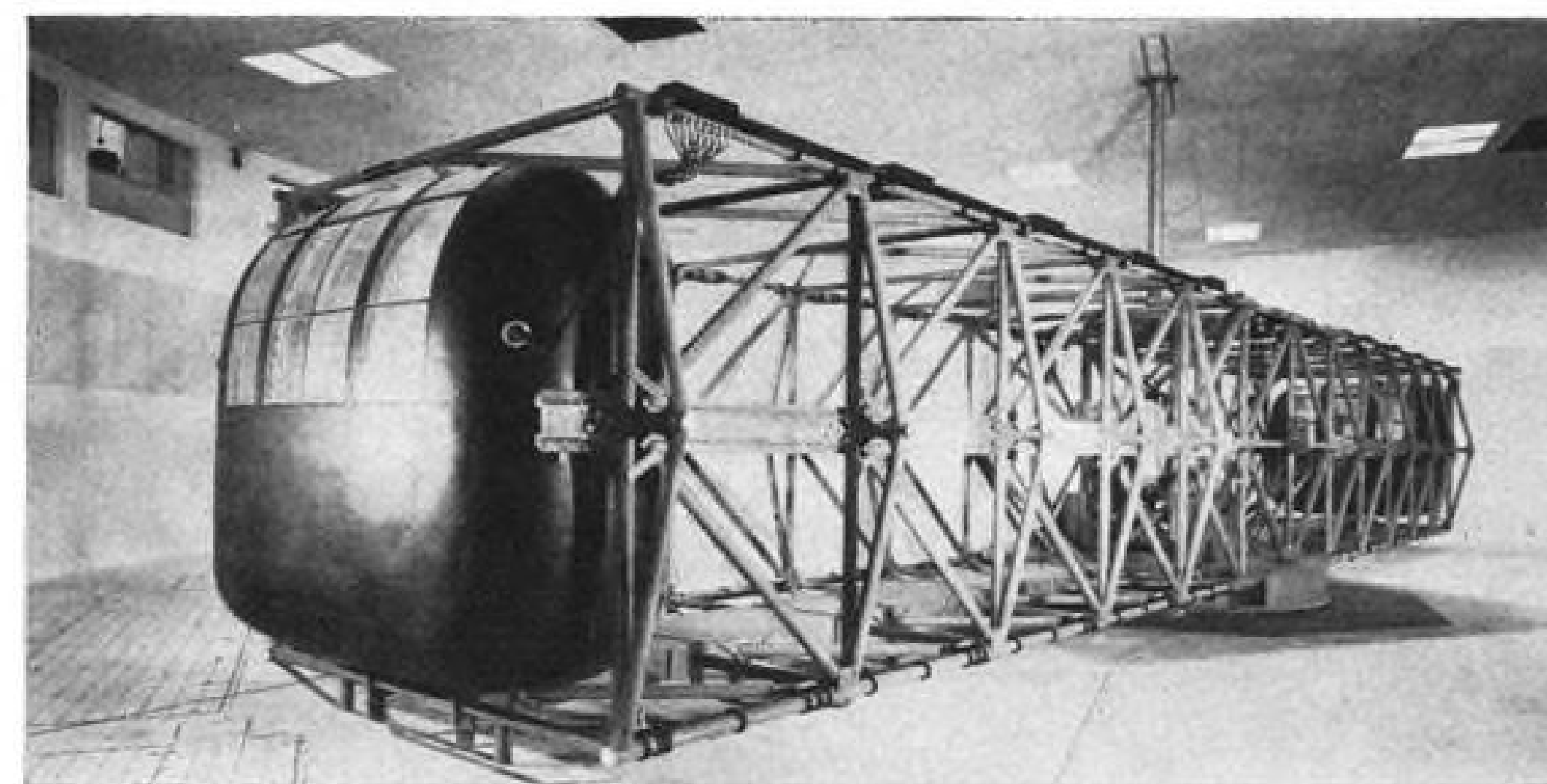
The leading edge slats should reduce the wing pitching moment.

In the patent, the slats are shown mechanically linked to the trailing edge flaps and the propeller tilting mechanism. The special-design spoilers will handle lateral control, presumably in much the same manner as on the Helio-plane (U.S. Patent 2,719,014, Sept. 27, 1955).

Other STOL Research

In addition to fostering the Bolas-Hunt approach to STOL, Fairchild research under Friederich Wagner is investigating combinations of forced circulation, working towards coefficient of lifts as high as 30 (see diagram).

Both blowing and suction are used to delay boundary layer separation and increase the circulation flow, gamma. The results of these tests may be combined with the vectored slipstream principle now used in the M-232 to further increase this plane's small field capacities. But Fairchild indicated that,



British Merry-Go-Round

Designed to obtain human engineering data under safe laboratory conditions, this man-carrying centrifuge was recently installed at the RAF Institute of Aviation Medicine in Farnborough. The centrally pivoted 60-ft. arm swings its human cargoes in the cars at each end at speeds up to 54 rpm., imposing forces up to 30G. A geared 1,350-hp. d.c. motor controlled by amplidynes drives the vertical shaft from under the floor. While the arm is programmed through automatically supervised test cycles and monitored by a number of safety devices, sensitive instrumentation transmits the subject's medical reactions to the control room.

which way*
to measure
jet engine
performance?

thrustmeters

to indicate PRESSURE RATIO...to indicate DIFFERENTIAL PRESSURE

KOLLSMAN is in production...

on components for BOTH TYPES—for Remote or Direct reading



Actual photograph

TYPICAL SYSTEM OPERATIONAL DATA

1. Accuracy: .015 in 100% of readings at room temperature.
.025 in 85% of readings at -55°C and +70°C.
.035 in 15% of readings at -55°C and +70°C.
2. Altitude: No specific limitation.
3. Power: 115V, 400CPS, single phase, 18VA
4. Pressure Ratio Range: 1.2 to 3.4
5. Pressure Ranges (operating):
Pt₂=2 to 50" Hg. Abs.
Pt₂=2.4 to 100" Hg. Abs.
Pt₂-Pt₁=0.4 to 70" Hg.
6. Temperature Range: -55°C to +120°C
7. Weights:
Transmitter: 2.2 lbs.
Indicator (including integral amplifier): 1.8 lb.
8. Response: Full Range in 7 seconds.

For over a quarter century, Kollsman has been making precision pressure sensitive mechanisms using displacement type diaphragms. This diaphragm can be called the heart of a thrustmeter pressure indicating system.

Our long experience making displacement type diaphragms guarantees reliable thrustmeters.

Proven Kollsman displacement type diaphragms, when fitted with Kollsman Synchrotels, comprise the transmitters for remote indicating types. Thousands of Synchrotels are now in use in other applications equally demanding of accuracy and durability.

Tailor-made Thrustmeters can be supplied for any engine-airplane combination. Write for complete technical information.

**The Pressure Ratio System has advantages for indicating optimum climb and cruise throttle setting, whereas the Pressure Differential System has a definite advantage at take-off.*

Kollsman activities cover these seven fields:

AIRCRAFT INSTRUMENTS • PRECISION CONTROLS
PRECISION COMPUTERS AND COMPONENTS • OPTICAL COMPONENTS AND SYSTEMS
RADIO COMMUNICATIONS AND NAVIGATION EQUIPMENT • MOTORS AND SYNCHROS
INSTRUMENTS FOR SIMULATED FLIGHT TRAINERS



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KOLLSMAN PRESSURE RATIO THRUSTMETER
used on Convair's F-102 and McDonnell's F-101

whether or not diminishing returns of lift come with increased blowing horsepower, largely depends upon the particular wing configuration.

Goodyear Receives B-52 Subcontract

Goodyear Aircraft Corp. last week announced receipt of a multimillion-dollar contract for the construction of B-52 components for Boeing Airplane Co.

Under the long-term contract, wing stub sections, fuselage side panels, fuel deck assemblies and panels and fuselage bulkheads will be manufactured by Goodyear for Boeing's Seattle plant.

In addition, Goodyear also will produce spoilers and fuselage panels for Boeing's Wichita facility. All work will be carried out at the company's Litchfield Park, Ariz., plant.

Space at the plant already has been allocated, and jigs and fixtures from both Boeing facilities will be shipped there in the near future.

Aluminum Expansion

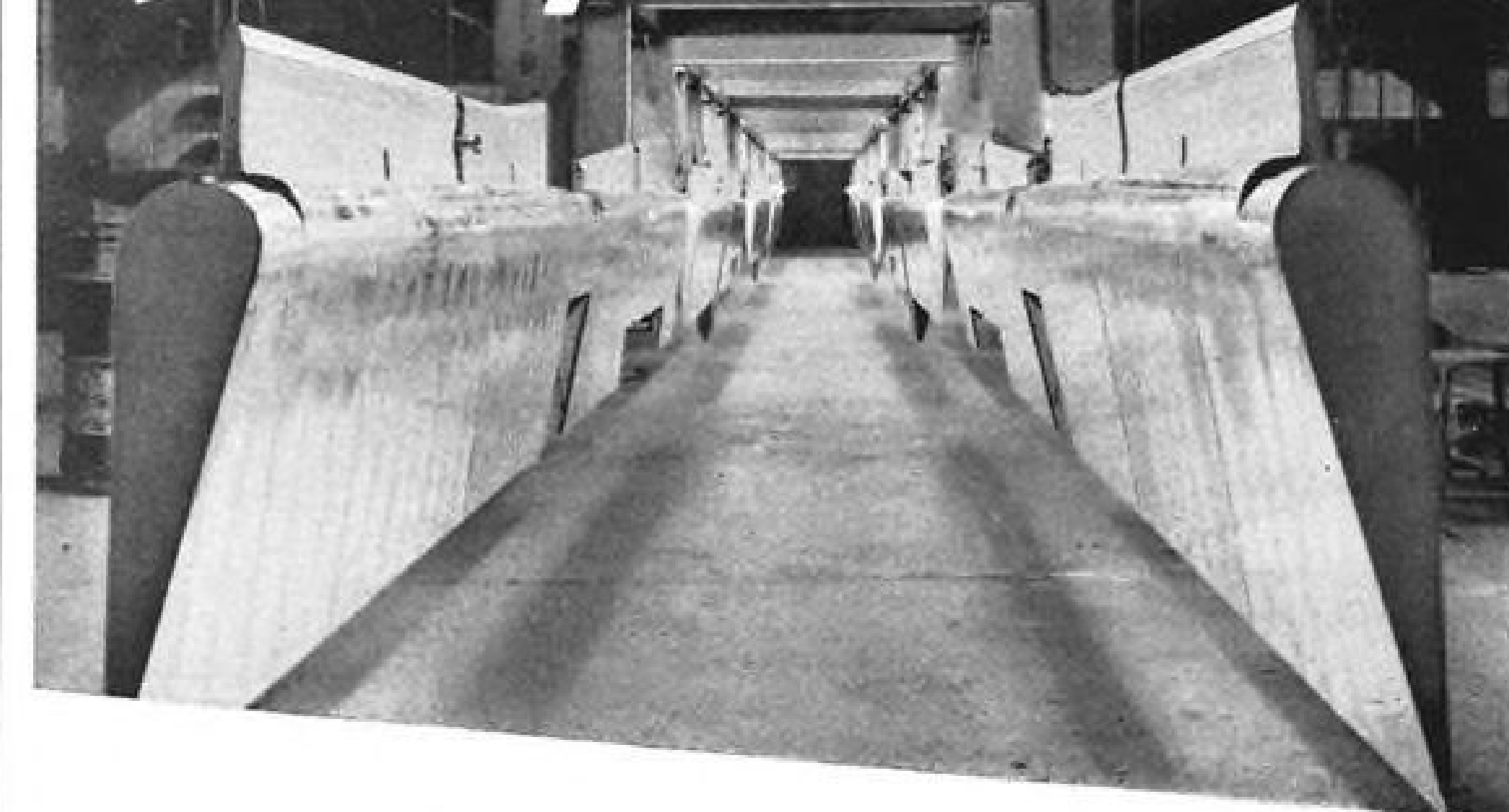
Kaiser Aluminum & Chemical Corp. is planning a \$280-million expansion of aluminum production to meet anticipated doubling of U. S. aluminum needs by 1965. Ground will be broken in April on a 220,000-ton reduction plant at Ravenswood, W. Va., and a 500,000-ton alumina plant on the Mississippi near Gramercy, La.



XV-1 Convertiplane Jet

Closeup shows one of three pressure jets used for vertical flight of the McDonnell XV-1 convertiplane. Each of the three rotor blades has one of the McDonnell-developed jets at its tip. The jet engine shell is formed by dishing Hastelloy alloy X sheet in two halves and then welding them together. Haynes Stellite Co., maker of Hastelloy, says the nickel-base alloy was chosen because of its strength and high-temperature characteristics—the pressure jets are subjected to 1,000G forces at temperatures up to 1,500F in the XV-1—and because it is easily welded and formed.

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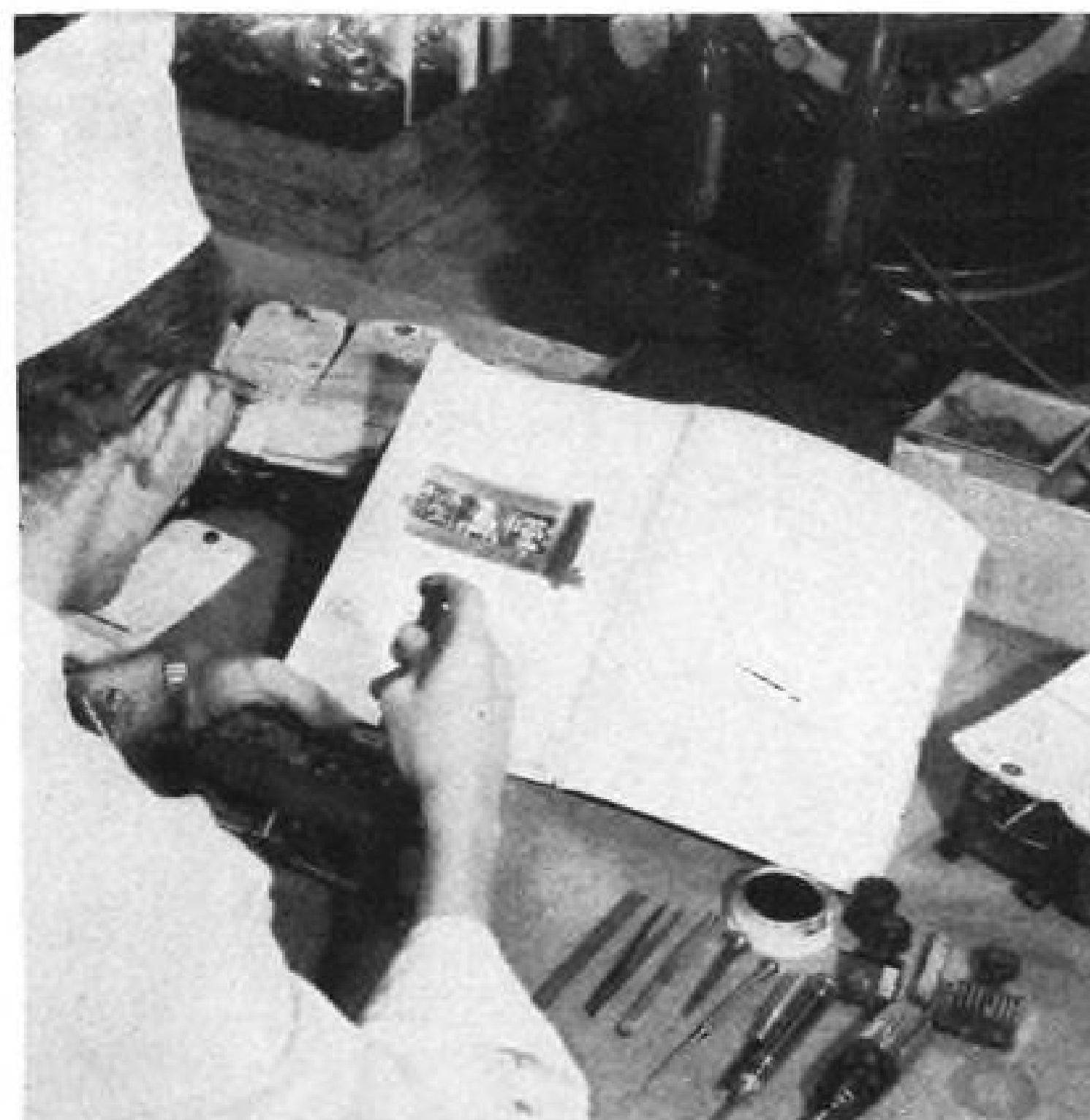


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PRODUCTION



PICTORIAL INSPECTION—Assembly is checked against labeled picture and instruction sheet; typical picture sheet shown at right.

Quality Control, Reliability Plans Bring Dividends to Eclipse-Pioneer

By Henry Lefer

Teterboro, N. J.—The Eclipse-Pioneer Division of Bendix Aviation Corp. is beginning to reap the benefits of a three-pronged attack on the problems of reliability and quality control.

The new program already has paid off in a sharp reduction in the number of field rejections of the company's gyros, synchros and instruments, according to Robert Nimitz, director of the division's quality control. Furthermore, the company can move faster to take corrective action when difficulties are uncovered in the field.

The final bonus the company hopes to derive from the program is a head start on meeting requirements of future military specifications.

Combination of New and Old

Importance of quality control to Eclipse-Pioneer is indicated by the precision nature of the company's products list. The division makes flight, navigation and engine instruments and components for military and civil customers. Products include automatic pilot systems, altimeters, pumps, compasses and various types of remote control and remote indication systems.

The threefold program, which is in addition to the usual quality control procedures of any large production

plant, is a combination of the new and the old. Its major facets:

- **Product Reliability laboratory**, opened a few weeks ago, where equipment is being tested far beyond current military and commercial specifications, to determine actual operation limits and pinpoint possible design improvements.
- **Pictorial inspection procedure**, be-

lieved by Eclipse-Pioneer to be unique in this field, whereby technicians at various stages of assembly are able to check equipment against pictures showing how it should look, and follow simple inspection instructions.

• **Standards laboratory**, equipped with a quarter-million dollars worth of master gages and instruments, the standards by which all shop secondary master measuring devices are set.

In addition, a separate Service Inspection Group is ready to sound the alarm if field rejections of any particular items go too high.



GYROSCOPE is adjusted during routine run-in on Scorsby stand before shipment.

Helping Nimitz in the quality control effort is a staff of 490, keeping tabs on the division's 3,000 production employees.

Product Reliability Laboratory

This recently activated department, under William Lichte, is not yet fully equipped. It already has in operation, however, a pair of environmental test ovens, walk-in cold-and-altitude chamber, mechanical and electrical cycling stands and various types of vibration equipment for qualification, life and reliability tests.

The laboratory not only runs tests on new developments but also subjects standard Eclipse-Pioneer products to new, more rigorous conditions.

The tests are stopped before the point of failure. Nimitz says more can be learned from study of the equipment while it is still whole. "Failure destroys the evidence we're looking for," he says.

Two important advantages have emerged from this program:

- **Weaknesses** turned up by the tests correlate closely with actual troubles that occur in the field. As a result, Eclipse-Pioneer is able to initiate corrective action before rejects become a matter of customer concern; or where reports from the field indicate the need for a change, the company can move to make the necessary fix faster.
- **The tests establish the final limits** of the company's equipment and show the design points which need revision to enable the equipment to meet more vigorous specifications than now in force.

The environmental oven is a twin unit, each half holding three drawers. It was built by Steiner-Ives to Eclipse-Pioneer specs. The two thermostatically controlled oven chambers are insulated from each other, so that one can maintain a continuous temperature of 450F (the unit's peak) while the other is at 100F, for instance.

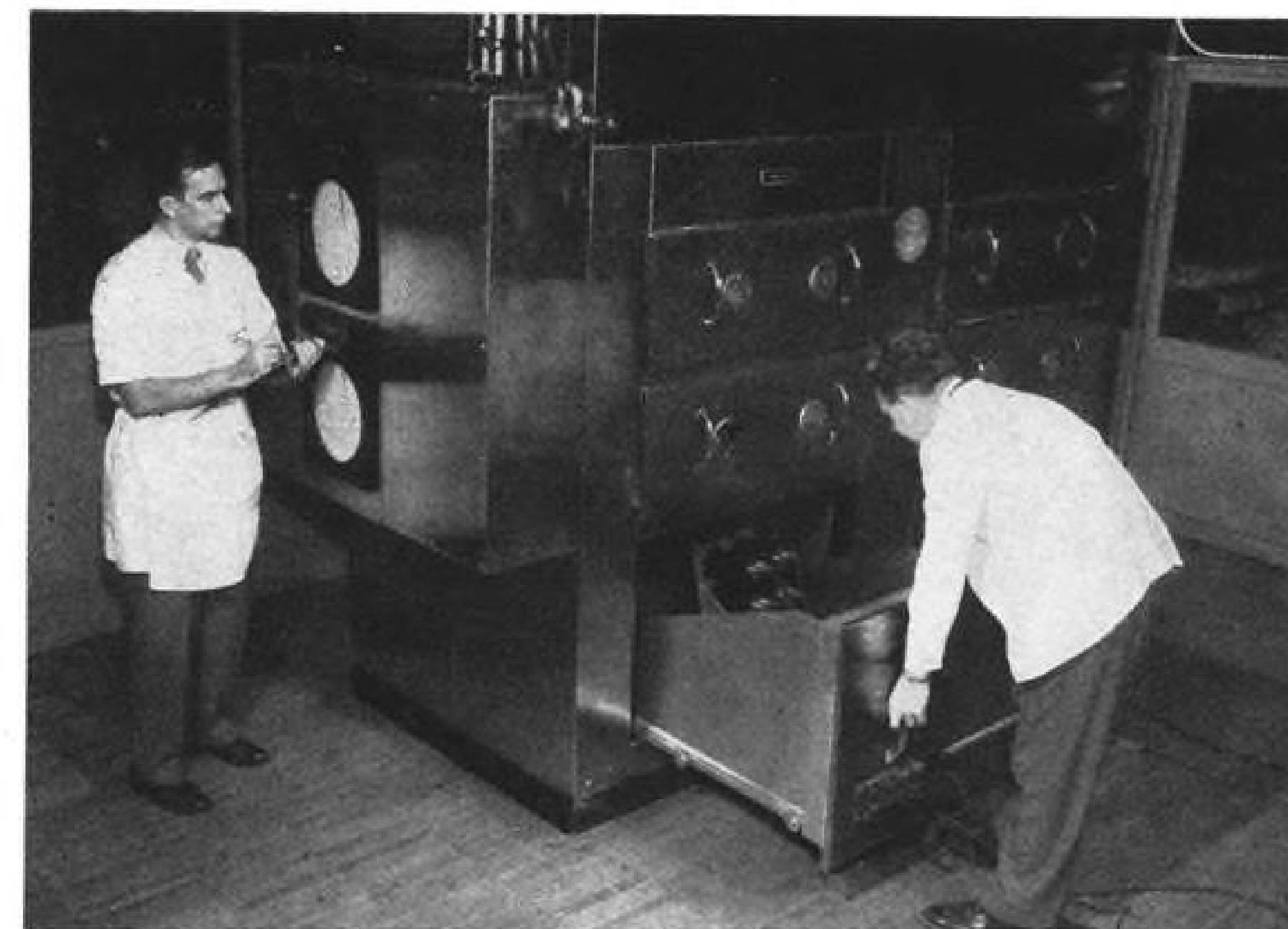
The drawers are removable. Thus, equipment can be mounted in them on the work benches and necessary connections made and tried out before the oven is loaded. Cables are brought out through insulated plugs.

The lower drawer of each chamber is extra-large size (see picture above). It can take a complete autopilot mounted on a Scorsby table, so the unit may be put through simulated maneuvers in the oven to see how the drift and accuracy of the gyroscope is affected by elevated temperatures.

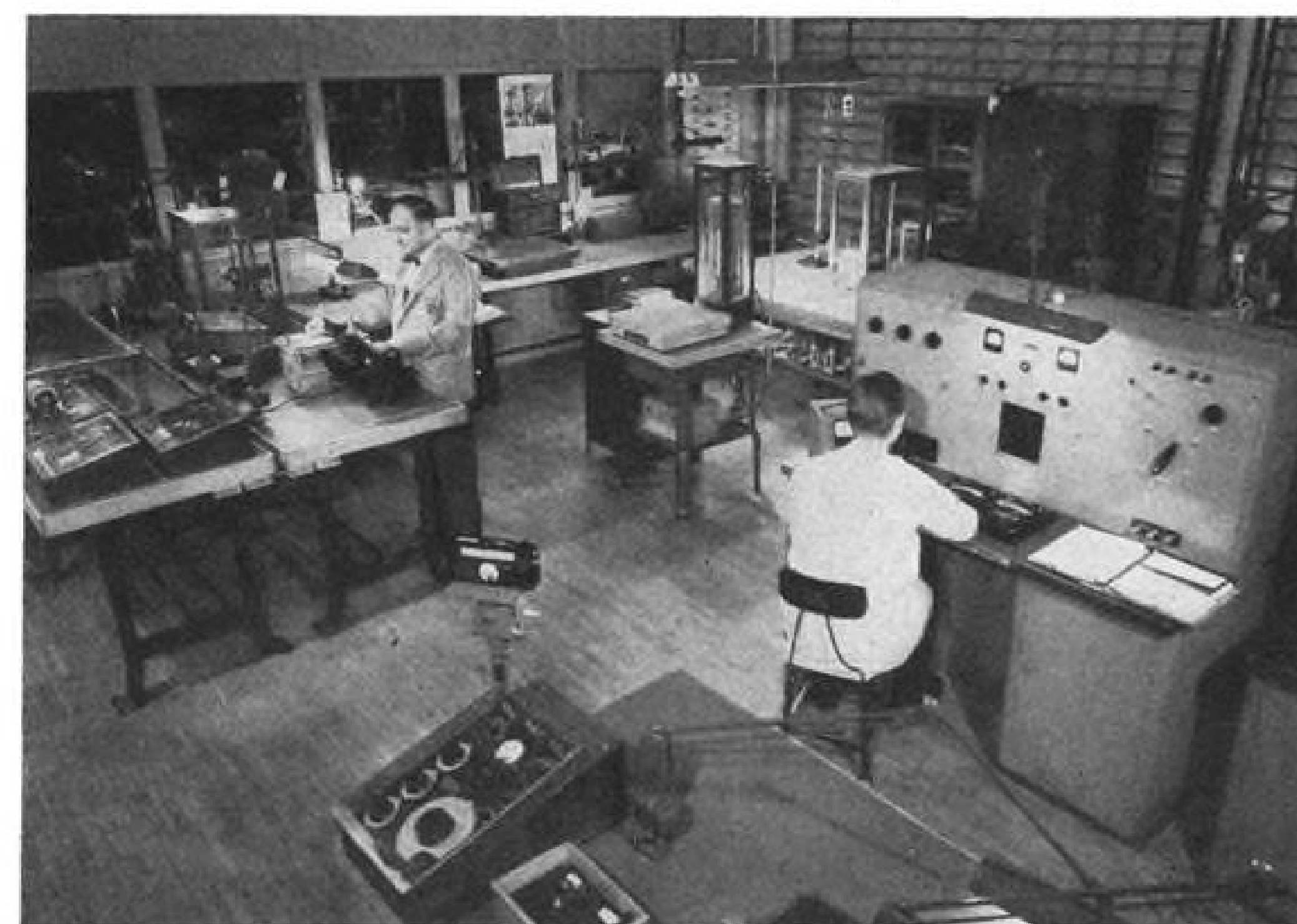
The drawers are removable. Thus, equipment can be mounted in them on the work benches and necessary connections made and tried out before the oven is loaded. Cables are brought out through insulated plugs.

Pictorial Inspection

The pictorial inspection technique developed at Eclipse-Pioneer takes the old-style printed check list as its point of departure. To this check list is added a photograph of the piece of



EXTRA-LARGE DRAWER in twin-oven unit can take autopilot on Scorsby stand.



STANDARDS LABORATORY checks every secondary master in the plant twice a year.

equipment as it should look at the particular stage of assembly, with all parts that are mentioned in the check list numbered and labeled (see photographs, top of p. 34).

For instance, the old check list might have said: "Check three screws holding motor bracket to frame for tightness and for freedom of burrs and mutilations."

This seems simple enough, but it lent itself to possible ambiguity because inspection personnel might occasionally not be familiar with correct nomenclature of parts. Further, when an inspector was assigned to a new piece of equipment, a fairly lengthy indoctrination period might be required.

With the pictorial inspection method,

a complete loose-leaf manual is made up for the equipment. It consists of a complete series of labeled pictures showing the equipment at successive stages of assembly. Facing each picture is the appropriate checklist. Now, for the same operation described above, the check list says: "Check three screws (No. 3) holding motor bracket (No. 5) to frame (No. 1) for tightness and freedom of burrs and mutilation."

Individual inspectors do not receive the complete manual, only those pages covering their particular phase of the assembly.

Eugene Metzler, head of the statistical quality control group and the pictorial inspection program, says that although it is still in its "swaddling



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clothes" (manuals for only three of the company's gyroscopes have been completed since the program started in October), it is already paying off in better and more thorough inspections.

The company plans to catch up with all important current production items, a job which will keep the department busy for many months, and then move into preparation of manuals for new items. It takes several weeks to complete a manual.

The pictorial inspection manual section works closely with production personnel in developing the books. Later, when they have caught up with the backlog, pictorial inspection people will sit in on pre-production meetings, with the aim of having manuals ready when an item reaches the production stage.

Standards Laboratory

Henry Dieckmann, an old-time tool and die maker, heads the Standards laboratory. He brings to the lab the precision instincts of his former craft, working in terms of millionths and hundred-thousandths of an inch.

Each of the 750 secondary master gages in the plant goes through Dieckmann's department twice a year for checking, and re-setting when necessary. Dieckmann puts a date tag on each secondary after it is checked, and the gage may not be used beyond that date without a recheck. The lab contains more than 50 types of mechanical master instruments and about 25 electrical-electronic standards. Dieckmann handles the former group, and his assistant, Nicholas Komanasky, takes care of the latter.

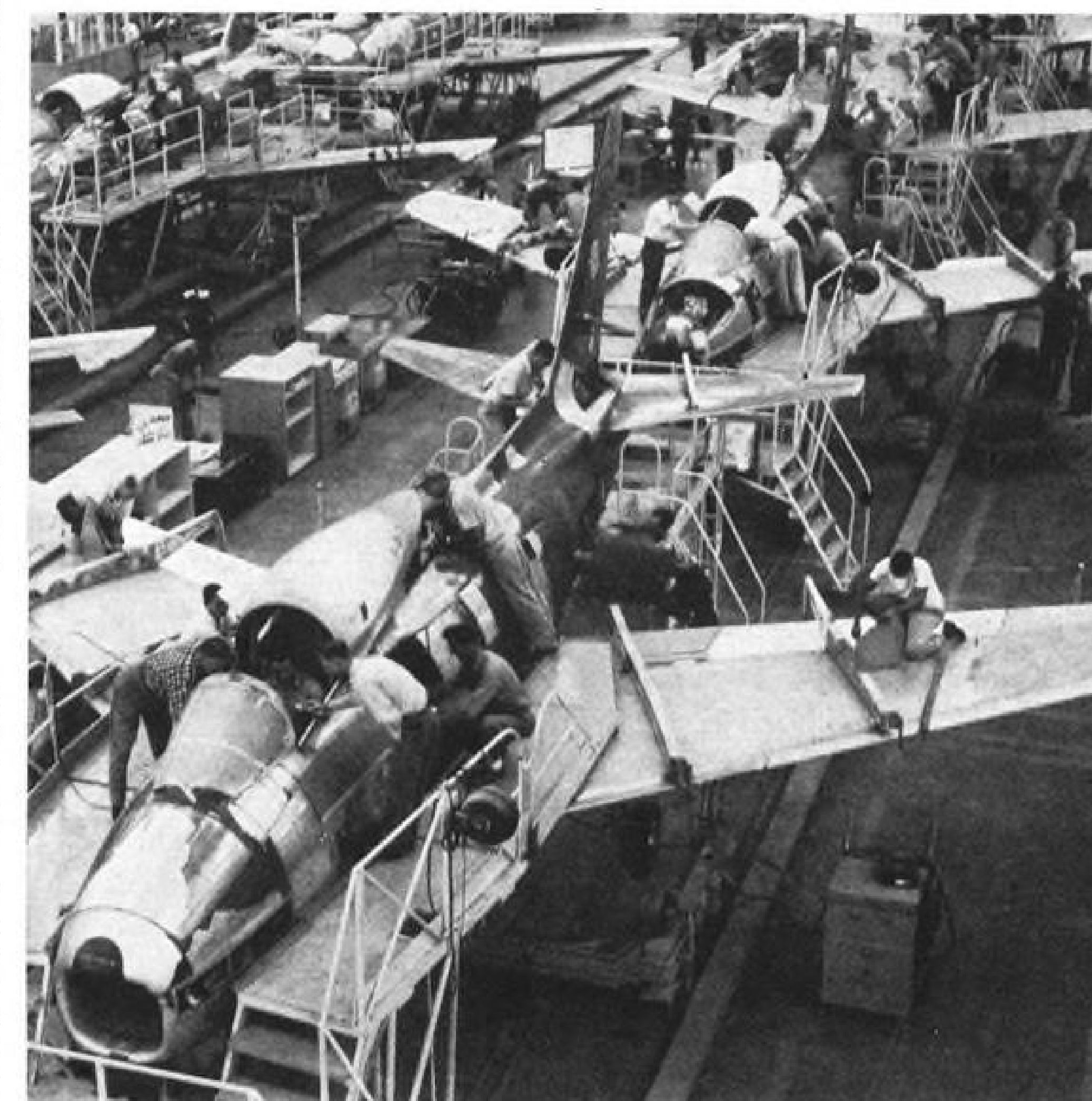
The very heart of the standards lab is a set of Johansson AA gage blocks that are accurate to within two-millionths of an inch. These are used for checking a Johansson A set, which is accurate to four-millionths. The AA set is the lab's grand master and the A set is the master. The remainder of the mechanical gages in the shop are referred to the A set.

The laboratory's very precise master barometer is one of only two in the country according to Dieckmann—the other is at the Bureau of Standards. Both of the units were made by Eclipse-Pioneer.

Among the other precision gages in the laboratory:

- Visual gage, made by Sheffield, for checking taper pipe plug thread gages; accurate to scale plus or minus .000025 in.
- Toolmaker's comparator, made by Gaertner, for checking hole locations and centers on jigs, concentricity, threads; accurate to .0001 in.
- Micro-AC electronic comparator, made by Cleveland Instrument Co.;

New and Old from North American



FJ-4 FURY carrier-based Navy fighters come down the final assembly at North American Aviation Columbus, Ohio. Starting out as a Navy version of USAF's F-86 Sabre, the Fury has evolved into a completely new plane. This latest Fury model has Wright J65-W-4 of 7,800 lb. thrust.



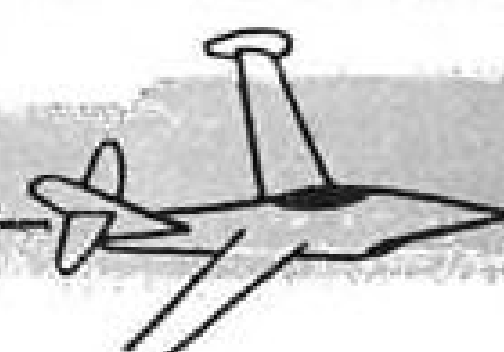
SERVICE-WORN F-86's are modified and modernized at North American Aviation's Fresno, Calif., Division. Following complete teardown, the plane's are brought up to latest service standards. Shelters in foreground protect workers from hot sun during the work.

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,

Senior Member, Aviation Writers Assn.



Power, drag and time are fast combining to build big headaches for equipment producers as well as aircraft manufacturers.

These, as you know, are the basic elements of the so-called "heat barrier," a misnomer, for it's no well-defined line such as the sonic "wall." Rather, it has infinite depth under the inexorable law that the faster you fly within the atmosphere—and the longer you fly fast—the hotter you'll get.

Friction is the key word in the heat problem for airframe manufacturers and, indirectly, for equipment suppliers. Skin friction builds energy that is dissipated as aerodynamic heat into the dragging boundary layer of air in immediate contact with an aircraft. Given enough speed and enough time, the boundary layer will transfer terrific temperatures to the plane's structure by conduction.

The thermal jump due to this conduction is phenomenal, although unimportant at sub-sonic speeds. You've heard that even a hurled baseball develops an infinitesimal temperature rise. So, too, does a car, about one degree at 80 miles per hour. An airliner flying at 300 miles per hour will record a 16-degree increase.

But not until a plane gets into supersonic speeds does the insidious danger of heat become serious. At sonic speed, for instance (on a normal day at sea level), temperatures may go to 200 degrees (F) on a sustained run. At Mach 2 they will reach approximately 510 degrees and at Mach 3 perhaps 1020 degrees.

This thermal menace poses all types of problems for the airframe engineer to avoid strains and stresses, warping and weakening, which have been rarely considered heretofore. His design must have a maximum of laminar or smooth boundary flow rather than turbulent flow. To safeguard plane and pilot, he must search out metals and materials that will be least affected by scorching temperatures, a whole new field of investigation, although thermodynamicists have long been aware of the heat problem.

Present day designers must worry about such factors as non-uniform heating—and cooling, too—that can in itself endanger structural soundness. And they must face the crucial quandary of cooling systems for the cockpit and the aircraft skin as well, systems that involve their own problems of weight and complexity.

But the heat problem does not belong to the airframe engineer alone, although he faces the most vital decisions. It belongs also to the equipment manufacturers, the companies that produce the valves, the tires, the pumps, the electronics and automatic controls—all the myriad items that make up the "hot innards" of the bird.

For if equipment fails because it can't take heat, then the plane fails, too, either drastically or in the performance of its mission.

At present, equipment suppliers are being advised to plan for production units that will operate efficiently at a stabilized 500 degrees plus. In other words, valves, for instance, must be capable of functioning at this temperature within the fuselage or wing and without special unit cooling.

It cannot be said what relation this temperature bears to speed or skin heating, for exact methods of cooling forthcoming supersonic planes have not been disclosed, and it would be difficult to guess what systems will be used and what temperature drops can be achieved.

But the fact that equipment must operate at 500 degrees plus is a big enough challenge for an opening gambit in the thermal realm.

This means that suppliers, too, must seek new metals, new materials and new designs for their units. Furthermore, they will be faced with even greater demands for weight and size reduction in view of the additional weight that cooling systems will add to supersonic airplanes. And their test routines must be altered and refined to check reliability under furnace-like conditions.

Any number of greater problems can be foreseen: units that must be submerged in fuel to keep them cool, items that must go into particularly sensitive spots heatwise with no special cooling available.

The stabilized 500-degree plus design level is a general specification. It alone will cause problems multi-fold. But special units for even higher temperatures will take equipment engineers even faster into the thermal complex.

It can be said in all truth: The heat is on!

can be read to .0000005 in.

• Elasticometer, made by Testing Equipment Co., tests spring elongation.

• Universal pitch measuring machine, made by Sheffield, measures external and internal leads on threads and gears; accurate to .000005 in.

• Four ledge granite surface plate, 36x48 in., made by Herman Stone and Granite, and a Sheffield plunjet stone flatness gage.

• Electrolimit universal external comparator and a Pratt & Whitney standard measuring machine for external threads, plugs, wires, both accurate to .000005 in.

• Indi-AC electronic indicator, made by Cleveland Instrument, for checking inside and outside diameters and general surface plate work; accurate to .000005 in.

• Cylindrical square, made by Taft-Peirce, for checking angle blocks, box parallels, etc.; the gage is only .000002 in. off square in 12 in.

• Naval Observatory time signal receiver, made by Matawan Electronic Co.

• Frequency counter, made by Hewlett-Packard, precise within 0.3% at 300 pcs.

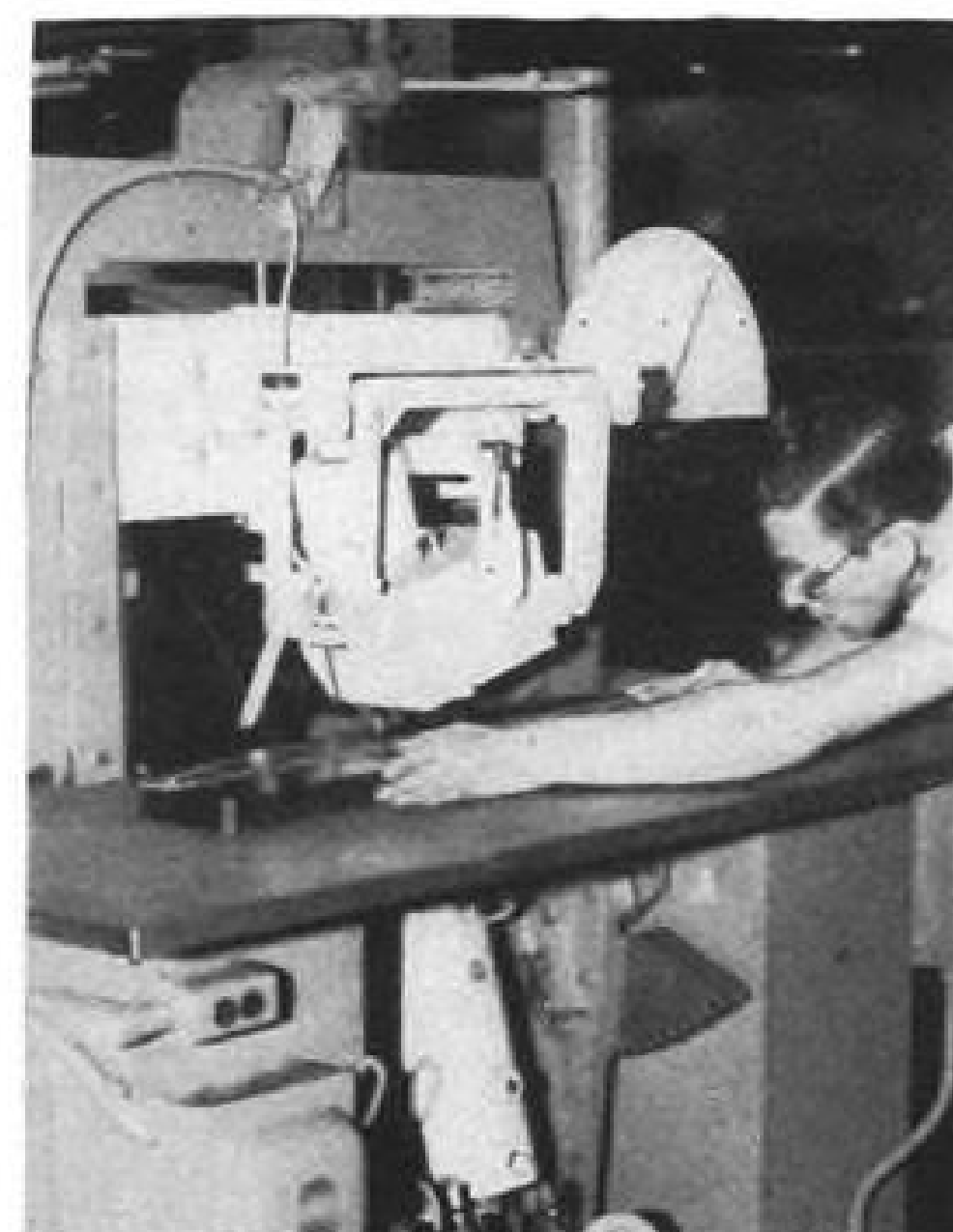
• Vacuum tube precision tuning fork.

• Master manometer.



Novel Incentive Plan

Employees of Topp Industries, Los Angeles subcontractor of aircraft instruments and components, are shown inspecting the cockpit of a Navy F4D Skyray at Douglas Aircraft Co.'s Los Angeles International Airport installation. The F4D is equipped with a number of Topp airborne devices, including angle of attack and sideslip computing systems. Topp's president, B. F. Gira, says the employees who make the delicate electronic components gain added incentive when they see the actual plane whose flight safety and combat efficiency depends upon the devices. Topp transported more than 100 employees in chartered buses for the F4D inspection.



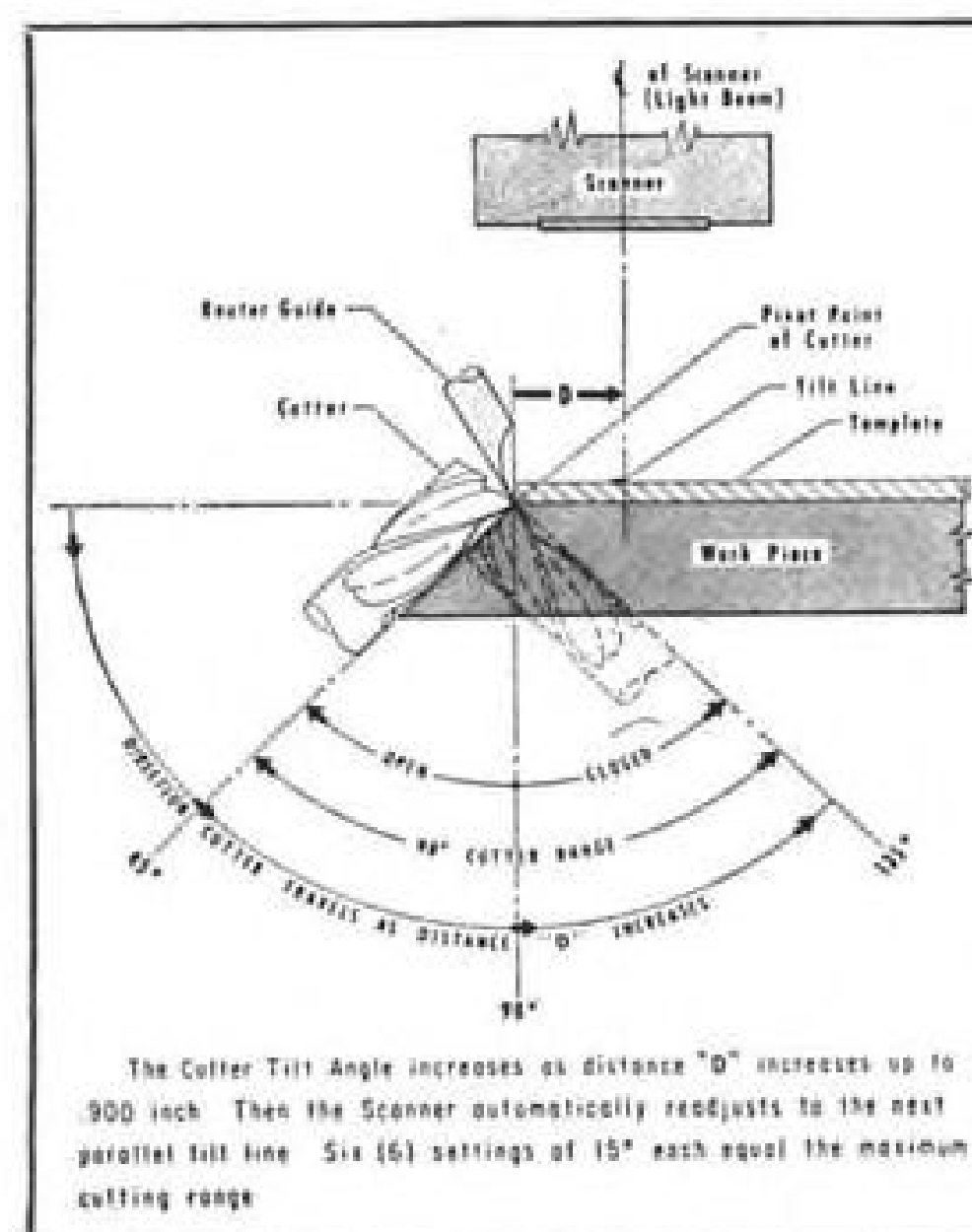
AUTOMATIC ROUTER used to machine variable angles at Convair-Ft. Worth.

Variable Router Uses Electric-Eye Scanner

A new automatic router which employs a photo-electric scanner to continuously machine variable angles is now in use at the Convair-Ft. Worth plant of General Dynamics Corp. The new tool saves about 25% in manufacturing costs, Convair says.

The machine was designed to fill a need in the plant's fabrication department, where conventional routers were being used to cut the variable angles on stretchform blocks. Hydropress tooling and in the machining of production parts from slug material.

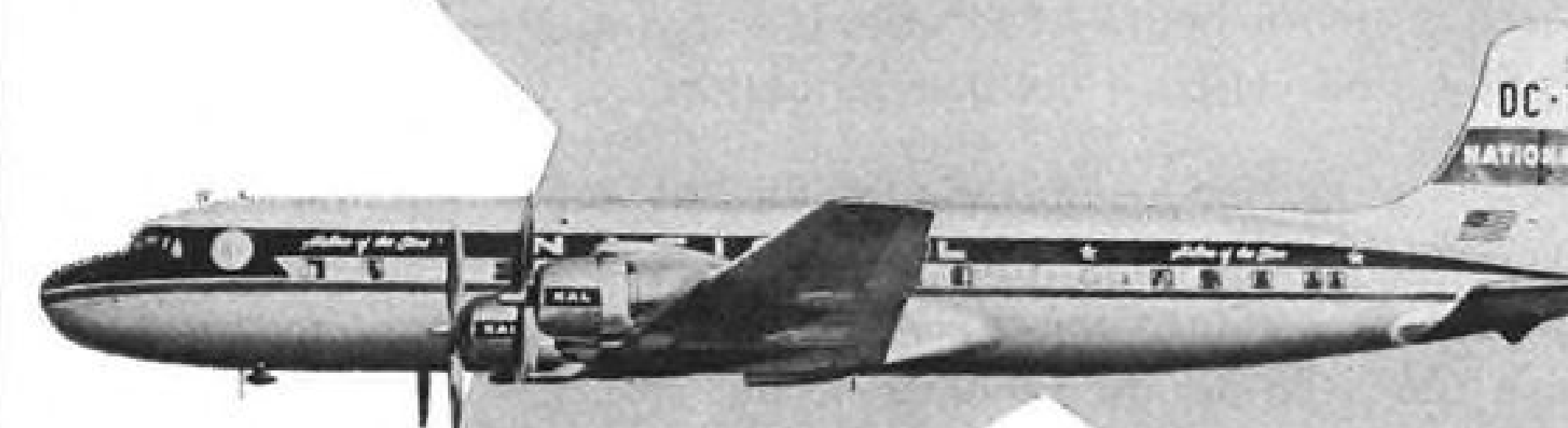
Convair tool designers felt that conventional routers leave much to be desired when it comes to machining a surface where the degree of angle varies. Furthermore, manual operations, the downtime to make frequent set-ups and human error are costly items in the



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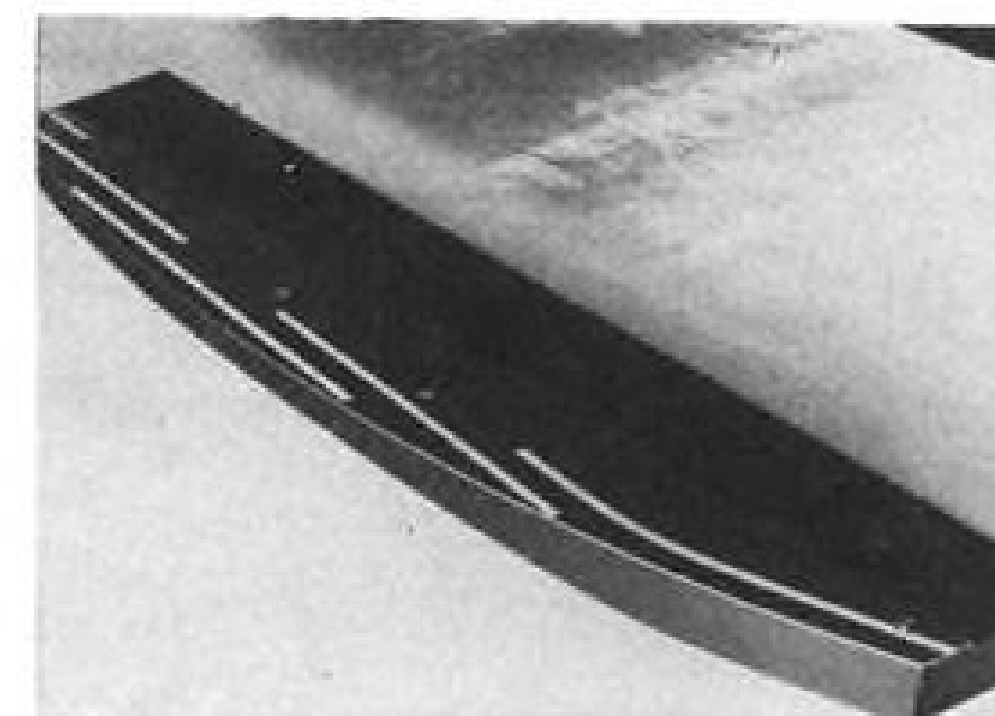
Most of the Magnetic Amplifier Voltage Regulators flying today are Cline-built. Each regulator has logged far more hours of trouble-free flying time than any other aircraft voltage regulator.

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EXCITER VOLTAGE REGULATORS



WHITE TILT LINES scribed on black template excite the photo-electric scanner on the variable-angle router. Angle of cut is determined by distance from edge of template to the tilt line.

manufacture of Hydropress and stretcher tooling.

The router operator must make multiple set-ups in raising, lowering and tilting the cutter in relation to the router table. He must make spindle adjustments frequently to maintain the proper relation between the cutter and the router template.

When a conventional router is used the operator must hand-finish the cut to blend the radii, remove chatter marks and polish the working surfaces of the tool.

To meet these objections, the manufacturing research and development section of Ft. Worth's tooling department developed the new router.

With it, the operator can make smooth and accurate cuts through each complete cutting cycle. He can make variable-angle cuts, either manually or automatically, with only a slight adjustment of the router controls. He can also make heavier cuts and save time that was previously required for finishing.

The toolmaker sets up the job for the variable-angle router by preparing the template which will later be secured to the top of the material that is to be cut. He employs either a black or a white template, and scribes the tilt lines on it in a contrasting color.

The contrasting color of the tilt lines excites the photo-electric scanner on the router. The angle of the cut is determined by the distance from the edge of the template to the tilt line.

The successful operation of the router depends on the toolmaker who lays out the tilt lines by using a "tilt line selector" to obtain his data.

General construction of the router includes a strong all-steel machine base, supports and work table; the photo scanner; an actuating system employing mechanical gearing and the necessary limit switches to assure safe operation, and a two-way adjustable router head unit.

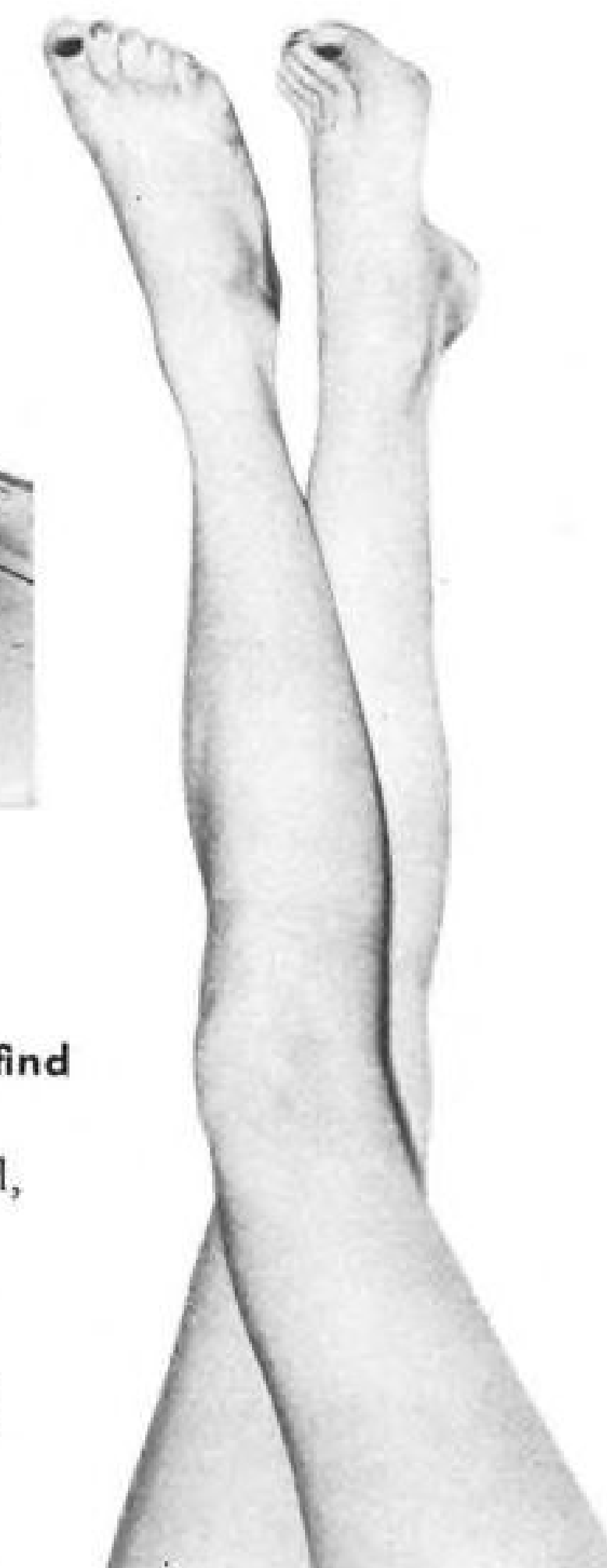
Ektrom, Carlson & Co., Rockford, Ill., has been licensed to manufacture the router.



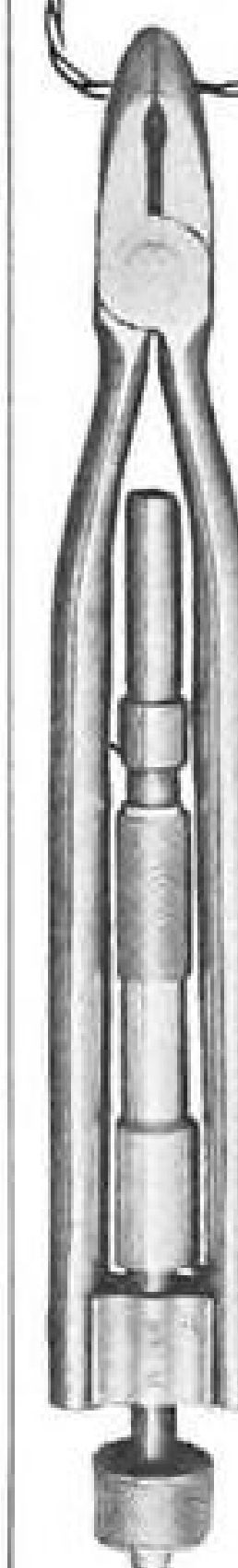
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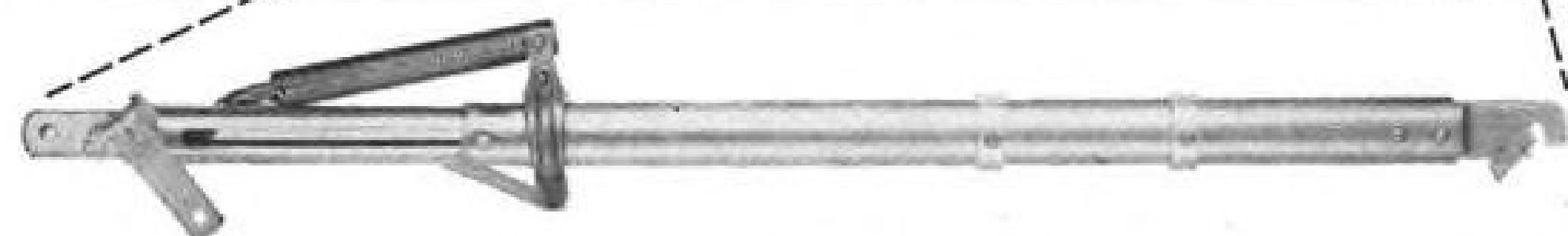
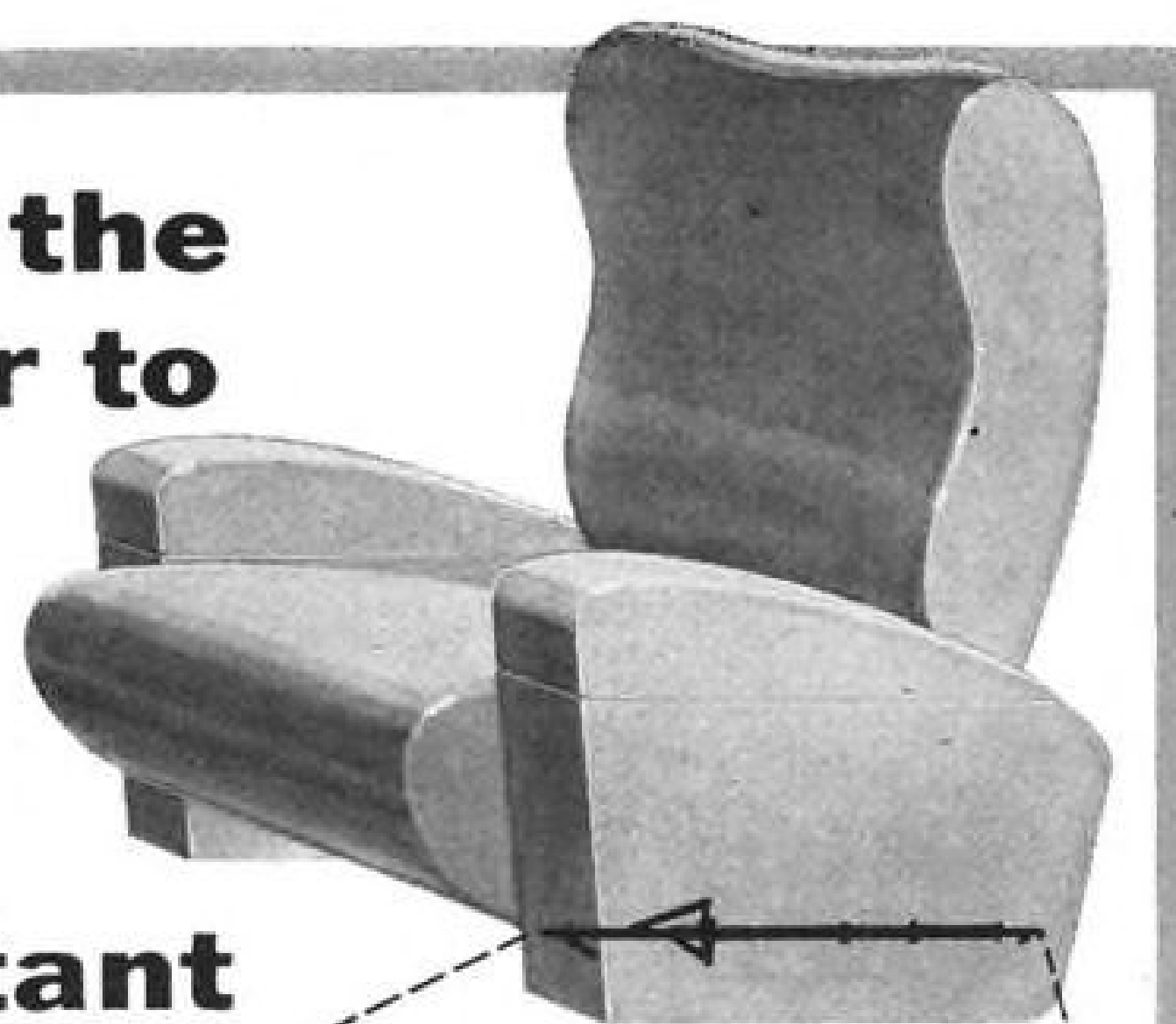
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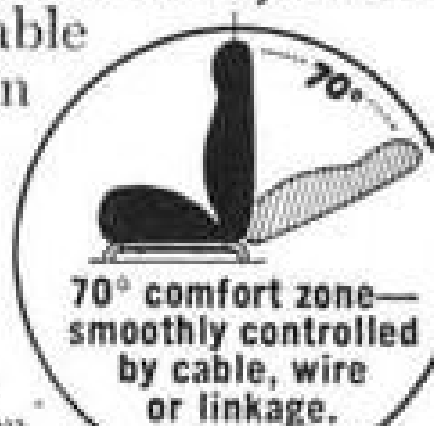
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SATISFIED USERS Seat-back adjustment by passenger or stewardess is smooth, silent and easy...locks firmly in an infinite number of positions. Its dependable and efficient operation has been proved in thousands of installations...can't soil passenger's shoes or clothing.



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WHAT'S NEW

Telling the Market

Setting up problems for electronic computer programming is speeded by new method developed by Hugo M. Martinez; method is described in Data File 120; Department NR 30, Berkeley Div. of Beckman Instruments, Inc., 2200 Wright Ave., Richmond 3, Calif. . . . Criteria and Test Procedures for Electromagnetic Delay Lines is name of Technical Paper 491, available from Helipot Technical Information Service, 916 Meridian, South Pasadena, Calif.

Laminated metals, and how they may be applied in the electrical and electronic industries, are described in fact file available from Standard Metals Corp., 262 Broad St., North Attleboro, Mass. . . . Machine for in-plant production of complex, special-purpose electronic cable is described in bulletin on Douglas Variable Pitch Planetary Cabler; Douglas Roesch, Inc., 2200 S. Figueroa St., Los Angeles 7, Calif.

Publications Received

• **Technical Aerodynamics**, Third Edition—by Karl D. Wood—Pub. by the author, distributed by Ulrich's Book Store, Ann Arbor, Mich. Textbook on aerodynamics for the engineering student or a refresher course for the practicing engineer.

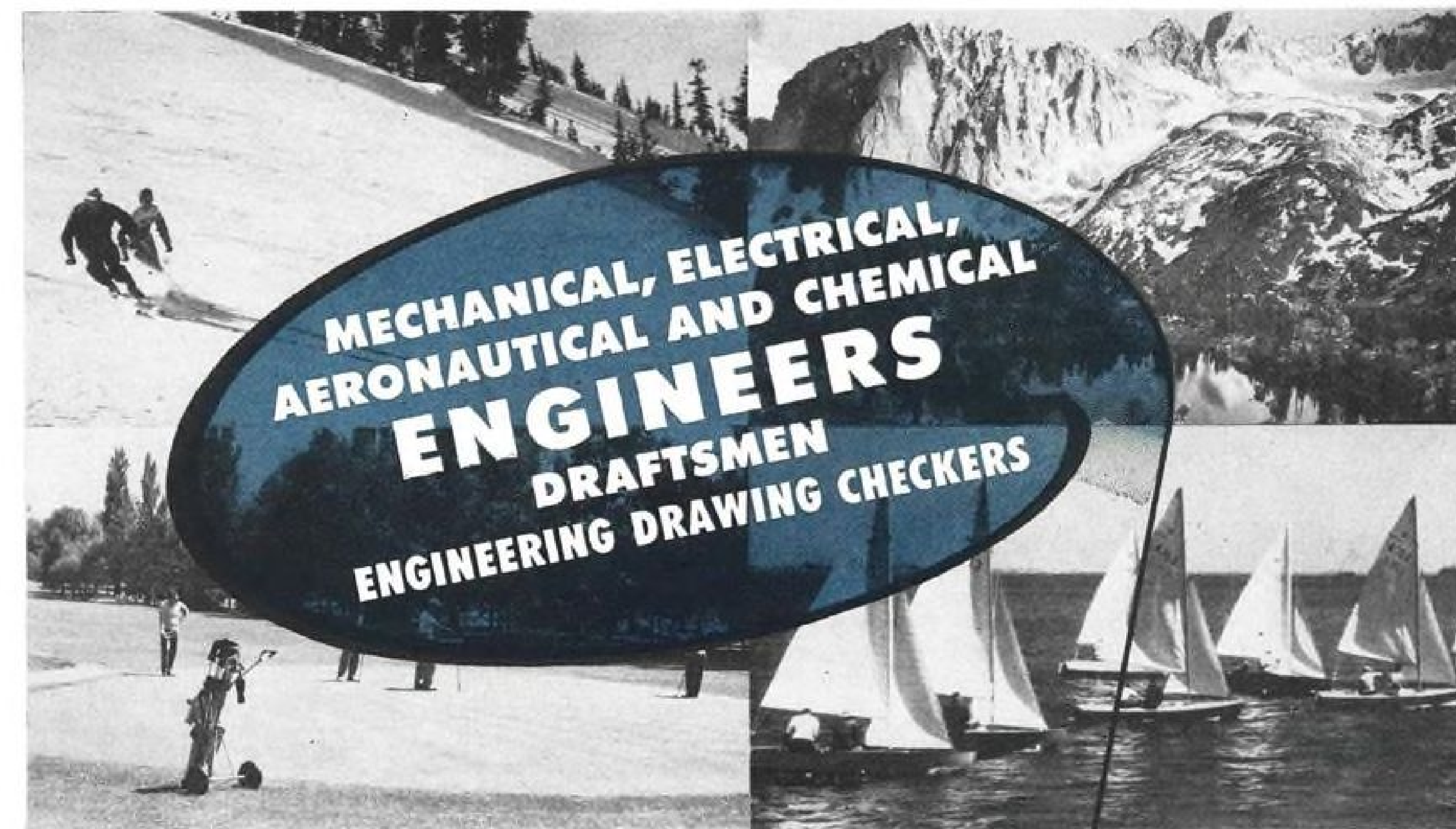
• **Hydraulic and Pneumatic Operation of Machines**—by H. C. Town—Pub. by Philosophical Library, 15 East 40th St., New York 16, N. Y. \$7.50; 191 pp. Information on the use of oil or compressed air for driving and controlling machines and vehicles.

• **Jet Propulsion Turbojets**—by Volney C. Finch—Pub. by National Press, 435 Alma St., Palo Alto, Calif. \$5.50; 327 pp. Introduction to the theory and operation of turbojet engines.

• **Technical Aspects of Air Transport Management**—by R. Dixon Speas—Pub. by McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. \$8.50; 316 pp. Airline management and the technical aspects of airline operation.

• **Practical Air Navigation**, Seventh Edition—by Thoburn C. Lyon—Pub. by Aeronautical Services, Inc., 229 Prince George St., Annapolis, Md. \$3.00; 420 pp. Guide to all phases of air navigation.

• **Introduction to the Study of Chemical Reactions in Flow Systems**—by S. S. Penner—Pub. by Butterworths Scien-



Aerojet-General, America's leader in rocket propulsion, announces the activation of its new Liquid Rocket Plant near Sacramento, California. Devoted to research, design, development and manufacture of large liquid-propellant rocket engines, the new plant is the world's largest industrial establishment of its kind.

Operations are starting now on a permanent basis. Unparalleled "ground-floor" opportunities exist for engineering personnel and draftsmen at all levels of experience.

A subsidiary of The General Tire & Rubber Co., Aerojet combines the stability and resources of a large industrial organization with the vigorous forward thinking of the youthful rocket industry. Nowhere is professional and economic growth so highly assured.

Sacramento, California's capital and one of the West's fastest-growing metropolitan areas, offers the finest in contemporary living, with excellent housing, schools, recreation facilities, and major shopping centers. Superb year-round temperate climate and proximity to the lakes and national forests of the West make it an outdoor man's paradise.

For further information please write or call the Personnel Department, Liquid Rocket Plant, Aerojet-General Corp., Sacramento, Calif. Your inquiry will receive immediate, confidential attention.

Start with 28 Sacramento parks and three golf courses, all used year-around. Add the Sacramento and American Rivers for boating, picnicking, and for striped bass, salmon and steelhead fishing. Add two and a half million acres of valley lands teeming with pheasants, ducks, and geese. Then add the foothills of the Sierra, the ghost towns of '49, and the nearby mountain resorts. Ski, if you like, at famous Sugar Bowl and Squaw Valley, from December through May. Hundreds of Sacramento-area residents own summer homes near these resorts and at beautiful Lake Tahoe, or beach homes in the Santa Cruz-Carmel area. From this Heartland area the High Sierras and sunny Pacific beaches are nearly equidistant. . . . trips or weekends!

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MORE POWER FOR AIR POWER

A attractive living
E excellent fringe benefits
R relocation expenses
O opportunity unlimited
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T TOP SALARIES

Titeflex

Lightweight flexible hose



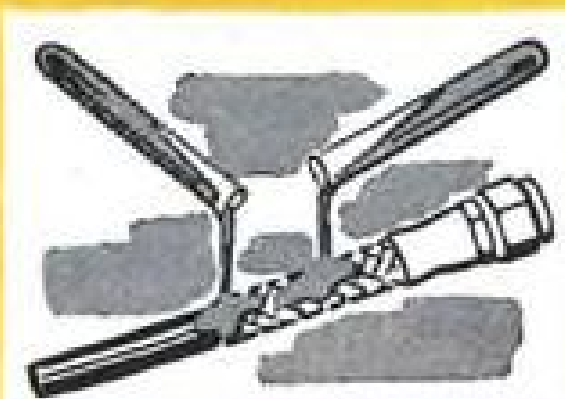
Light—Inner core of Du Pont TEFLON*

Strong—Tough wire braid covering

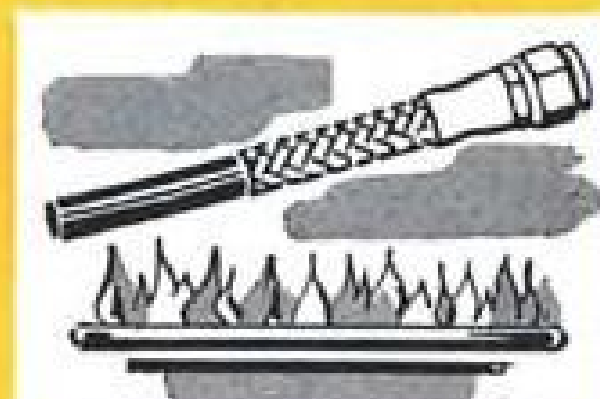
FLEXIBLE—Meets space-saving requirements

Qualified—Tested to MIL-H-5511

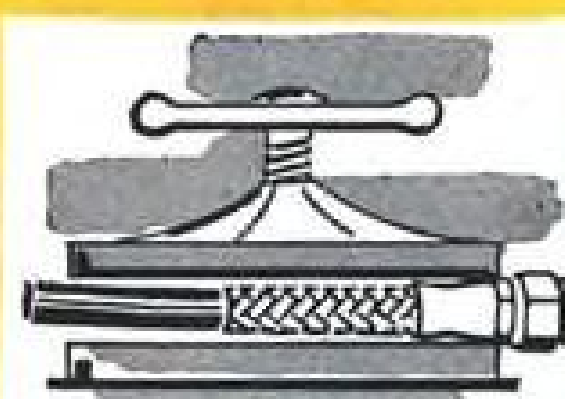
Engineered for the increasing demands and rigid specifications of the aviation industry, TITEFLEX flexible hose, with an inner core of Du Pont TEFLON, provides a practical solution to one of the industry's most critical design problems. Check, for example, these indispensable resistance characteristics.



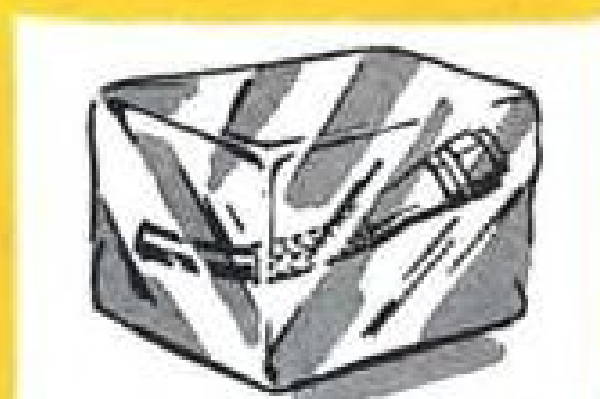
Resistance to Chemicals. New Titeflex hose is impervious to the corrosive action of synthetic lubricants, hydraulic fluids, salt spray, and is unaffected by fungus.



Resistance to Heat. New Titeflex hose withstands temperatures up to 500°F. Does not soften, deteriorate or change in any way.



Resistance to Pressure. New Titeflex hose is tough—recommended operating pressures range from 600 to 3000 psi.



Resistance to Cold. New Titeflex hose retains its flexibility even at -100°F. Super cohesive—will not crack, chip or cause oil lines to clog.

Available in 1/4" to 1 1/4" sizes. Send coupon for more information on the outstanding advantages of this new hose and its applications in aviation design.

*DuPont trademark for its tetrafluoroethylene resin

Titeflex

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Aviation Products Division
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Newark, N. J.

FLEXIBLE HOSE

Please mail new literature on Titeflex flexible hose made with an inner core of Du Pont TEFLON. Intended for _____

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

tific Publications, 88 Kingsway, London, W. C. 2, England. 86 pp.; 21 shillings. (\$2.94). Introduction to the study of chemical reactions in moving ideal gas mixtures.

• **Combustion Researches and Reviews 1955**—Pub. by Butterworths Scientific Publications, 88 Kingsway, London W.C. 2, England. 187 pp.; 35 shillings (\$4.90). Invited papers presented at the 6th and 7th AGARD Combustion Panel Meetings held respectively in Scheveningen, The Netherlands, May 1954, and in Paris, France, November 1954.

• **Spontaneous Ignition of Liquid Fuels**—by B. P. Mullins—Pub. by Butterworths Scientific Publications, 88 Kingsway, London W.C. 2, England. 117 pp.; 20 shillings (\$2.80). Survey and review of spontaneous ignition data.

Certificates of Necessity

Boeing Airplane Company, Seattle, Wash., has been awarded two certificates of necessity for expansion of military aircraft facilities by the Office of Defense Mobilization. Total amount for the certificates is \$1,084,304, with 60% allowed on \$350,000 and 65% allowed on \$734,304.

Other certificates include:

Liberty Products Corp., Farmingdale, N. Y., aircraft parts, \$172,629 certified with 45% allowed.

Solar Aircraft Company, San Diego, Calif., military aircraft engine parts, \$453,022 certified with 45% allowed.

Texas Instruments, Inc., Dallas, Tex., military electronics, \$96,315 certified with 70% allowed.

D. S. Kennedy & Co., Cohasset, Mass., military electronics, \$140,000 certified with 45% allowed.

Hughes Tool Company, Culver City, Calif., military aircraft armament, \$143,765 certified with 65% allowed.

USAF Contracts

Following is a list of unclassified contracts for \$25,000 and over as released by Air Force Contracting Offices:

AIR RESEARCH & DEVELOPMENT COMMAND, Baltimore 3, Md.

Trustees of Princeton University, Princeton, N. J., basic research in kinetics, (AF 33(038)-23976), \$75,000.

Regents of the University of Minnesota, Minneapolis 14, Minn., a study of flame stabilization of bluff bodies at high speed and large Reynolds numbers (AF 18(600)-1553), \$56,894.

University of Delaware, Newark, Del., research on microwave line widths and intermolecular forces, (AF 18(600)-449), \$25,000.

Arde Associates, 14 William St., Newark 2, N. J., evaluation of chemical processes of energy release, (AF 18(600)-1560), \$80,000.

University of Southern California, 3518 University Ave., Los Angeles 7, Calif., research on stability characteristics of two-dimensional ramp and scoop diffusers, (AF 18(600)-1167), \$25,072.

Institute of the Aeronautical Sciences, 2 East 64th St., New York, N. Y., research on cataloging of technical motion picture films in fields of interest to the Air Force, (AF 18(600)-1559), \$29,650.

LETTERS

Aviation Week welcomes the opinion of its readers on the issues raised in the magazine's editorial columns. Address letters to the Editor, Aviation Week, 330 W. 42 St., New York 36, N. Y. Try to keep letters under 500 words and give a genuine identification. We will not print anonymous letters, but names of writers will be withheld on request.

Navy Air Power:

Praised . . .

Having just read the editorial in the November 28th issue of AVIATION WEEK, I wish to compliment you on your handling of the Navy's and especially Secretary Smith's, mobile nuclear reprisal force activities. I think much more than is said should be said of Secretary Smith's courage and forthrightness in the handling of a very difficult job.

CHARLES F. WILLIS, JR.
Assistant to the Chairman
W. R. Grace & Co.
7 Hanover Square
New York 5, New York

. . . Or Maligned

For many years now I have enjoyed reading AVIATION WEEK editorials and some have given me great enjoyment when they have "laid it on the line".

In your 28 November, 1955, issue, it seems as though you have taken an unwarranted crack at our Navy, and for some reason resentment compels me to say a word in our great Navy's defense.

Evidently you had not the opportunity to spend much time at the Navy's research center at Patuxent River, Maryland, prior to the Korean War. I and others who did could tell of the many advanced models of Jet planes tested there.

McDonnell, Douglas, Martin, North American, Chance Vought, Grumman and Lockheed all had advanced types in test and the Navy did an excellent job in evaluation and are to be praised for allowing only one to go into production that didn't "measure up" and that because of a faulty engine, that was fully covered in your columns a few weeks ago.

It may be true that the Navy did not have enough qualified personnel and funds to complete its programs but there was certainly not a lack of such plans.

If there were doldrums of any kind they were created by an administration headed by an Army minded President, who has succeeded a now unlamented President (but who, however, was Navy minded) and appointed people like Secretary Johnson.

When you compare the Navy's sub-sonic carrier jet planes with Air Force land planes, like crops should be compared and not the first crops against second crops. Even in World War II the first crop Curtiss P-40 proved to be more than a match for the much later type F-109 Messerschmitt. These were both land planes.

Just prior to the Korean War the Navy

...to meet

aviation hose requirements

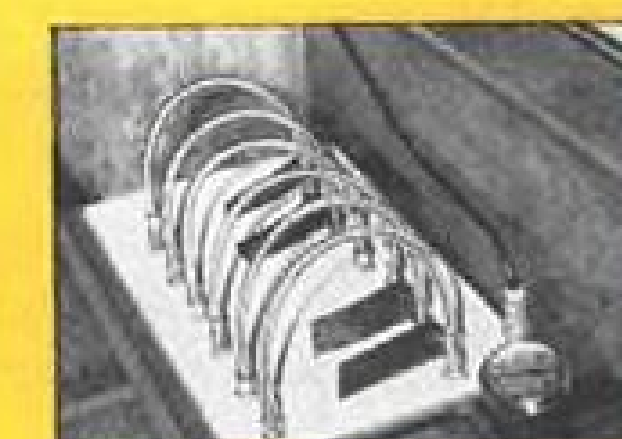
Chemical Resistant

Withstands Very Low Temperatures

Operates at High Temperatures or Pressures

Sizes—1/4" to 1 1/4"—Standard Fittings

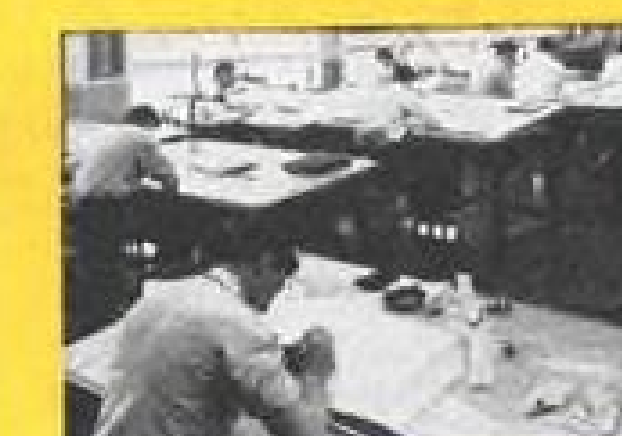
Titeflex's new aviation hose (with inner core of Du Pont TEFLON*) was developed by our research engineers working closely with jet-engine designers. This hose meets or exceeds standards set by jet engine manufacturers. We maintain these standards through a rigid quality control system and a fully rounded engineering service.



Rigid Testing. Sample Titeflex hose lines set up for impulse-test cycling from 75-2500 lbs. psi. This is a MIL-H-5511 test.



Quality Control. View of Titeflex quality control laboratory where raw materials and other components are inspected for uniformity.



Engineering Service. If you are looking for design ideas and adaptation of Titeflex aviation hose our highly skilled engineers are at your service.



Customer Service. Trained Titeflex sales engineers work directly with you to help you find the right answers to your aviation hose problems.

Mail coupon to obtain more detailed information on this new type Titeflex flexible aviation hose with an inner core of durable, chemically inert and heat-resistant TEFLON.

*Du Pont trademark for its tetrafluoroethylene resin

Titeflex

FLEXIBLE HOSE

Please mail new literature on Titeflex flexible hose with an inner core of DuPont TEFLON. Intended for _____

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Aviation Products Division
518 Frelinghuysen Ave.
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NEW HIGH ALTITUDE MAGNETIC RECORDER

THE AIRBORNE AMPEX 800 records the broadest combination of data ever obtained concurrently on one magnetic tape —performs under all high altitude environmental conditions—and furnishes data compatible with the most widely used playback equipment.

HANDLES ANY AIRBORNE DATA REQUIREMENT

The Ampex 800 can provide from 1 to 28 data channels. By interchangeable amplifier units, each one can be adapted to any one of three basic magnetic recording techniques:

Direct recording — 300 to 35,000-cycle response for a wide-band data or multiple recording of RDB subcarriers.

FM-carrier type recording — D.C. to 5000 cycles and high instantaneous accuracy suitable for shock and vibration data.

Pulse-width modulation recording — Up to 30 instrument readings commutated on to each tape track; frequency response 0 to 5 cycles/sec.

Combinations of these recording techniques can be provided to satisfy practically any flight test requirement by simple insertion of the proper plug-in amplifiers. Separate channels can be assigned to measurements requiring wide-band response or high transient accuracy. By using pulse-width techniques, many relatively steady instrument readings can be commutated on to a single channel. All will have a common time base.

WITHSTANDS THE RIGORS OF HIGH ALTITUDE FLIGHT

The Ampex 800 will perform within specifications under vibrational forces as high as 10G —operates over a temperature range from —65° F. to +130° F.— is unaffected by altitudes to 50,000 feet —and withstands a relative humidity of 100% up to 122° F. The Ampex 800 is light in weight. It operates on 27.5 volts D.C. and 115 volt, 400 cycle, A.C. All operating functions can be remotely controlled.

RETAINS WIDELY ESTABLISHED RECORDER STANDARDS

The majority of all magnetic recorders now in instrumentation use are Ampex machines. Their recording characteristics, tape speeds, track widths and other parameters have become a standard in aircraft and missile testing. The Ampex 800 retains these standards while greatly extending the environmental and mechanical conditions under which accurate test data can be gathered.

Performance specifications, descriptions and explanations have necessarily been limited by the space on this page. A full description and detailed specifications on the Ampex 800 are available by writing Dept. UU-2243

First in Magnetic Tape Instrumentation

BRANCH OFFICES: New York; Chicago; Atlanta; San Francisco; Dayton; College Park, Maryland (Washington D.C. area)

AMPEX
CORPORATION

DISTRIBUTORS: Radio Shack, Boston; Bing Crosby Enterprises, Los Angeles; Southwestern Engineering & Equipment, Dallas and Houston; Canadian General Electric Company, Canada

934 CHARTER STREET
REDWOOD CITY, CALIFORNIA

• LETTERS

was even willing to match its small F2H Banshee Jets against the great B-36 newly fitted with jet engines and it was not given a fair trial.

To round out the Navy's story, one should review the records of the Navy Task Force 77 during the Korean War and see just what the F2H-2 and F9F-2 really did while the Sabre was having its "bugs" worked out.

I myself as a "McDonnell" representative made four trips to the combat zone on the carrier Essex (CV-9) with the Navy fighter squadron VF-172 led by Cmdr. Barney Barnett. This squadron, with Banshees and a Grumman Squadron with F9F-2 Jets, both made outstanding records against the enemy with small losses in 1951-1952.

So as an individual reader I take exception to your remarks about our Navy and believe the record will show that in spite of all the hardships put in the way of a service previously over favored it did a great job when the call came and will do so again if necessary.

PAUL CARPENTER
Bell Aircraft Corporation
Buffalo, New York

In Defense of Tacan

Are "table-top" births bad?

This letter concerns the ballad on Tacan and the ITT which appeared in a recent issue of AVIATION WEEK. A sense of humor is always welcome in this troubled world, and a certain "mellowed" attitude among the pro-Tacanists and anti-Tacanists (I can't resist a pun either) in a technical controversy would be all to the good. Yet, one may be permitted to wonder whether pilots of carrier-based aircraft find equal cause for humor in this particular matter.

Tacan was originally developed in response to the U.S. Navy's real and expressed need for an adequate navigational aid for carrier-based aircraft. Our brothers, fathers, sons and friends who fly such aircraft are people too; and just like the aircrews on land-based aircraft, they too would like to enjoy all possible safeguards for their lives. Carrier pilots may find themselves many miles from their haven—one pretty small, heaving strip of steel at a constantly changing and unknown location; there are no fixed alternate landing fields, no great variety of land type airborne navigational aids to choose from, no supply of friendly ground GCA's or radars or D/F's to help them find a place to put down, such as their brethren on land flights enjoy. This "ain't funny, McGee" (I think).

Before Tacan, carrier aircraft pilots had no adequate facility to pinpoint their location with respect to their home carrier, or some alternate carrier in emergencies, so that they could navigate efficiently and safely to a landing, as well as navigate efficiently in performance of their outgoing mission. Now with Tacan, carrier aircraft pilots have such a facility. This reality, stemming from the development effort which started from a "table-top" dream at ITT (International Telephone and Telegraph), is evidenced by recently published photographs showing the Tacan antenna mounted on the top-mast of the Forrestal, the Saratoga, the Intrepid and other U.S. Navy carriers. All this represents not merely a dream, but a real contribution to military



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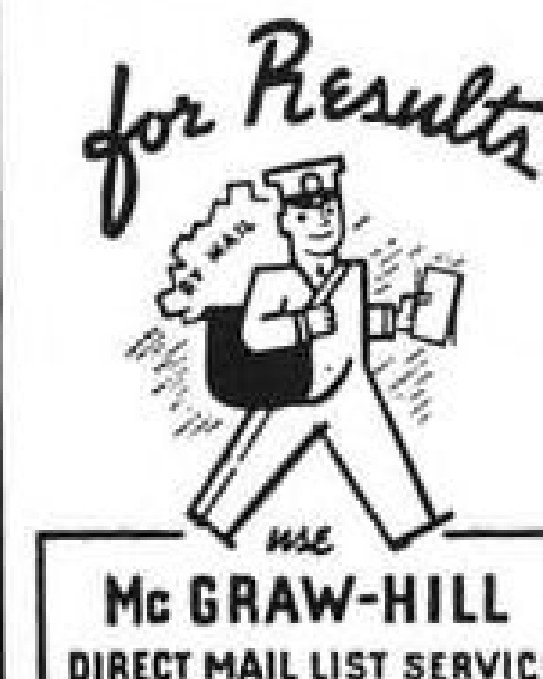
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• LETTERS

aviation electronics, of which the implications are not quite exhausted by humorous parodies.

As regards civil adoption of Tacan, which seems to be an item of controversy, here in closing is some food for thought (which could conceivably also be set to music): What does Tacan have in common with four-course ranges, instrument landing systems, ground controlled approach systems, distance measuring equipment, traffic control radar, radar safety beacon, VHF communications, private line or data links, etc.?

The answer is that: (1) The development of these systems from ideas into practical and useful devices was largely due to the foresight, initiative and perseverance of

the Armed Forces; (2) Their consideration for civil use was at first misunderstood, opposed or derided in one or another quarter; (3) Civil aviation has eventually adopted them all, with great benefit to itself. (Incidentally, in many cases, "table-top" planners at ITT played an important role in the conception, the development or the production of the equipments which are now in world-wide use).

Any one carrier-based aircraft mission which is aided by Tacan equipment is an incontrovertible fact which has greater significance than all the humorous remarks about table-top dreamers put together. This, perhaps, is a perspective which might be brought to the attention of your read-

ers; and to the American public in general, whose standard of living is largely the result of "table-top" dreamers.

ROBERT I. COLIN
106 Warren Street
Nutley, New Jersey

On Proprietary Data

I have read with interest the article entitled "Industry Wants Proprietary-Data Policy" by Mr. Robert E. Beach in the November 7th issue of AVIATION WEEK.

The situation presented by Mr. Beach is no doubt reasonable from the point of view of industry. Certainly it must be annoying, to say the least, to have a process, design, technique or component delivered to a competitor to strengthen the competitor's position. And yet, a deeper, more basic principle is involved in the whole problem of technical data and proprietary rights.

The basic fact remains that in contracting for research and development with industry, the Government is buying an end item.

It is paying the full price negotiated and, as in any commercial transaction, expects full title to that item for which it has paid in full. This is completely analogous to the system almost universal in industry whereby, in consideration for his salary and usually one more dollar the efforts and talent of a designer for a company, which prove to be of a patentable nature, belong to the company for any purpose it deems suitable.

I realize that Mr. Beach, in his paper, has used experience gained mostly from participation in Air Force procurements which, particularly in the "competitive design" aspect, differ somewhat from the practices of other services. Nevertheless, policies, regulations and directives are boundary conditions at the negotiating table where I dare say "every avenue of legal and economic pressure" are utilized by both sides to secure the terms and provisions they deemed advantageous.

The fear of a contractor that the fruits of his labor will be spirited away to enhance the position of a competitor is understandable.

However, many services have taken pains to allay these fears. For example, the Army Ordnance Corps in procuring guided missile systems has stated that initial production for such materiel, whenever practicable, will be negotiated with the organization which performed or participated in the development. Yet it is difficult to see how the element of enterprise is encouraged by limiting such production to one source indefinitely because the Government cannot secure competition on an item it has bought and paid for.

The talents and experience of industry are a stock in trade to be purchased by any customer, including the Government, just as the education and experience of the company engineer are. Indeed it appears that the Government is more liberal since it recognizes that technical data generated under company funded effort is proprietary while the company, on the other hand, claims its employee's developments, if patentable, even if performed in his home workshop on week-ends.

I feel that the subtleties of technical data

• LETTERS

policy arguments are somewhat shadowed when viewed in the light of "What is the Government buying?" If it buys development and gets delivery with elastic strings then I, as a taxpayer, am bilked. The time to determine the elasticity of the strings, if any, is before the contract is signed.

STANLEY BERNSTEIN
1013 Pratt Avenue
Huntsville, Alabama

USAF Engineer Policy

In a recent issue a personnel man from Eglin A. F. Base mentioned that positions were available at the base, but since the government does not advertise, there was no way that engineers could be informed of this. He also mentioned that there was a shortage of engineering personnel at the base.

I wish to point out to this individual that the reason the Government has a shortage of engineers is that it takes forever and a day to get an appointment. In spite of the lower salaries (as compared to private industry) there are many interested people for these government jobs.

Would this individual please explain why a person can't be considered in as short a time as private companies do? While the examining board considers an application, an individual could have a dozen jobs. The jobs are 1955 vintage, but the examining board is of the 1776 variety.

NAME WITHHELD

'Skyhook Research'

The October 10th issue of AVIATION WEEK carried an article about balloon work being done by General Mills, Inc. for our Armed Forces. Because of the wide interest in this work, I thought your readers might like some additional information about it.

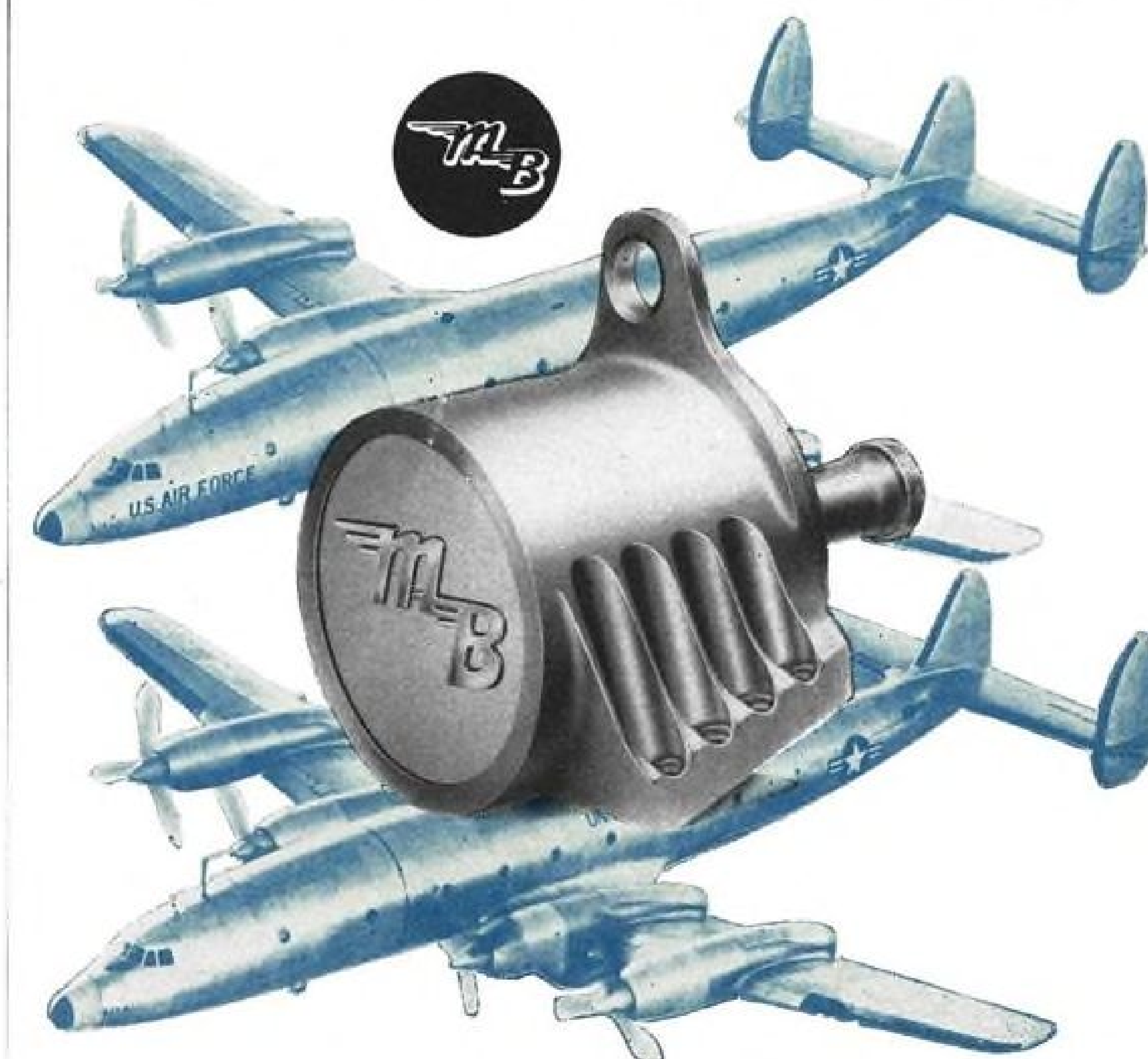
In recent years, Minneapolis has become the world center of Upper Atmosphere Research. In addition to General Mills, Winzen Research Inc., another Minneapolis firm, is engaged in this highly specialized field of manufacturing and flying plastic stratosphere balloons. Winzen Research currently holds the record of over 126,000 feet (pressure altitude) for a balloon research flight set last July 26.

It was Otto Winzen, president of Winzen Research, who originally interested the Armed Forces in using plastic stratosphere balloons as research tools. During the latter part of 1945, Winzen was able to interest Cmdr. George W. Hoover of the Office of Naval Research in going ahead with such a project. It was due largely to Commander Hoover's vision that Upper Atmosphere Research via plastic balloons came into being.

Winzen persuaded General Mills to permit him to set up a laboratory where the government-sponsored research could be carried out. In May 1946, Winzen organized the Aeronautical Research Laboratory of General Mills, Inc., and directed the successful development of the first operational plastic stratosphere balloon for which he holds the patent. In 1948, Winzen left General Mills and formed his own company.

Since the first successful flight of the Navy "Skyhook" balloon to an altitude of 100,000 feet on September 25, 1947, many

MB mounts do big job of vibration control



for fastest turbo-prop transports!

Big 5700 hp T-34 turbo-prop engines . . . big, broad-blade propellers . . . these help make Lockheed's YC-121F and R7V-2 the fastest propeller-driven transports in the world. They also presented an unusual vibration control problem . . . which MB Type 5100 Mounts solved to complete satisfaction.

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• LETTERS

fields of research have benefited from this work including cosmic ray studies, meteorology, astronomy, atmospheric physics, aerial photography, aero medical research, rocket research and many others. Project "Skyhook" (so named by Capt. H. B. Hutchinson, U.S.N.) of the Office of Naval Research has made the new balloon research tool available to scientists in America and abroad.

I think your readers would be interested too in the invaluable support upper atmosphere balloon research has had from other government and civilian laboratories. There is a cosmic ray research project being conducted at the University of Minnesota by Dr. E. P. Ney, Dr. John Winckler and Dr. Leland Bohl which has added a great deal to the technology of balloon design and instrumentation. Dr. J. Howell, at the Air Force Cambridge Research Center, carried out the development of the magnetic valve, therefore making it possible to utilize much more practical steel slot as balloon ballast. Another example is the Aero Medical Field Laboratory at Holloman Air Development Center headed by Col. J. P. Stapp (M.D.), Project Officer Maj. David G. Simons (M.D.) was responsible for the development of a practical air-conditioned capsule for extended (36-hour) flights with animals which may set the trend for future space flight.

Assisting in the work of determining cosmic ray exposure tolerances and effects are Dr. Herman Schaefer of the Naval School of Aviation Medicine, Dr. Herman Yagoda of the National Institute of Health, and Dr. Webb Haymaker of the Armed Forces Institute of Pathology.

Since its modest beginning in 1947, upper atmosphere balloon research has become increasingly more important and now is supported by all branches of the Armed Forces and by the Committee for Free Europe. The Office of Naval Research still monitors over-all balloon research and represents the Navy's interests in this field. Lt. Cmdr. Malcolm D. Ross is the Project Officer.

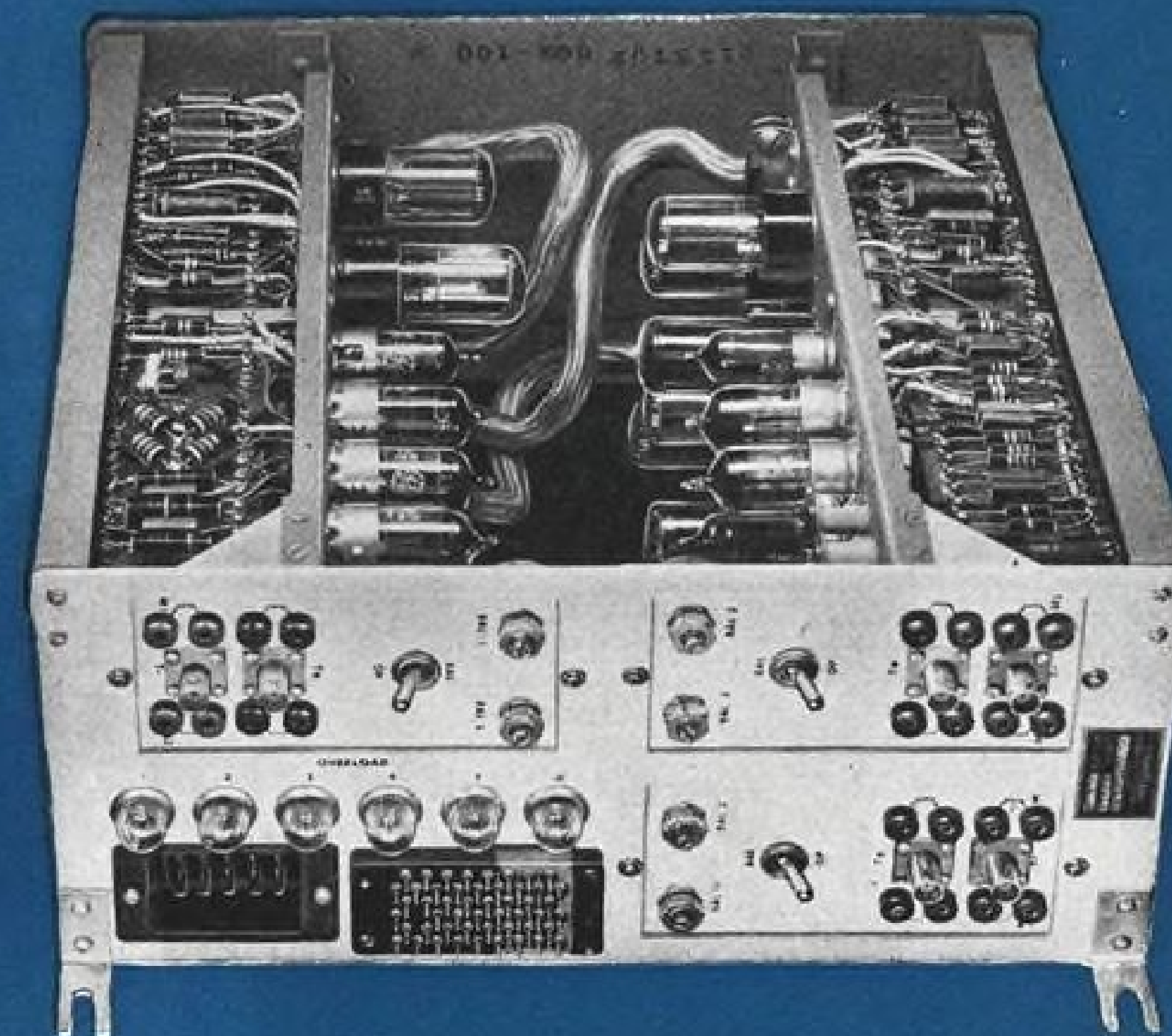
The Cambridge Research Center of the Air Research and Development Command is the center of balloon activity in the Air Force. The Signal Corps has research responsibility for the Army in this field.

In conclusion, upper atmosphere balloon research represents the concentrated and sincere efforts of many scientists working together in the exploration of the mysteries of the earth's atmosphere and the outer space beyond it. It is an exciting field to which they have dedicated their full interests.

Beyond that, it is a shining example of the U. S. Government successfully supporting and encouraging research. In the last analysis, it reflects the faith of the public and our Government in useful new research and in the scientists behind it who keep our nation far advanced in the field of upper atmosphere research.

RICHARD G. REVORD
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★ **Guaranteed accuracy over ENTIRE range throughout ALL FOUR quadrants.**

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★ **New, convenient switching for choice of internal or external reference signals.**

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A Goodyear Engineering Report, GER-4952, is available which describes the principle of operation of the GEDA electronic multiplier. To obtain your copy and a complete description of the GEDA line, address your inquiry to: Goodyear Aircraft Corporation, Department 931BL, Akron 15, Ohio.

P.S. The NEW N3A and N3B are two of more than 12 analog computing units which make up the famed GEDA line. Each unit of the series mounts in either the L3 GEDA linear computer or N3 GEDA non-linear computer—each unit is completely interchangeable with any other unit, can be used in any quantity, in any combination for the widest flexibility of all electronic differential analyzers on the market today.

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Just now going into production is the new high-altitude Bendix Type 2894 Automatic Diluter Demand Pressure Breathing Oxygen Regulator. It's another advancement resulting from pioneering by Bendix—the world's most experienced manufacturers of oxygen regulators and converter systems. For full details on the new Type 2894, or on other oxygen equipment, write PIONEER-CENTRAL DIVISION, BENDIX AVIATION CORPORATION, DAVENPORT, IOWA.

West Coast Office: 117 E. Providencia, Burbank, Calif.
Export Sales and Service: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.



Marines Want to Buy New-Type Helicopter

U. S. Marine Corps is seeking two additional types of helicopters to round out its stable of small, medium and large transports. The Marines propose to add a type to each end of the helicopter family spectrum with a one-man helicopter on one end and a large cargo "flying crane" helicopter on the other, according to Lt. Col. K. B. McCutcheon, who is attached to the Marine Development Center, Quantico, Va.

Speaking before the American Helicopter Society last week, Lt. Col. McCutcheon said the additional helicopter models are needed to provide the capability of performing the Marine Corps mission under all conditions.

The logistic requirements particularly call for a high payload vehicle, he said, and added: "We're willing to sacrifice speed to get the capability."

"The cargo helicopter needed must, in effect, be a flying crane."

McCutcheon stated that the Marines will begin their evaluation of the one-man helicopter next summer. At the same time, he said, first delivery will be made of the large Sikorsky HR2S, which has gone into production. By July, he said, the Navy will have completed conversion of the first escort carrier to be assigned exclusively to helicopter use.

Further Marine requirements include automatic folding and extension of the helicopter rotor blades and the ability to taxi helicopters with rotor blades folded.

Efforts are continuing to improve the ease of maintenance, according to McCutcheon, who said "helicopter maintenance today is excessive."

Cubana Order

Compania Cubana de Aviacion purchased three Vickers Viscount turboprop transports. Cubana's order for Viscounts will enable the carrier to match competition on its Caribbean area routes.

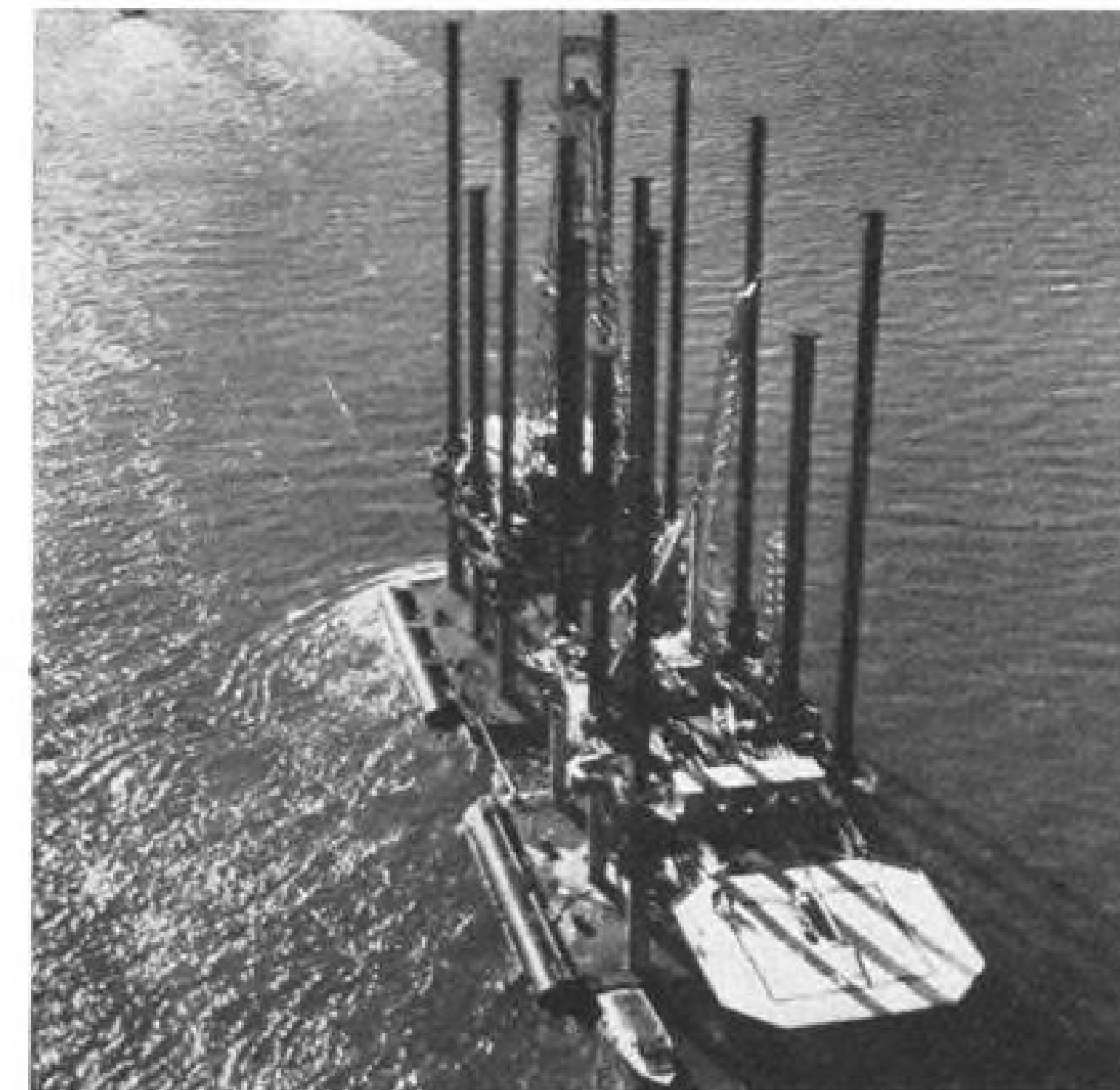
The Cuban company is currently operating a fleet of 12 piston engine aircraft.

Delta Sets Record

Delta Air Lines set a new commercial airlines speed record of 1 hr. and 46 min. between Dallas, Tex., and Atlanta, Ga.

The Delta DC-7 broke the previous commercial airline record for the 721-mile non-stop flight which was 1 hr., 52 min. and 10 sec.

BUSINESS FLYING



HELICOPTER'S EXPANDING HORIZON: Oil company uses the rotary-wing aircraft to ferry executives to drilling barge at left (note landing area), while Chicago firm employs helicopter as commuter vehicle between office and outlying plants.



Bell Raises Corporate Helicopter Output to Meet Record Demand

By Erwin J. Bulban

A snowballing trend towards corporation use of helicopters for speeding communications between office and plant is taking up a substantial portion of Bell Aircraft Corp.'s total rotary-wing production.

The company's helicopter-manufacturing Texas Division in Ft. Worth reports that 32% of its 1955 helicopter sales have been made to private companies and agencies, a 30% gain over last year's record 20% increase above the 1953 figure. Although Bell does not report helicopter sales by number of aircraft or dollar volume, a source close to the firm estimates that the 30% increase amounts to sales of over 100 commercial aircraft.

In 1955, 29.56% of the commercial helicopter sales went to new customers buying their first helicopters. Domestic demand has increased to the point where it accounts for 69.5% of commercial sales, with the other 30.5% going for export.

Revise Production Plans

Corporation demands for the Model 47 has forced the company to revise production plans upwards twice this year.

Last month, after it already had committed commercial production for

the first few months of 1956, the Texas Division had to order production work for an additional 150 commercial helicopters.

"We are guilty of underestimating the market with our seemingly optimistic quantities," a Bell salesman said, and the sales department now estimates that commercial 47 sales should show a 30% gain during each of the next several years.

There also is an increasing demand by companies who formerly leased their helicopters to buy their own Model 47s. But, despite this move, the leasing operators are still an important part of Bell's sales picture, with new business continually opening up.

47J Ready for Market

The Texas Division says that all three of its current production models are sold out through the first quarter of 1956. Bell also will soon begin taking orders on the latest addition to its line, the new 47J four-place, high-utility helicopter, that is scheduled to begin a nation-wide sales tour early next year. Orders for the 47J won't be taken until after January, but officials say they could sell half of the company's planned 1956 production at the present.

The 47J is a commercial version of the new Navy HUL-1, powered by a 250-hp. Lycoming de-rated to 220 hp.

It will be available with several kits, including electric hoist, floats, internal litters, custom interiors, cargo fittings and long-range ferry tanks and pump. It is a revised version of the hand-built prototype 47J that Bell previewed on a 10,000-mi. nationwide tour. Design changes include longer rotor blades and longer tailboom.

Approximate prices on Bell's three-place current models: 47G, \$39,750; 47G-2 (250-hp. Lycoming de-rated to 200 hp.), \$42,000; 47H, \$47,500 (with de luxe custom interior). No price has been announced for the 47J.

There are over 500 commercial Model 47s now in service in the U.S. and abroad, more than all other makes combined. Manufacturing and design improvements have steadily increased the time span between major overhauls. When the company sold its first commercial Model 47 in 1946, mandatory inspection time between overhauls was only 25 hr.; now it is 600 hr.

Skimmer Amphibian Goes Into Production

Metal has been cut for the initial production run of 10 three-place C-1 Skimmer amphibians at Colonial Aircraft Corp.'s new Sanford, Me., plant. Delivery of the first airplane is scheduled for May, according to David B. Thurston, Colonial president.

Formerly located at Deer Park, L. I., N. Y., the company currently has 20 employees but plans to increase the payroll to 60 by May 1 and 120 by next November. Production of eight Skim-



AT G-E FLIGHT TEST CENTER, SCHENECTADY, N.Y., engine tests are conducted in special North American B-45 flying test bed. A new prototype powerplant can be installed in bomb bay while flight test engineers record, evaluate its performance.

G.E. Steps Up The Pace of Advanced Jet Engine Development



Teamwork with ARDC, coupled with new private investment, sets stage for significant steps forward in powerplants

At research, development, and test centers across the United States, thousands of American engineers are tackling the problem of keeping this nation first in air power. The job is of vital importance. For today we know that quantitative air superiority is not enough. Needed also is qualitative superiority.

USAF's Air Research and Development Command directs the Air Force's all-out drive. And in one important field—aircraft powerplants—close co-operation between ARDC and engine manufacturers is now making possible new progress toward advanced engines for tomorrow's aircraft.

As a member of the National Defense team, General Electric is constantly working to cut the time needed to develop new powerplants. To step up progress on jet development, G.E. is now using the demonstrator engine concept. The demonstrator idea, by separating production

considerations from development, has allowed rapid improvements in engine components and materials, radical design advances... cut new engine development time a year or more.

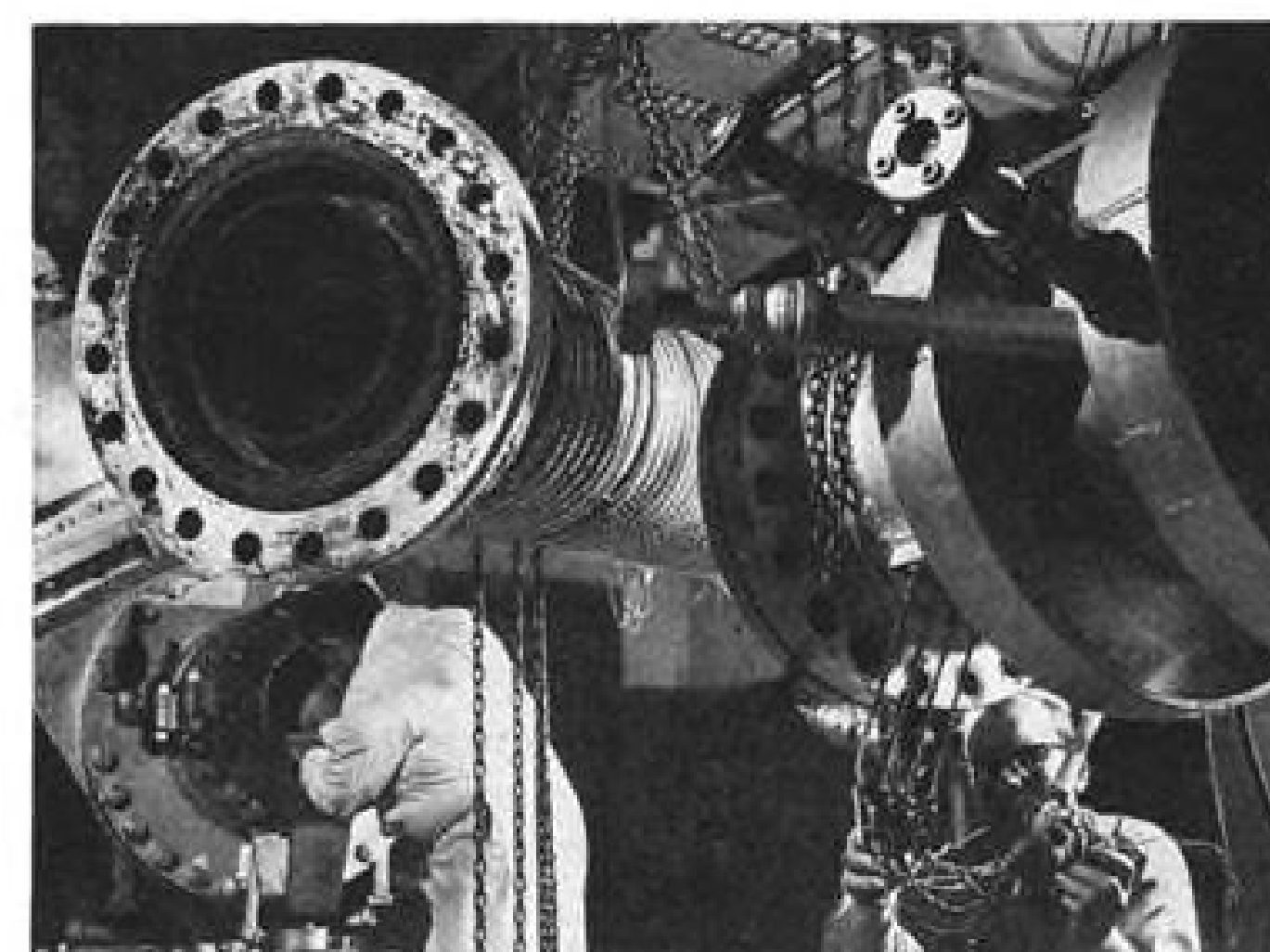
But as jet engines grow more powerful, so too grow development facility requirements. The investment of private capital in new facilities makes possible development progress which otherwise could not be accomplished. Near Cincinnati, for example, G.E.'s multi-million dollar investment in component development facilities—staffed and equipped for research on all types of engines—is doing much to advance the state of engine art.

Adequate national air power calls for close co-operation between industry, the Armed Services and other government agencies. In this partnership lies the best assurance of America's future leadership in the air.

232-16

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NEW PRIVATELY-OWNED FACILITIES such as G.E.'s AGT component development facilities near Cincinnati, help G-E technicians probe future phases of powerplant research.

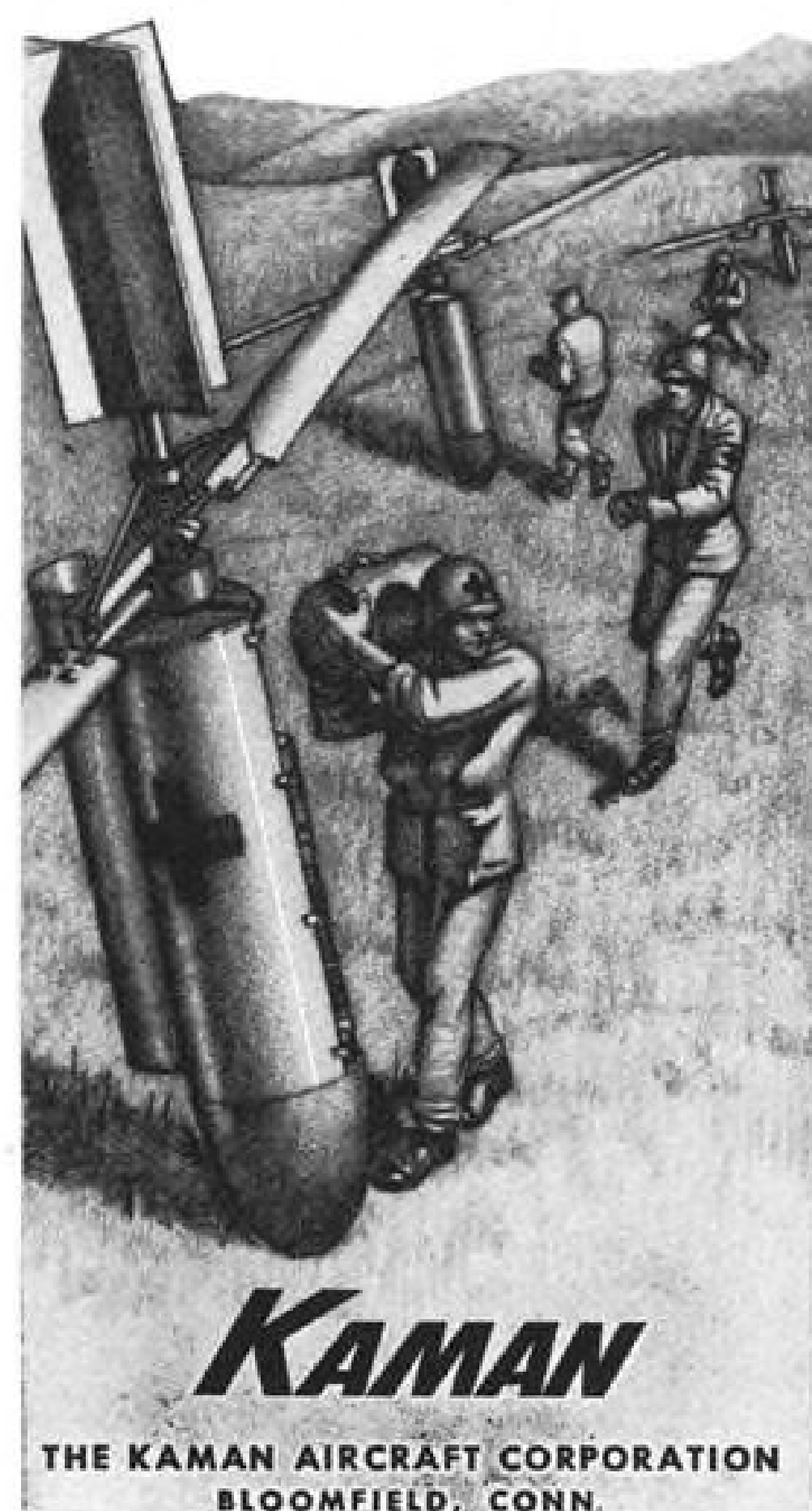


LONG-RANGE ENGINE DESIGN STUDIES at G.E. result in new advanced powerplants. Development work is currently being carried on for powerplants of 1960's and beyond.



New ROTOCHUTE for Pinpoint Drops

Working with the Office of Naval Research, Kaman Aircraft is developing a new concept of air supply for confined combat areas. The Rotochute will permit the dropping of supplies from low-flying high-speed aircraft into restricted areas with pinpoint precision. Supply planes will fly under the range of antiaircraft fire at jet speeds. Lifesaving supplies will land in "friendly territory." The Rotochute is another example of the advanced research and development programs being carried out by Kaman in the National Defense effort.



mers monthly is scheduled by January 1957. After the initial 10 airplanes, output will be geared to blocks of 20 airplanes. Negotiations are under way with approximately a dozen distributors, Thurston said. He expects to establish Skimmer franchises in South and Central America and Canada by the end of this year. Newest data developed for the airplane, which is powered by a pusher 150-hp. Lycoming engine, show a 14,000-ft. service ceiling at 2,000-lb. gross weight, sea level rate of climb with tricycle landing gear retracted and flaps down of 800 fpm., land take-off run of 725 ft. and water take-off time of 25 sec.

PRIVATE LINES

Some 130 business planes landed at San Francisco Airport bringing delegates to the recent four-day American Petroleum Institute meeting in that city. Normal private-aircraft traffic at the field is 15-20 planes daily.

Completely visual wind solution is provided by a new pocket-size air navigation computer that also automatically provides tailwind or headwind component, its force and degree of any crab angle. True airspeed indication takes into account possible errors in plane's outside temperature indicator readings due to heat from skin friction and compressibility. New model R-2 computer is available from Jeppesen & Co.,

Stapleton Airfield, Denver 5, Colo. Price for 44-in. diameter version, \$6.70; six-inch diameter, \$9.85.

Donation of a Cessna 170 has been made to California State Department of Education by Larry Hunt, president, Air-Oasis Co., Long Beach and Fresno, to aid in promoting aviation education.

Learstar takeoff weight increase to 24,000 lb. from 22,500 lb. has been approved by Civil Aeronautics Authority. Landing weight has also been upped to 21,500 lb. from 20,400. Modifications to permit higher weights include strengthening main landing gear assemblies, landing gear and spar attach points and outer wing panel attach points. Lear Aircraft Engineering Division, Santa Monica, Calif., is modifying earlier Learstars to handle the higher weights.

New address of Dixie Aviation Co. is Columbia Airport, Route 2, W. Columbia, S. C. The sales and service organization formerly was located at Owens Field.

Executive DC-3 has been delivered to President Gustavo Rojas Pinilla of Colombia by AiResearch Aviation Service Co., Los Angeles, Calif. President's quarters includes a complete short-wave radio communications setup. Powerplants are P&W R1830-94s of 1,350 each. . . . Evening News Publishing Co., Dayton, Ohio, has purchased an 11-place Learstar executive transport.



Cessna Delivers Tricycle 172

Aimed at making flying simpler for the businessman who pilots his own plane, the new Cessna 172 is the company's newest four-seater, featuring tricycle landing gear. Powered by a 145-hp. Continental, the all-metal 172 sells for \$8,750, f.a.f., Wichita. Cessna began deliveries of the new model in mid-November. Land-O-Matic landing gear self-centers as soon as plane's weight comes off the wheels and stays centered in the air, even when rudder is applied, to keep drag to a minimum. Geometry of the landing gear is such that the plane maintains a low center of gravity for easy maneuverability. On the ground the nose wheel is steerable with rudder 10 deg. on either side and controllable using brakes to 30 deg. either side. Cruise speed of the 172 is over 120 mph. and range is 4.5 hr. By removing the passenger seats, over a quarter-ton of cargo can be carried. Each of the doors is 36-in. wide.



Seven Seas by Douglas: worlds of warmth by Janitrol

Flying 62 passengers 5000 miles non-stop at 350 mph, the "Seven Seas" is the long-range version of the dependable DC-7, and Janitrol again provides anti-icing and cabin heating. Four Janitrol S-300 heaters—one in each wing, one under the cabin deck, and one in the empennage—each produces 300,000 Btu per hour. Wing units circulate hot air through the leading edges, and the tail unit keeps ice from forming on empennage leading edges. Passengers and crew are warmed by both radiant wall and floor heat and circulating warm air, kept at 70°F regardless of outside temperature.

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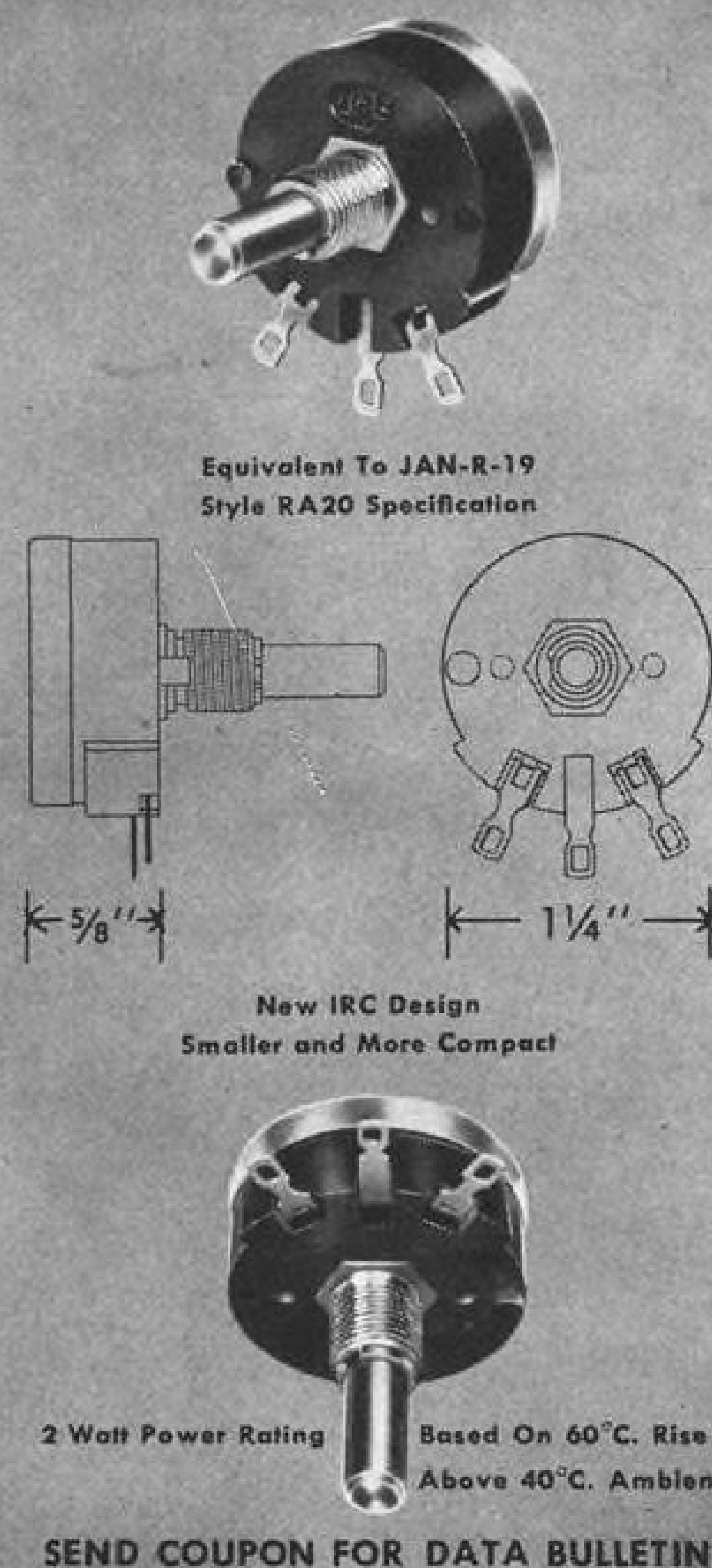
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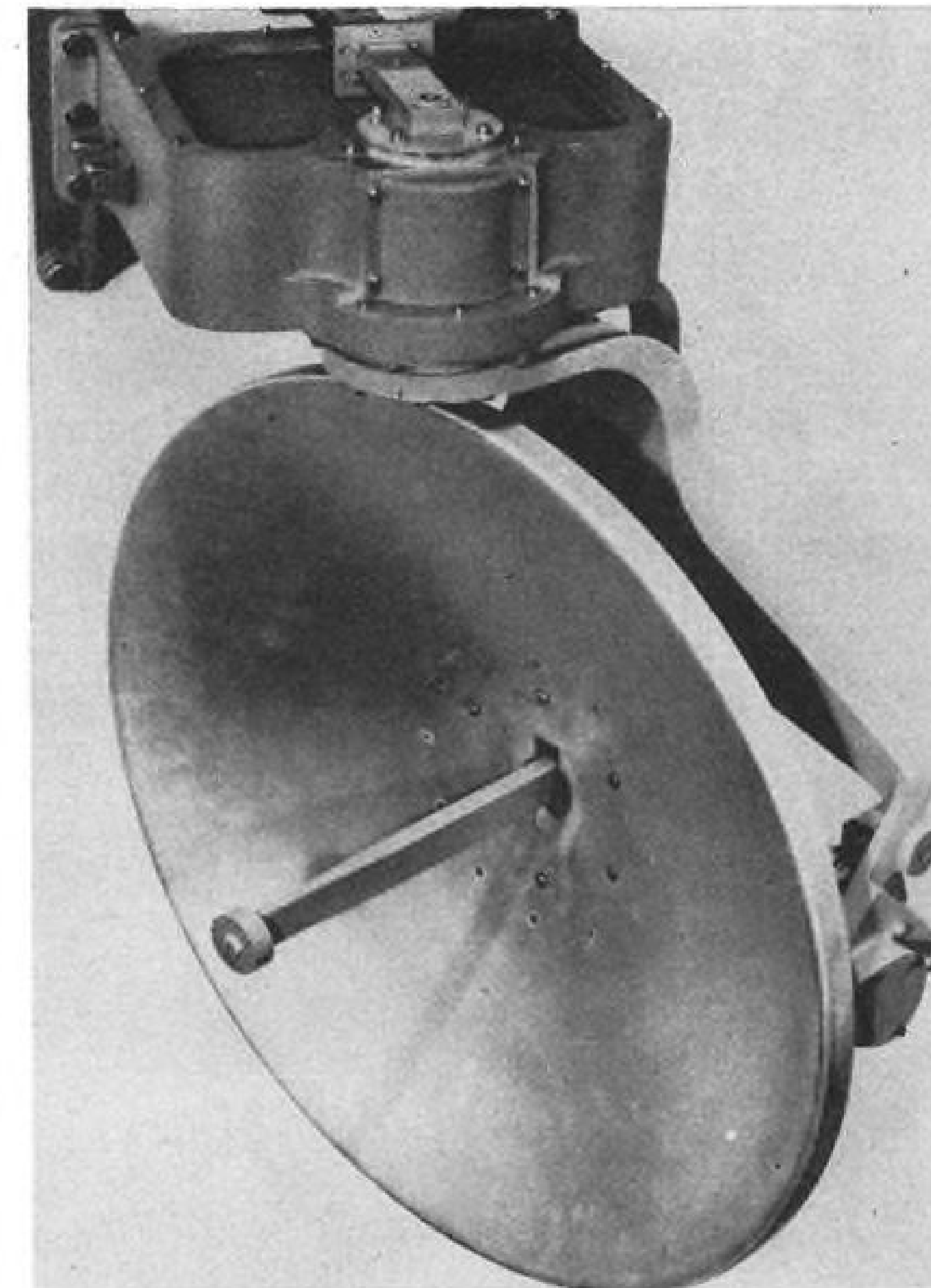
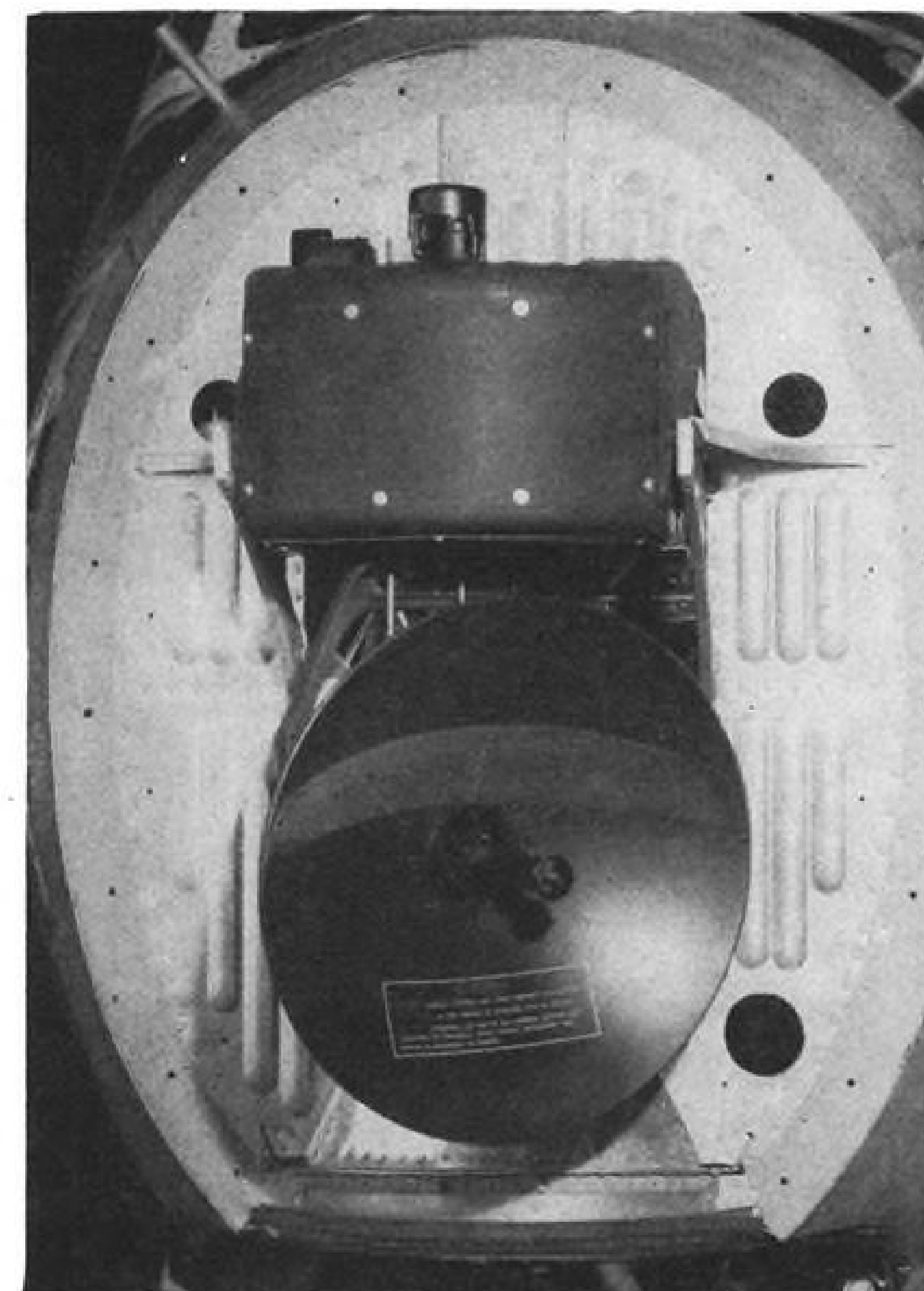
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AVIONICS



DIFFERENCES between military and civil avionics equipment, such as the AN/APS-42 airborne radar (left) and its airline counterpart (right) stem from different procurement practices used to buy the equipment and different operational requirements.

Civil-Military Design Differences Laid to Procurement Practices

By Philip J. Klass

Baltimore—Where differences exist between civil and military avionics equipment, they are more often the result of different procurement practices than of different mission requirements. Most producers of civil avionics also supply the military, so techniques developed for one are bound to find their way into equipment for the other.

This was brought out during a recent symposium here on the "Comparison of Design Features Required for Military and Civil Airborne Equipments," sponsored by the East Coast Conference on Aeronautical and Navigation Electronics.

The symposium's eight-man panel represented the three military services, the airlines, lightplane operators and three manufacturers of military and civil avionics equipment.

From a technical standpoint, the

comments of the panel pointed up that there is no clean-cut line dividing civil and military equipments. Avionics gear for one branch of the military often shows a closer kinship to civil avionics than to equipment used by another branch of the military. For example:

- **Airline avionics equipment** resembles, and often is identical to, that used in Military Air Transport Service aircraft, while differing considerably from civil lightplane avionics.
- **Army Aviation's lightplanes** and helicopters use communications and navigation gear which closely resembles or is identical to that used by civil lightplane operators. Cost, as well as size and weight, are important factors to both users, because of Army Aviation's small budget.

Where technological requirements do differ, the difference usually is only one of degree or emphasis, panel mem-

bers indicated. For example, all users attach considerable importance to equipment reliability.

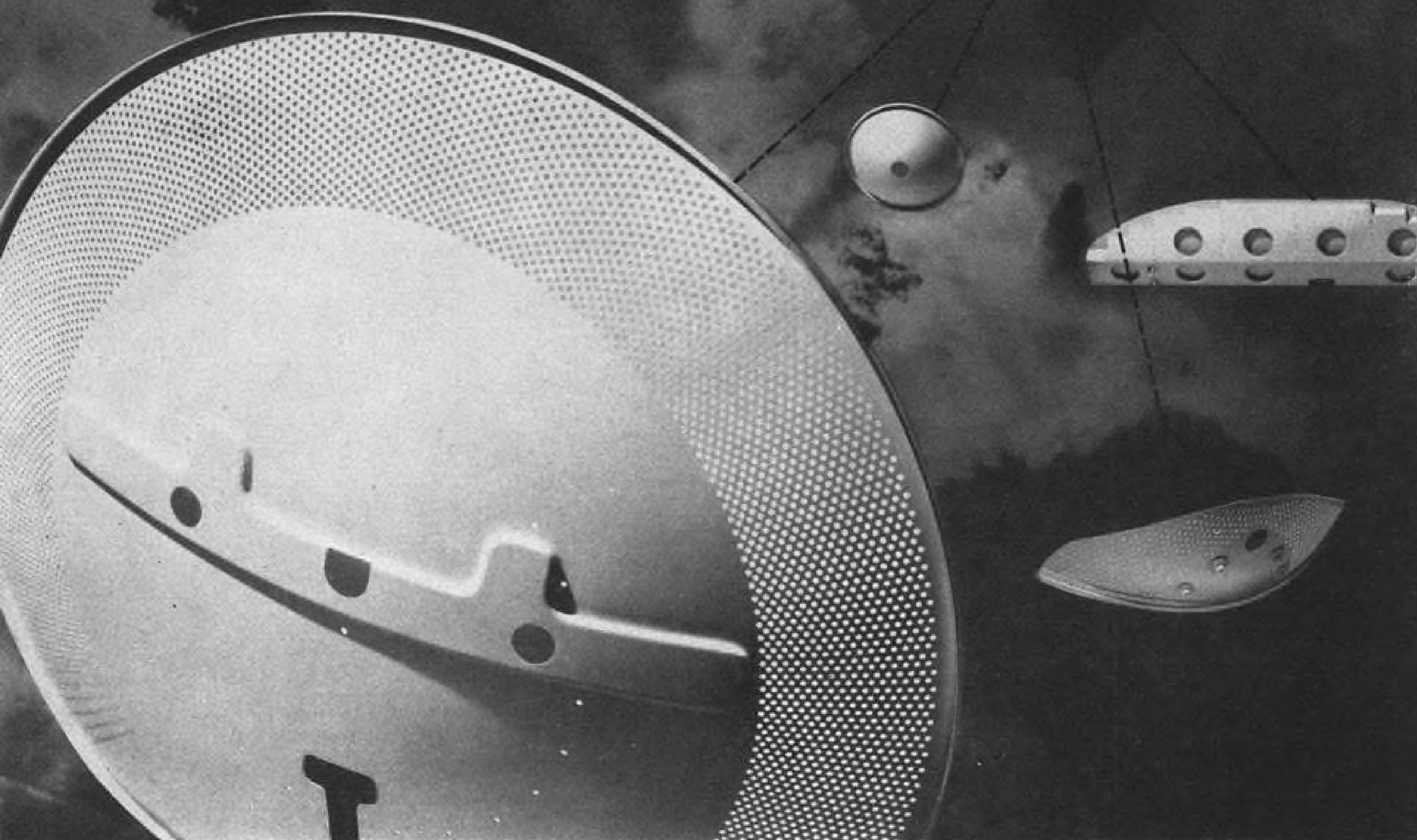
While the price of avionics equipment failure to an airline may run into thousands of dollars, "the penalty of failure in a military aircraft can run much higher," Ludlow Hallman pointed out. Hallman is technical director of the Communications and Navigation Laboratory at Wright Air Development Center.

The lightplane operator, whose plane and pocketbook can not take dual installations, also needs a high order of reliability. A. R. Applegarth, chief engineer of Narco pointed out.

Size, weight, and power consumption are important factors for all aircraft operators, but weight is "critical" in many Army helicopters now in use, Lt. Col. John L. Wilson, Jr., chief of the Aviation Branch, Army Signal Corps, said.

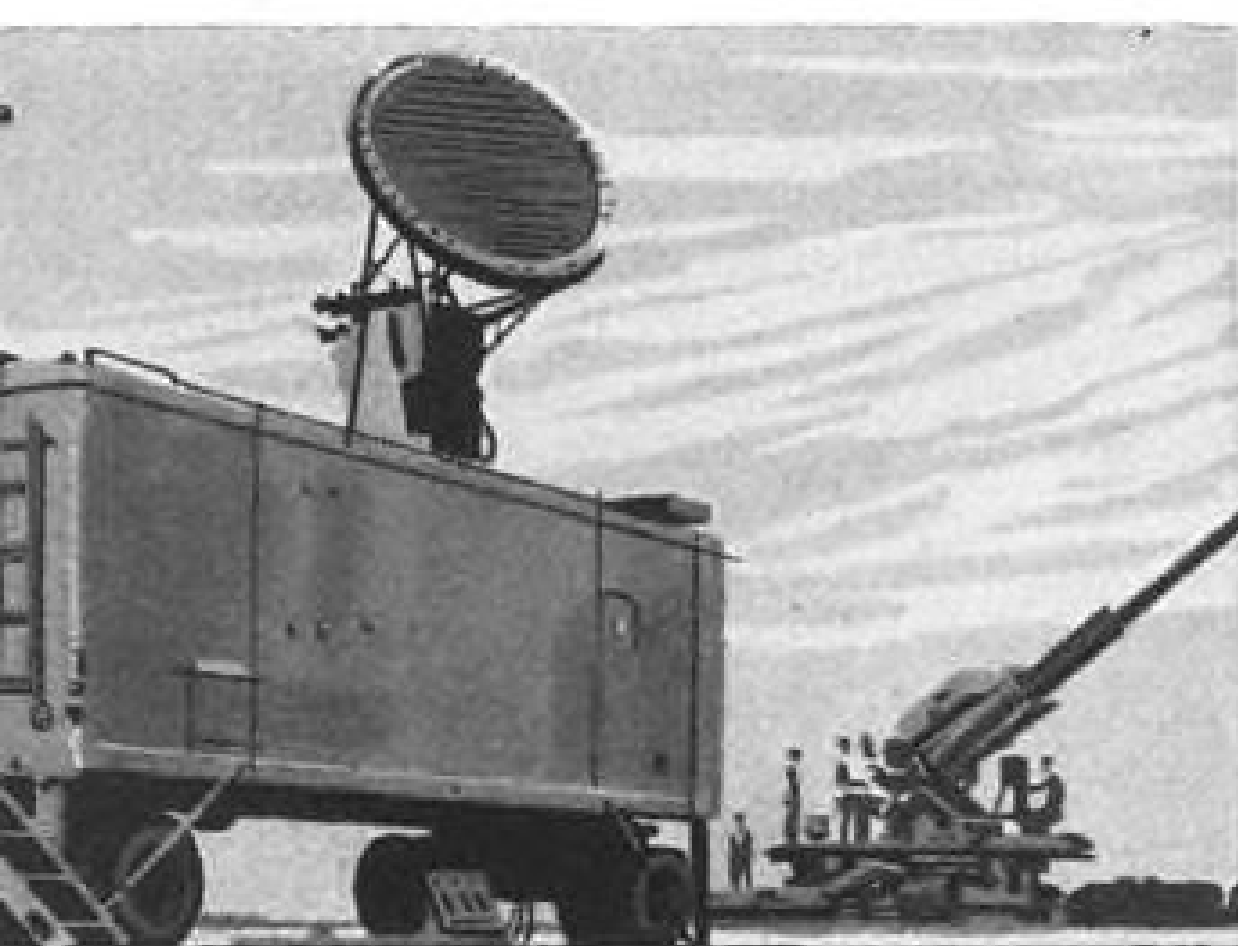
To meet the operational requirements of carrier-based aircraft, the Navy must cram more avionics into cramped airframes. As a result, it is calling for avionics equipment designers to go to more sub-miniaturization. This greater

magnesium



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From design to production is a long trip—take the first step with the *right metal*! Investigate magnesium. Complete engineering and fabricating facilities are available at Dow's Bay City Division as well as from other fabricators located throughout the country. THE DOW CHEMICAL COMPANY, Magnesium Sales Department MA 307J, Midland, Michigan.

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"density" raises serious cooling problems, according to Al Winick, head of BuAer's Navigation Aids Branch. Winick also pointed out that carrier catapult launching subjects avionics equipment to a high-G shock which may last 2½ seconds.

Despite these specialized requirements, J. C. McElroy, assistant head of research and development for Collins Radio, sees "little fundamental difference in design requirements between airline and military" avionics equipment. Bendix Radio's George Church noted that the design of avionics equipment "is a series of compromises."

Buying to Specifications

Some observers suspect that at least a portion of the unreliability problems now encountered in military avionics equipment is attributable to the military practice of "procurement by specification," instead of making more use of the competitive forces which govern commercial buying.

Considering the fact that the military spends an average of twice the initial equipment cost every year in maintenance, and the fact that it is

difficult to put equipment reliability into specification form, these observers believe that present procurement practices may be "penny wise and pound foolish."

Although there are some recent indications that military buying practices are moving in the direction of commercial procedures, the safeguards which Congress insists upon for military procurement make it appear doubtful that the pendulum can swing all the way.

To Lowest Qualified Bidder

When a new military device or equipment has been developed, the initial procurement normally goes to the firm which made the development. Subsequent procurements are then made on a competitive bid basis, with the lowest qualified bidder getting the job. Although a firm's past performance on a number of contracts for a variety of avionic equipment is weighed in determining whether the company is "qualified," only the original developer has had any production experience with the specific item under procurement.

If the second procurement goes to a

new contractor, frequently this company goes through the same "learning pains" as the original producer. Sometimes, but not always, the same troubles which plagued the original equipment, or entirely new ones, crop up in the second procurement equipment. The reason is that there is a lot of production know-how that can not be put on blueprints or into specifications.

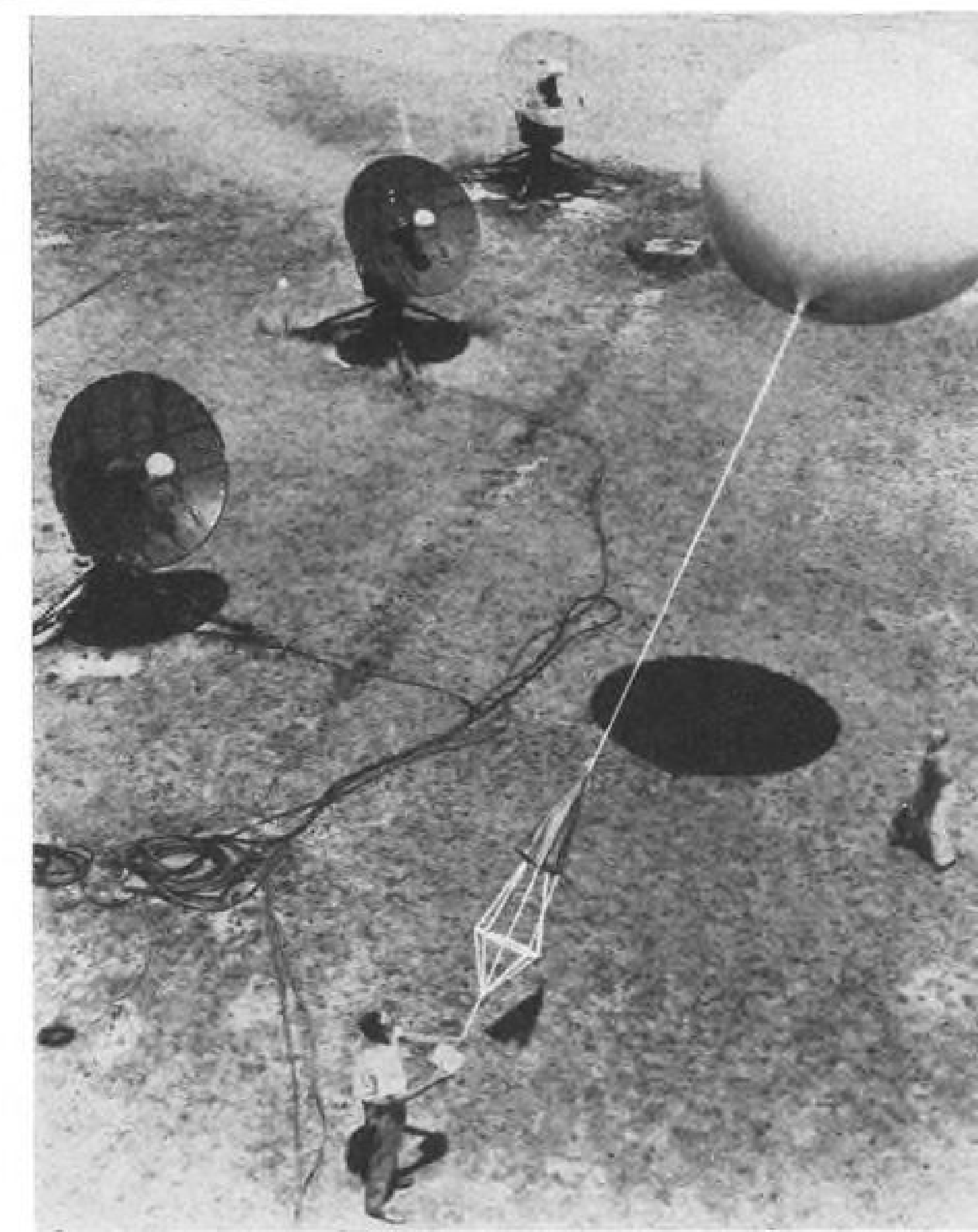
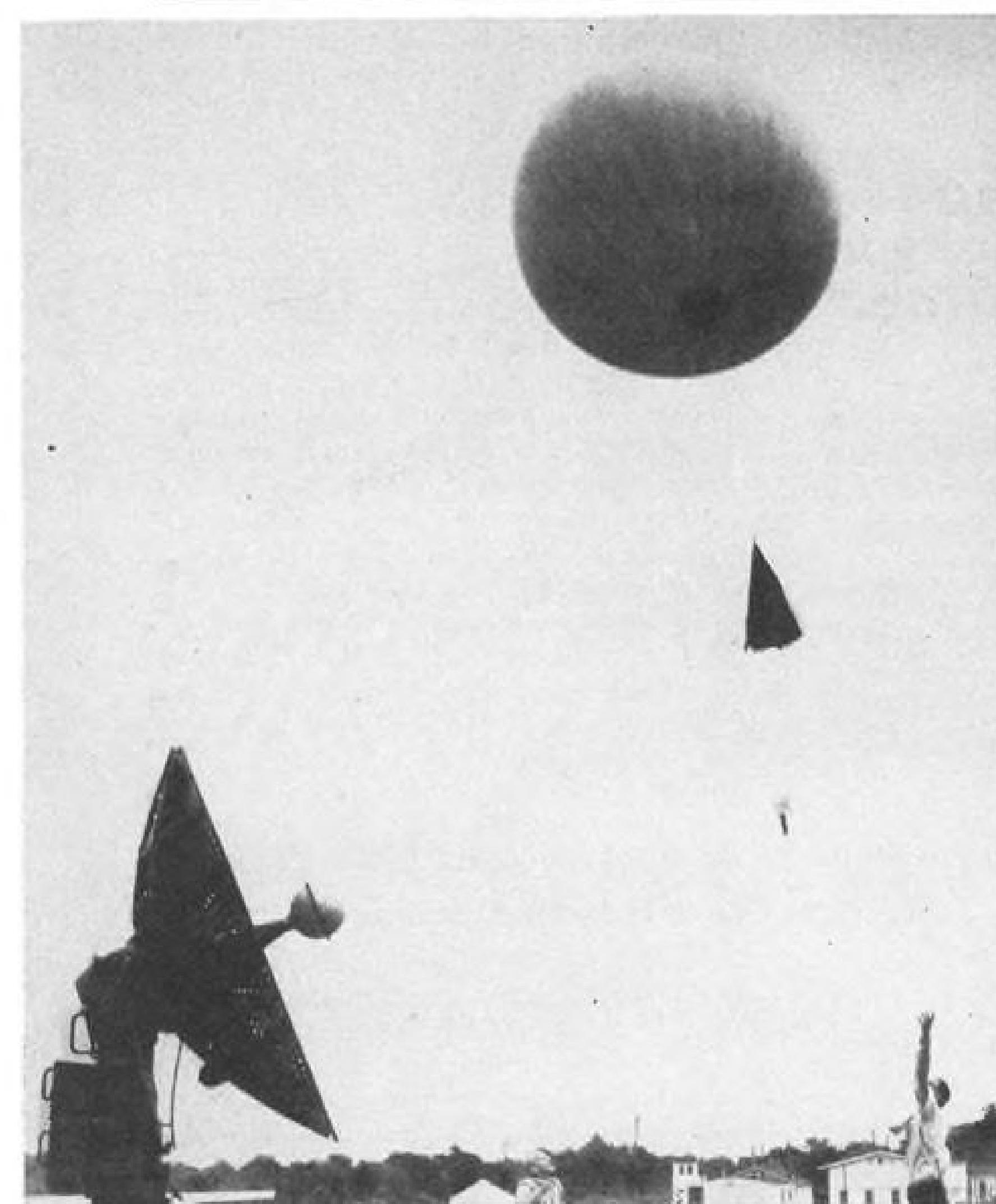
If there is a third procurement and it goes to a new supplier, the whole cycle may be repeated. The dollars which the Government saves in initial equipment costs may be more than dissipated in increased field maintenance costs.

However, such is not always the case. Sometimes a new supplier makes significant improvements and refinements over the original equipment.

Airlines Buy Differently

Competition and commercial buying practices are an important factor behind the greater reliability of airline avionics equipment, William Carnes of Aeronautical Radio, Inc., told the Baltimore symposium.

For example, if Company "X" gets



How's the Weather at 80,000 Ft.?

That's what the Signal Corps hopes to find out by launching this rapid riser balloon from Ft. Monmouth, N. J. "Express" balloon is said to climb twice as fast as standard spheres. Under the balloon is a parachute, attached to it is a radiosonde which flashes weather data to rawin (radio wind finder) receivers at left. Chute brings radiosonde to earth after balloon bursts at 70,000-80,000 ft.



**"Piasecki offers
an exciting challenge...
An unusual opportunity in
a new field of aviation."**

says: George Potwell, Staff Stress Engineer.

"They have superb facilities, plus an engineering staff of the highest caliber," he continued, "and their future is tied into long-range military and commercial aircraft research programs. Also, the ideal suburban Philadelphia living sold me on Piasecki."

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an airline order for a new type navigation receiver, it knows that repeat orders from that airline operator, and orders from other airlines, depend in large measure upon the reputation (both performance and reliability) which the equipment racks up.

If the set proves extremely dependable, Company "X" can be pretty certain of getting subsequent orders, without fear that an "unknown" in the field might come with a slightly lower price and snag the business.

This does not mean that the airlines are not interested in cost. However, they recognize that maintenance costs quickly exceed the original equipment cost.

While it is difficult quantitatively to measure or define these intangibles, an airline operation is small and close-knit enough to enable its engineering department and purchasing agent to factor such important considerations into their buying decisions.

Step in Right Direction

The recently announced policy of USAF's Air Materiel Command to penalize contractors for poor performance and late delivery (AW Sept. 19, p. 12) was called "a foundation stone in any sound business transaction and one which the airlines consider in buying equipment," by Collins Radio's McElroy. Collins is a major supplier of both civil and military avionics.

"We believe," McElroy said, "that industry can and should do more in the role of supplying the military with equipment based on the same rules and procedures that control normal business transactions. Industry should be given the opportunity and actively encouraged to develop equipment to satisfy military requirements, using its own financial resources and to specs determined largely by industry."

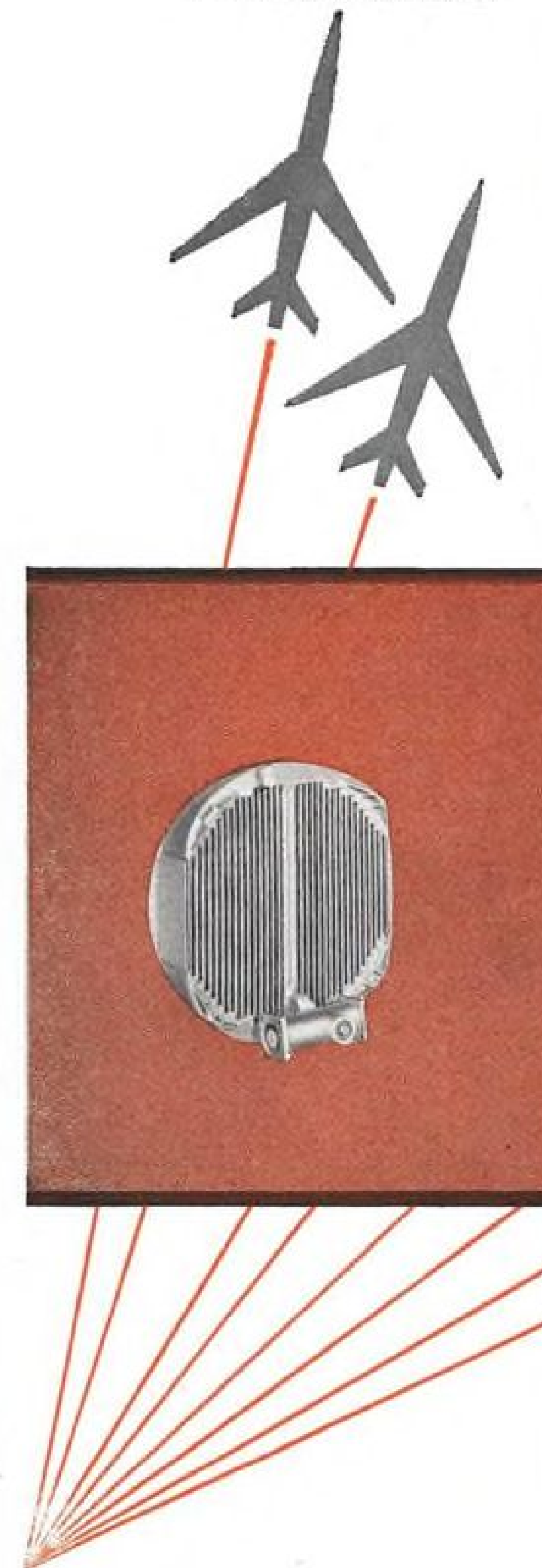
In announcing the new AMC policy, Maj. Gen. David H. Baker, Director of Procurement and Production, said: "In negotiations we will look carefully for indications that contractors are willing to accept normal business risk and fuller responsibility for products developed and produced."

Give Industry Free Hand

Where evidence exists that industry is willing to develop equipment on its own to meet military needs, McElroy called on the military to "refrain from initiating competitive programs." McElroy also called for "a just means of providing industry with compensation for proprietary items." If such a plan is established and adhered to there would be no sole-source procurement problems, McElroy said.

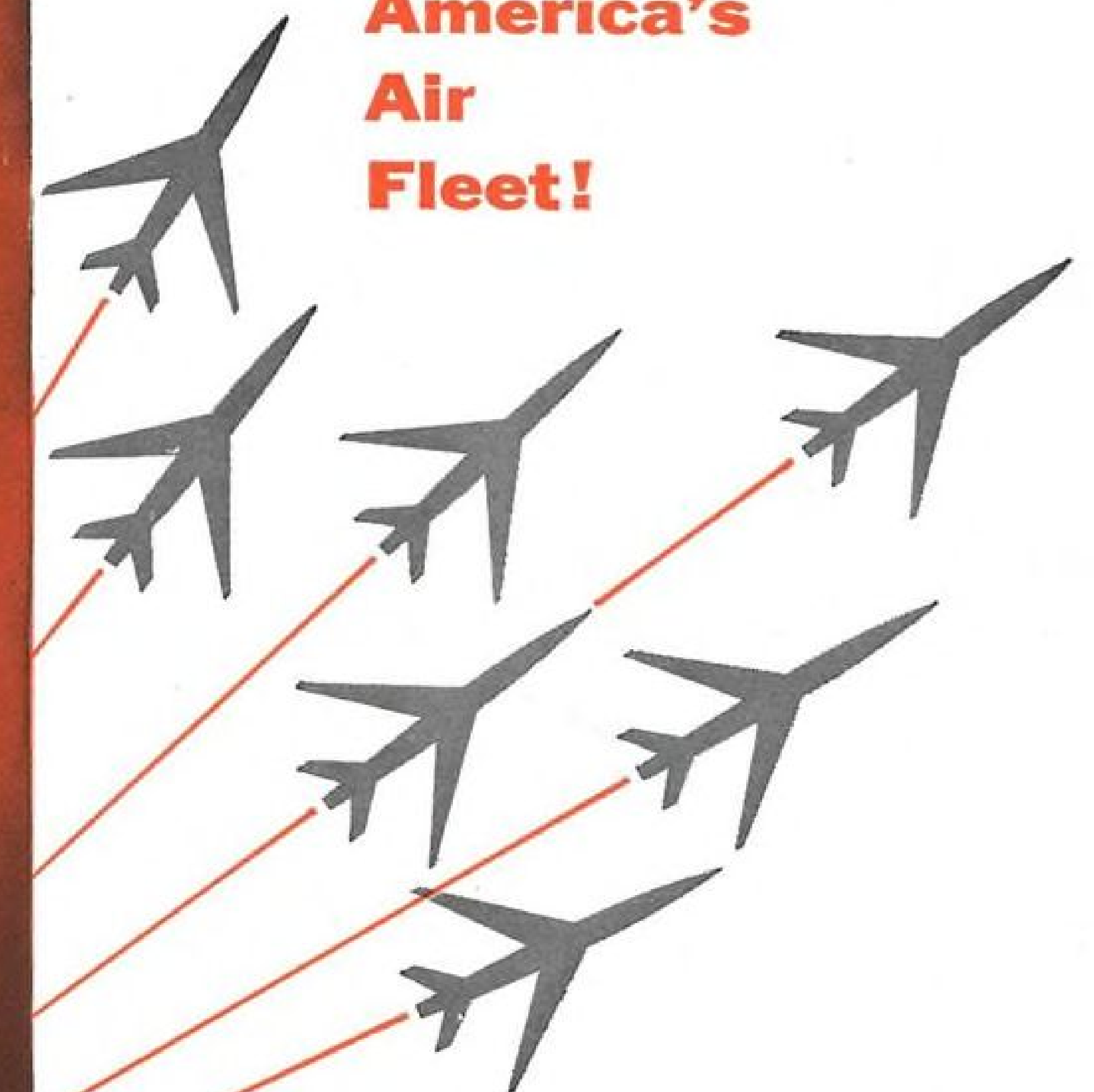
The military "must find ways of informing industry's thinkers and doers

Defense



Against Heat... For

**America's
Air
Fleet!**



Up : : : up they go into the stratosphere—the jet planes of the Air Force! And on many of these planes Harrison oil coolers are the "cool" co-pilots : : : keeping engine temperatures at exactly the right levels for peak performance! What's more, Harrison oil coolers are designed to save space and weight... vital factors in high-altitude, high-speed flying. With its unexcelled research facilities, Harrison is constantly on the alert for new ways to make aircraft heat exchangers lighter, more dependable, more durable! If you have a cooling problem, look to Harrison for the answer!

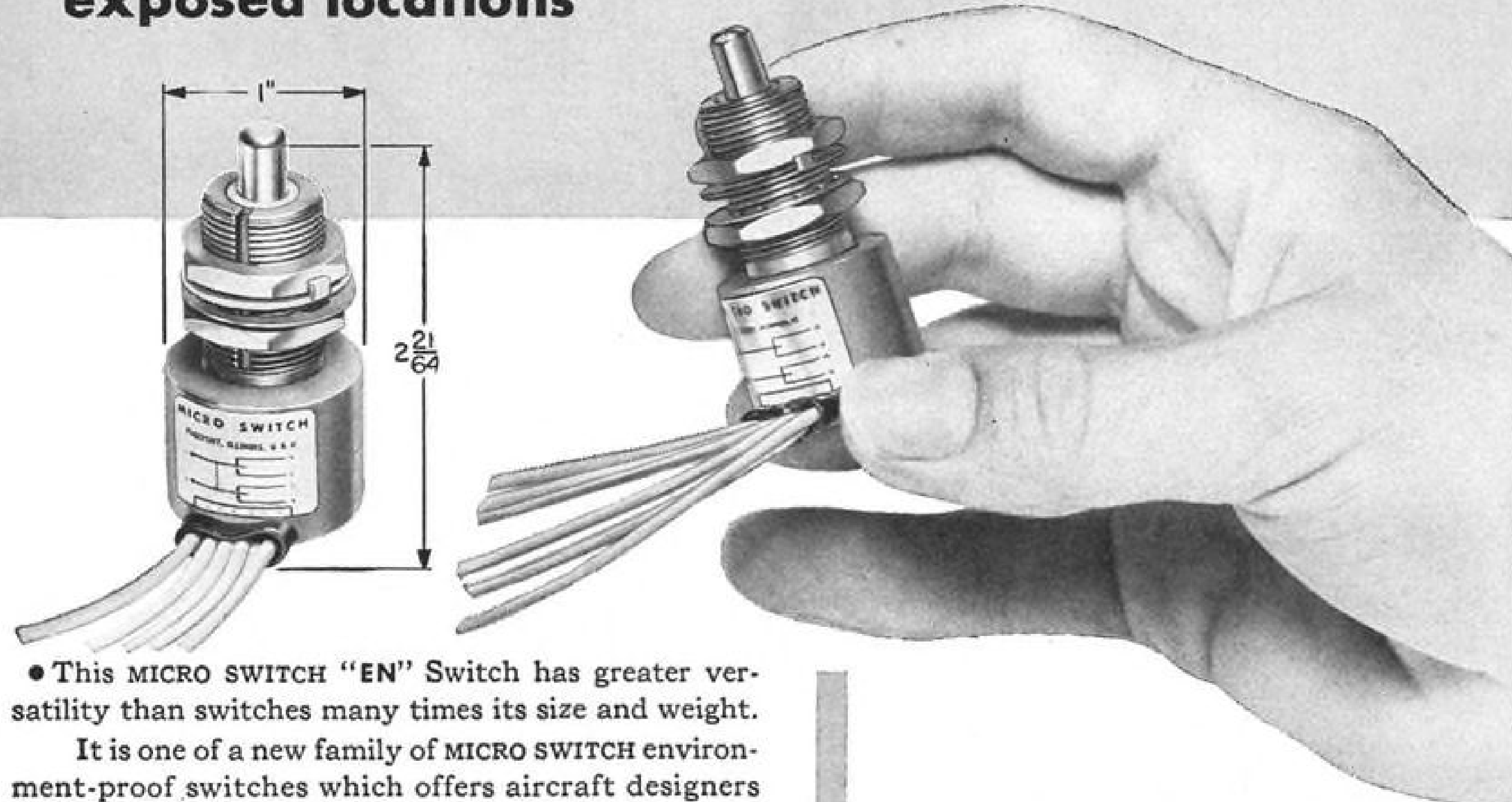
HARRISON RADIATOR DIVISION, GENERAL MOTORS CORP., LOCKPORT, N. Y.

TEMPERATURES
MADE
TO
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MICRO SWITCH Precision Switches
A PRINCIPLE OF GOOD DESIGN

**Here's a NEW concept in airborne switches—
Small... completely sealed... cylindrical switch
for landing gears, flaps and other
exposed locations**



• This MICRO SWITCH "EN" Switch has greater versatility than switches many times its size and weight.

It is one of a new family of MICRO SWITCH environment-proof switches which offers aircraft designers unusual flexibility in switches whose elements are completely sealed from effects of atmospheric changes.

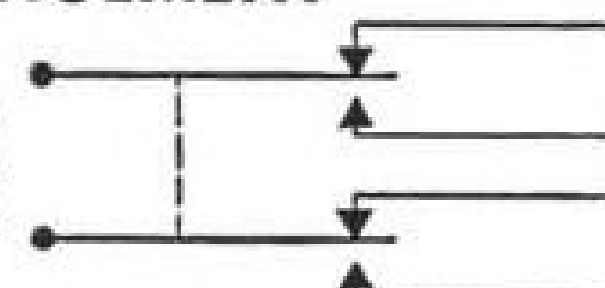
The "1EN1-6" shown here is composed of two single-pole, double-throw switching units completely sealed in a housing filled with inert gas under pressure. Six 20-gauge MIL-W-5086 leads, six feet long, are supplied, one from each terminal. These project at a 90-degree angle from the base of the switch. They may be run in any direction by rotating the switch.

These switches are designed for bracket type or through-hole mounting. The plunger operates through a 5/8 x 24 threaded bushing one inch in length.

For complete information on the new "EN" switches, types of rotary actuators and circuitry developments, contact MICRO SWITCH Engineering Service at your nearest branch office. Let them show you the complete MICRO SWITCH line of environment-proof and hermetically sealed switches for severe airborne service. You will find that it pays to bring your switch problem to MICRO SWITCH first.

CIRCUIT ARRANGEMENT

• Circuit is double-pole, double-throw. The wiring diagram and terminal designation are shown on the side of the switch.



ELECTRICAL RATING
(at 30 volts d-c)

INRUSH

Normally-closed, 24 amperes
Normally-open, 24 amperes

AT SEA LEVEL

Resistive, 4 amperes
Inductive, 3 amperes
Motor, 4 amperes

AT 100,000 FEET

Resistive, 4 amperes
Inductive, 2 amperes
Motor, 4 amperes



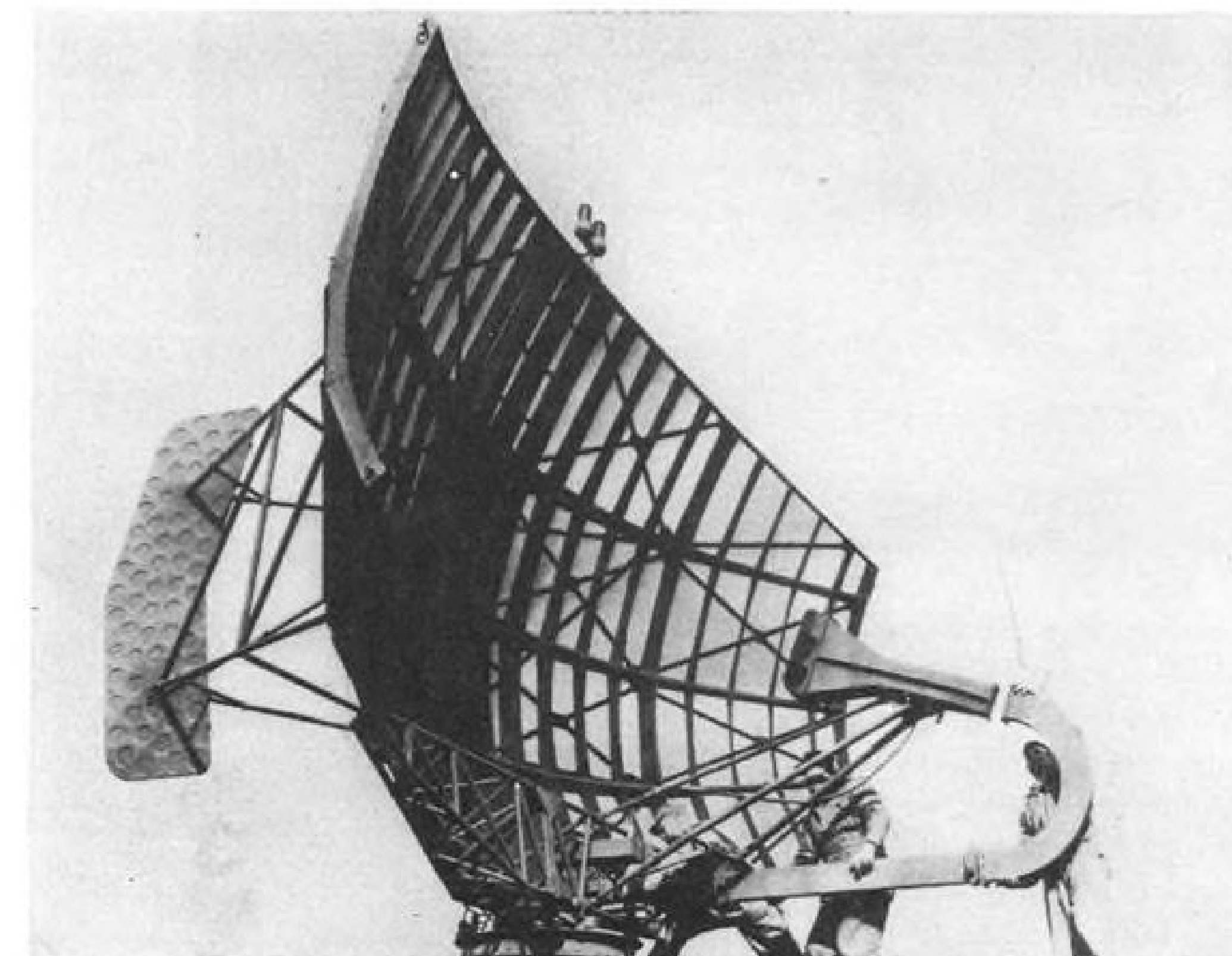
A complete line of snap-action switches for aircraft

MICRO SWITCH provides a complete line of extremely reliable, small-size, high-capacity, snap-action precision switches and mercury switches. Available in a wide variety of sizes, shapes, weights, actuators and electrical characteristics. For all types of electrical controls.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS



Mobile High-Power Radar

High-power search radar, the AN/MPS-11, and all its supporting equipment can be transported in nine trucks and two trailers and erected in less than three hours. Set was developed by General Electric and Rome Air Development Center for use by Tactical Air Command and the Marine Corps.

of their future planning," McElroy said. Security barriers should not deprive the military of industry's technical brain power. Recent moves in this direction by the Air Research & Development Command (AW Oct. 17, p. 12) were called "a very encouraging step," by McElroy.

"Economic necessity may finally orient the majority of divergent views to the point where little difference will exist in tomorrow's avionics equipment, be it for Army, Navy, Air Force or airlines," McElroy concluded.

Avionic Firms Expand

Collins Radio Co., Cedar Rapids, Iowa, has acquired 100% ownership of Communication Accessories Co., Hickman Mills, Mo., maker of transformers, magnetic amplifiers, and audio band-pass filters. The new subsidiary will continue to operate as an independent unit under E. J. King, Jr., founder and president.

Other recent expansions within the avionics industry include:

- Litton Industries' Power Tube Division, San Carlos, Calif., will soon begin construction of a new 40,000 sq. ft. building, increasing the division's facilities to 100,000 sq. ft.
- The Ramo-Wooldridge Corp., Los Angeles, has acquired 41 acres of land in the International Airport district, approximately 1 1/2 miles from the firm's present site. Company intends even-

tually to transfer its research activities to the new location.

- Weber Aircraft Corp., Burbank, Calif., has established a new electronics division, under James H. Doyle, with John T. Revis as chief sales engineer.

- Fenske, Fedrick, & Miller, Inc., Los Angeles, is name of new company formed to develop and manufacture avionic equipment for aircraft and missiles. Donald M. Fenske is president, Robert N. Miller is vice president, and Jack R. Fedrick is secretary-treasurer. Company occupies a 12,000 sq. ft. plant at 12820 Panama St.

- Electrical Testing Laboratories, New York City, has added a new 5,000 sq. ft. electronics lab to permit testing and engineering investigations into the microwave regions. Company now can conduct tests on microwave systems and components, as well as transistors and conventional components and radio receivers and transmitters, to private or government specs. Company address: 2 East End Ave.

- Corning Glass Works, Bradford, Pa., has announced plans to enlarge its facilities for manufacturing glass electronic components, including eventual installation of automatic resistor and capacitor production equipment.

- Raytheon Manufacturing Co., has opened its new 225,000 sq. ft. electronics lab at Wayland, Mass. New lab will house approximately 1,200 employees, consolidating activities carried out in seven separate locations.

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in
Component and Product Testing



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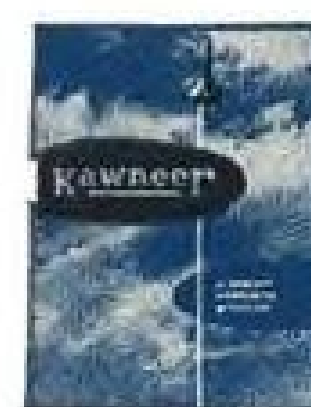


new Boeing jet tanker to stretch America's Air Arm with mid-air refueling

Almost daily, continuous flights halfway around the World are being made because huge KC-97 tankers meet bombers for refueling in mid-air. Tankers like the Boeing KC-135 will bring "targets" on faraway Continents within striking distance. The new Boeing KC-135 will haul extra large cargoes because *added strength with less weight* is possible with metal honeycomb construction. Kawneer is helping build more planes like the KC-135 *faster* because of excellent metal bonding facilities to produce any kind of honeycomb assembly. Our experience in metal bonding honeycomb will be helpful to you in designing new applications of this material. This is another example of how you can benefit by Kawneer's integrated engineering and manufacturing service.

Kawneer will produce the allersons for the KC-135 utilizing honeycomb sandwich construction

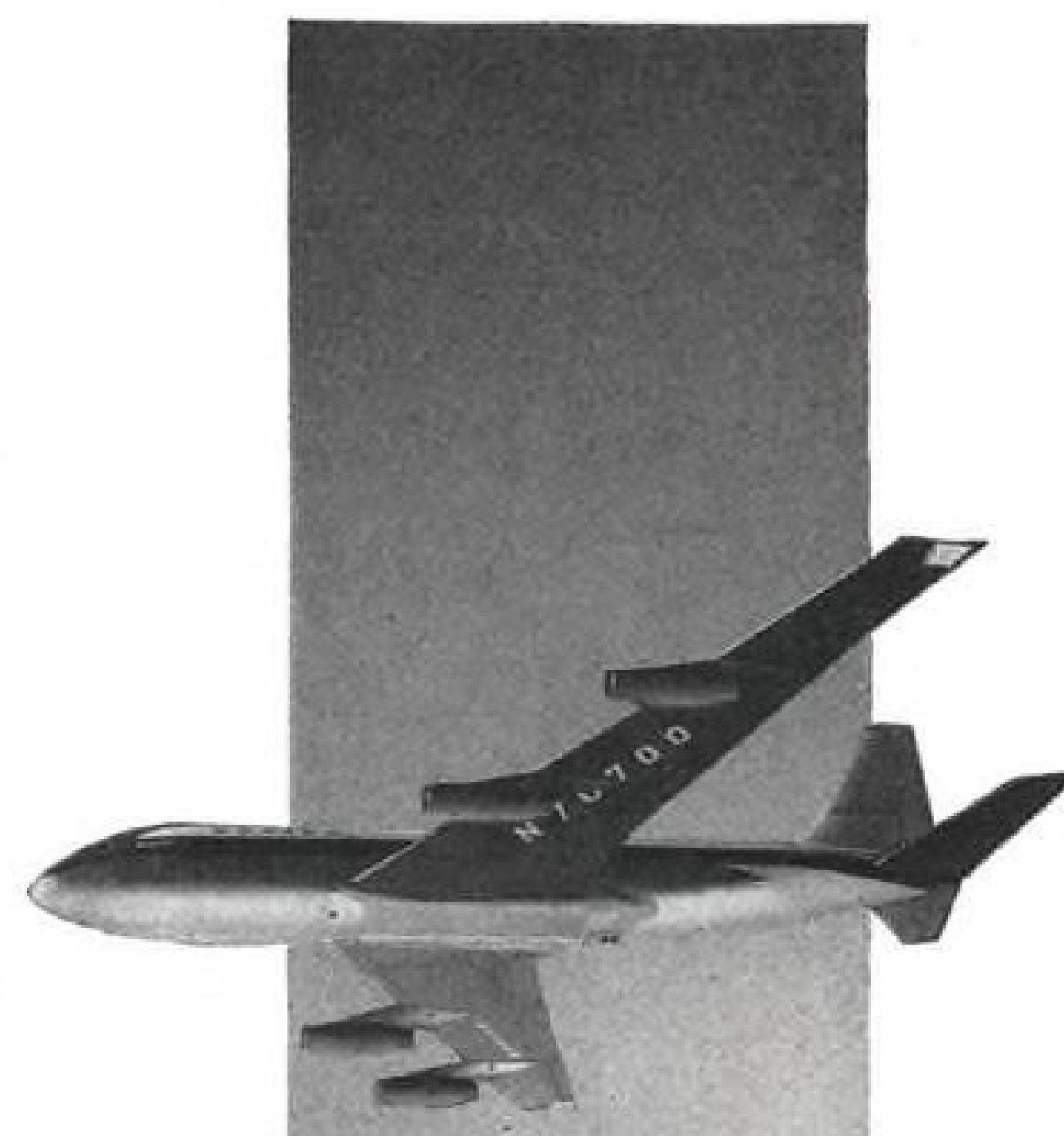
Illustrated here is the Boeing 707 Tanker-Transport prototype of the new KC-135.



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Delivered on time"
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Please send us copies of your new descriptive book to distribute to our key men.

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EQUIPMENT

Expendable Skid Brakes Lighten Vulcan Bomber Undercarriage

London—Conventional wheel braking on one of Britain's Avro Vulcan V bombers has been replaced by the use of two retractable skids lined with expendable soles which operate on the runway surface.

This revolutionary braking system was developed by Dowty Equipment Ltd., of Cheltenham, which made the liquid sprung gear on the Vulcan.

The skids are housed between the tandem wheel pairs on each leg, and when retracted lie flush with the axle beams. When braking, both pads are hydraulically lowered onto the runway and jacked to take up to 80% of the vertical reaction for the maximum braking condition. This weight distribution between wheels and pad is automatically maintained during a landing by a sensing element operating on the displacement of the oleo.

Between the Wheels

Twenty percent of the weight has to be left on the wheels as a minimum for dynamic stability, enabling the aircraft to respond satisfactorily to nose wheel steering. Each pad is designed as a small beam, with short-life, easily replaceable, synthetic rubber soles. A mean braking coefficient of 0.35 has been achieved.

Primary advantage of the system is the structural one of dispensing with the disks needed to form a heat sink in the brake system of jet bombers. Their weight can amount to several hundred pounds. Dowty claims a 1% reduction in aircraft structural weight is achieved. Taking the weight of a bogie undercarriage at about 4% of the aircraft structural weight this implies that Dowty has reduced the weight of the bomber's undercarriage itself by as much as 25%.

Other advantages of the system: reduction of tire wear, as wheels are relieved of braking torque; improved braking on wet and icy surfaces due to scouring action of the specially profiled rubber soles.

Skid Design

The piston of the skid jack is fixed to the axle beam within which the cylinder telescopes. In this way the jack is used as the sole's drag strut, the only other connections being the torque linkage at the toe to transfer the reaction of the normal and differential braking couples into the main structure.

At the heel is a retraction jack. So that 80% of the aircraft weight will not be carried on two "rigid" columns of oil, a pneumatic capsule is incorporated in the cylinder. A long stroke jack is needed to compensate for tire deflection and wear of the pad.

Operation is by foot motors and electro-hydraulic valves. Full brake can be selected in the air and is then applied automatically as soon as spinning up is completed.

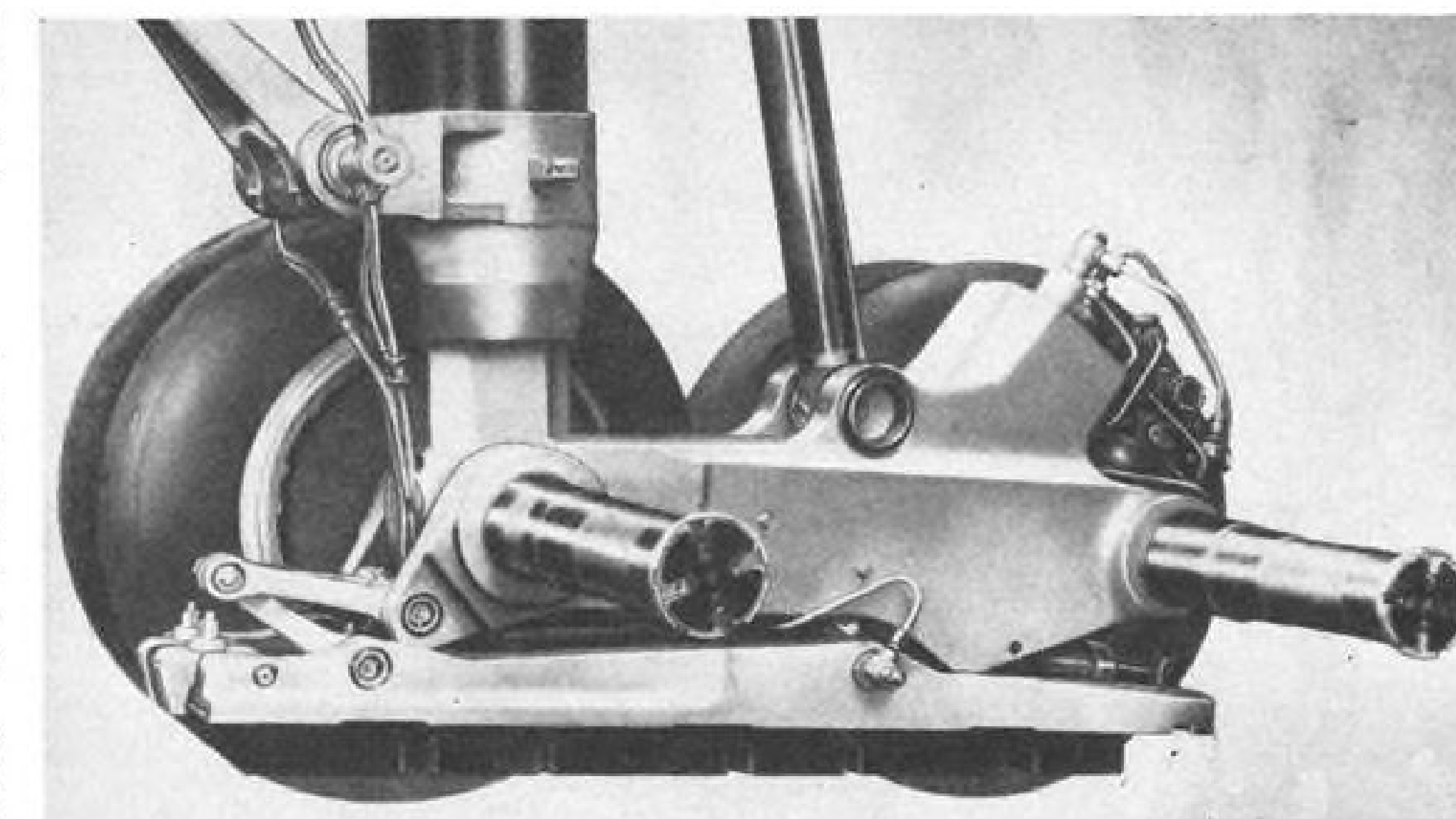
Pad Design

Most of the development centered on the choice of material for the pad. All

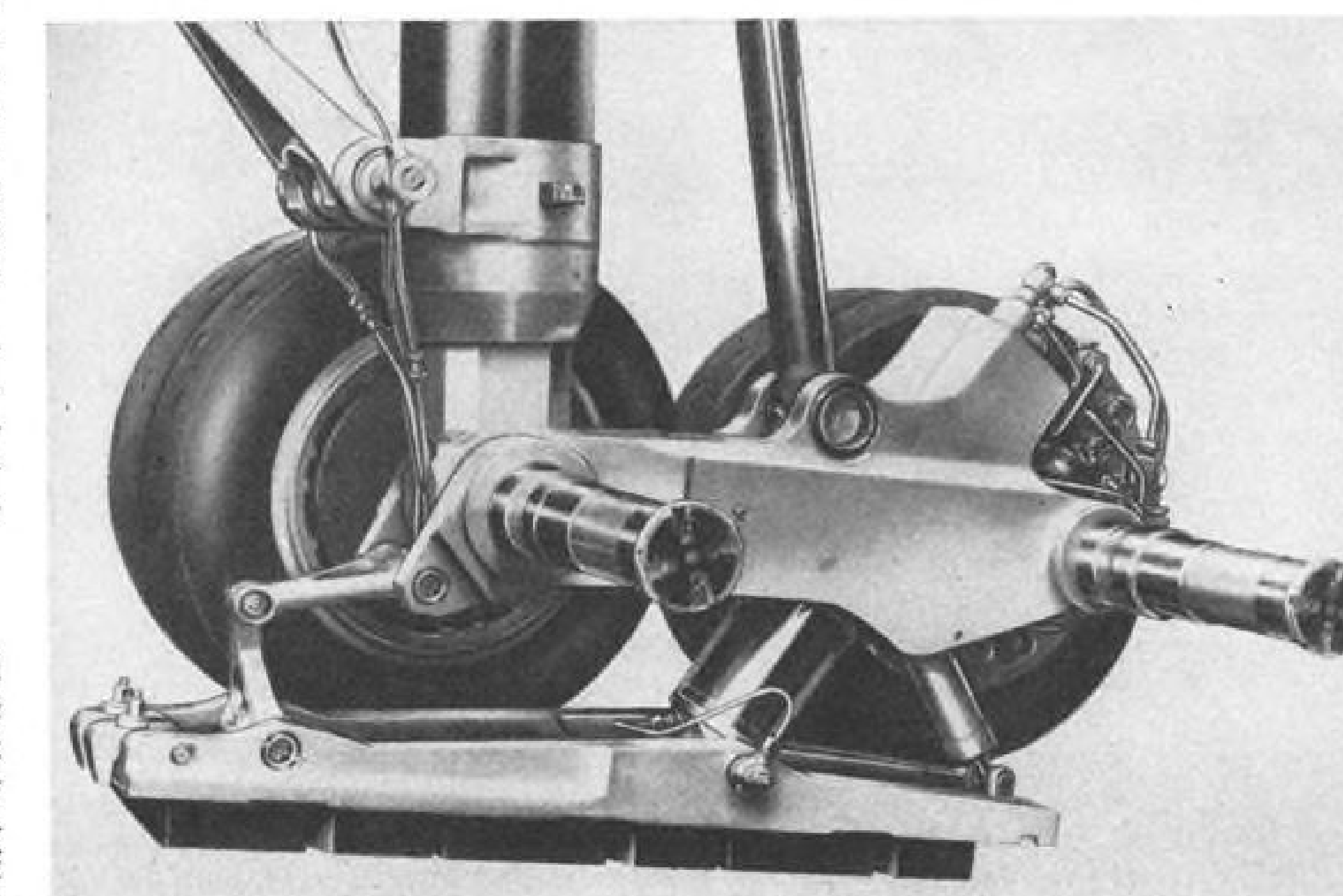
the metals tried got too hot and developed low friction coefficients. They also introduced an element of unsprung weight and tended to damage the runway. Heating of the concrete however proved insignificant.

Most non-metallic materials tried had insufficient life or strength. Only a special synthetic rubber showed up with the necessary low coefficient of heat conductivity, high coefficient of friction, hard enough to resist tearing and yet flexible enough to give to surface defects. The specification of the synthetic rubber could also be closely controlled. Wire reinforcing could not be used, as this caused internal overheating of the pad. The development, incidentally, was carried out in suitable converted sports cars.

The sole is made up of three rubber

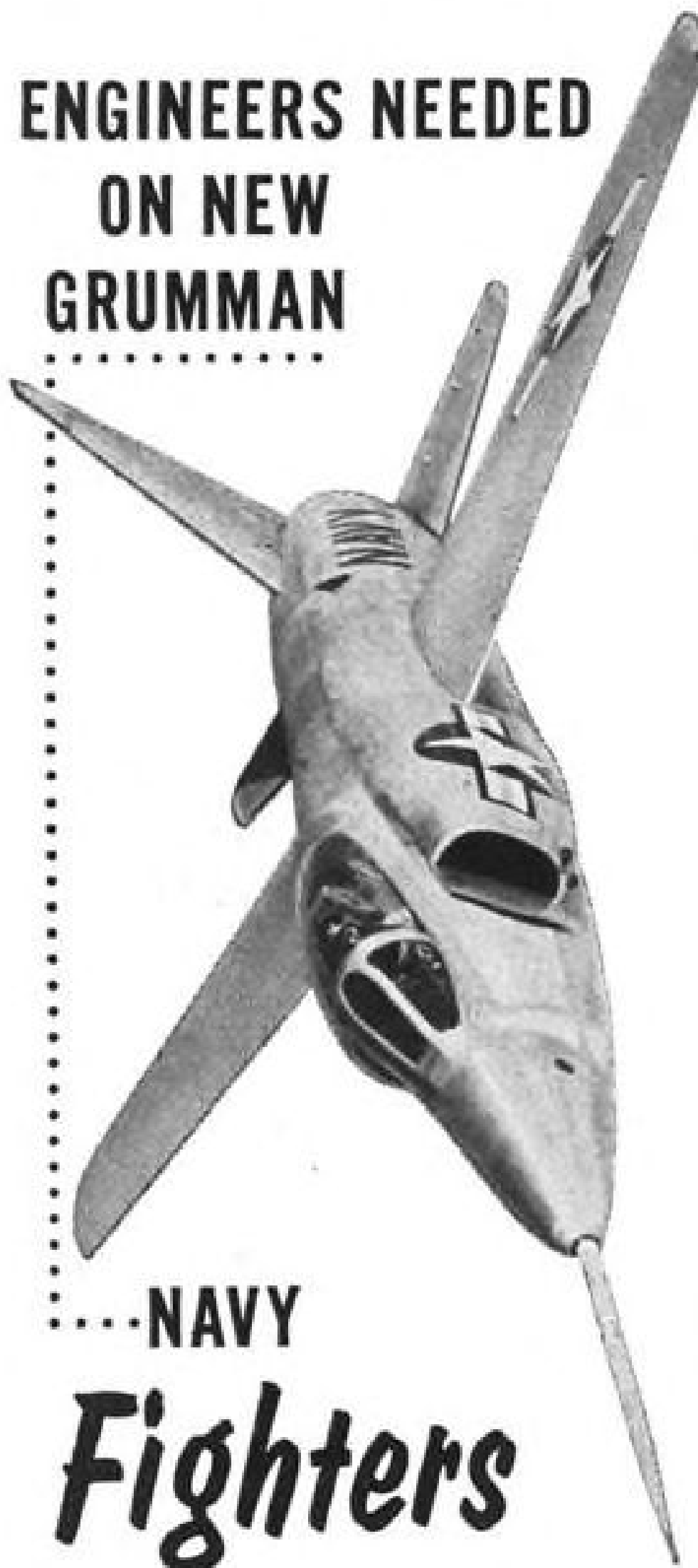


SKID RETRACTED—View of bogie beam with one wheel pair removed to show skid.



SKID EXTENDED—Large long-stroke jack lowers rubber-soled foot onto runway.

ENGINEERS NEEDED ON NEW GRUMMAN



...NAVY Fighters

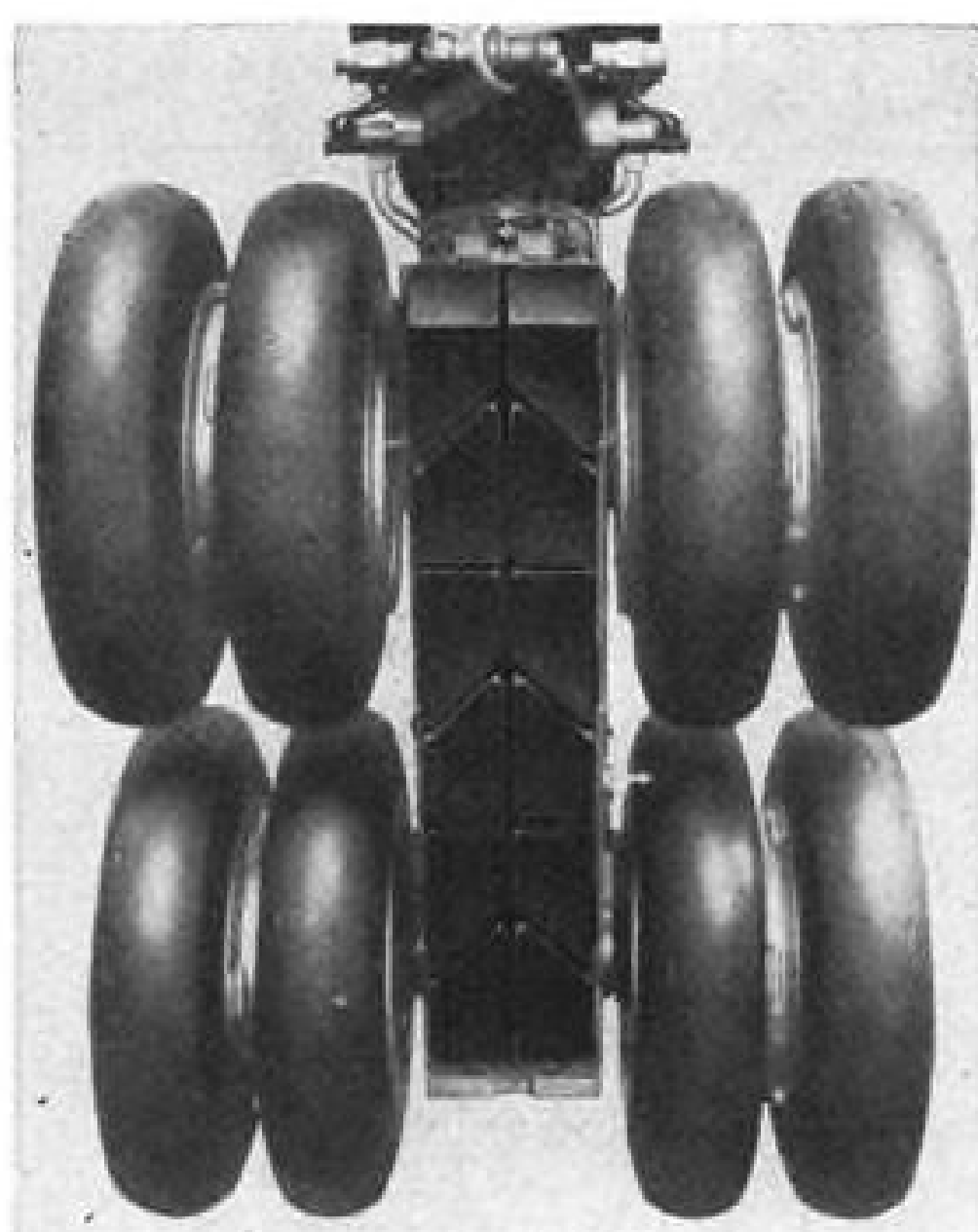
Grumman, one of the most stable aircraft companies in the industry, needs engineers to work on the new supersonic Tiger and transonic Cougar. With Grumman, your home will be Long Island, the playground of New York. If you are an experienced aircraft engineer, or a recent engineering graduate, send your resume to Engineering Personnel Dept. Interviews at Employment Office.

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GRUMMAN AIRCRAFT ENGINEERING CORPORATION
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BRAKING SOLE consists of three rubber pads with grooves to act as channels for abraded material and surface water.

pads which are chemically bonded to backing plates. These are located in the foot by tenon slots and secured with quick release attachments at the toe. Herringbone grooves in the pads ensure that abraded material or surface water escape by the quickest route and do not act as lubricant across the length of the foot. Energy absorbed by the pad is

proportional to the rubber abraded and it appears that each sole has a life of several landings.

Long-Life Battery Adopted for S-59

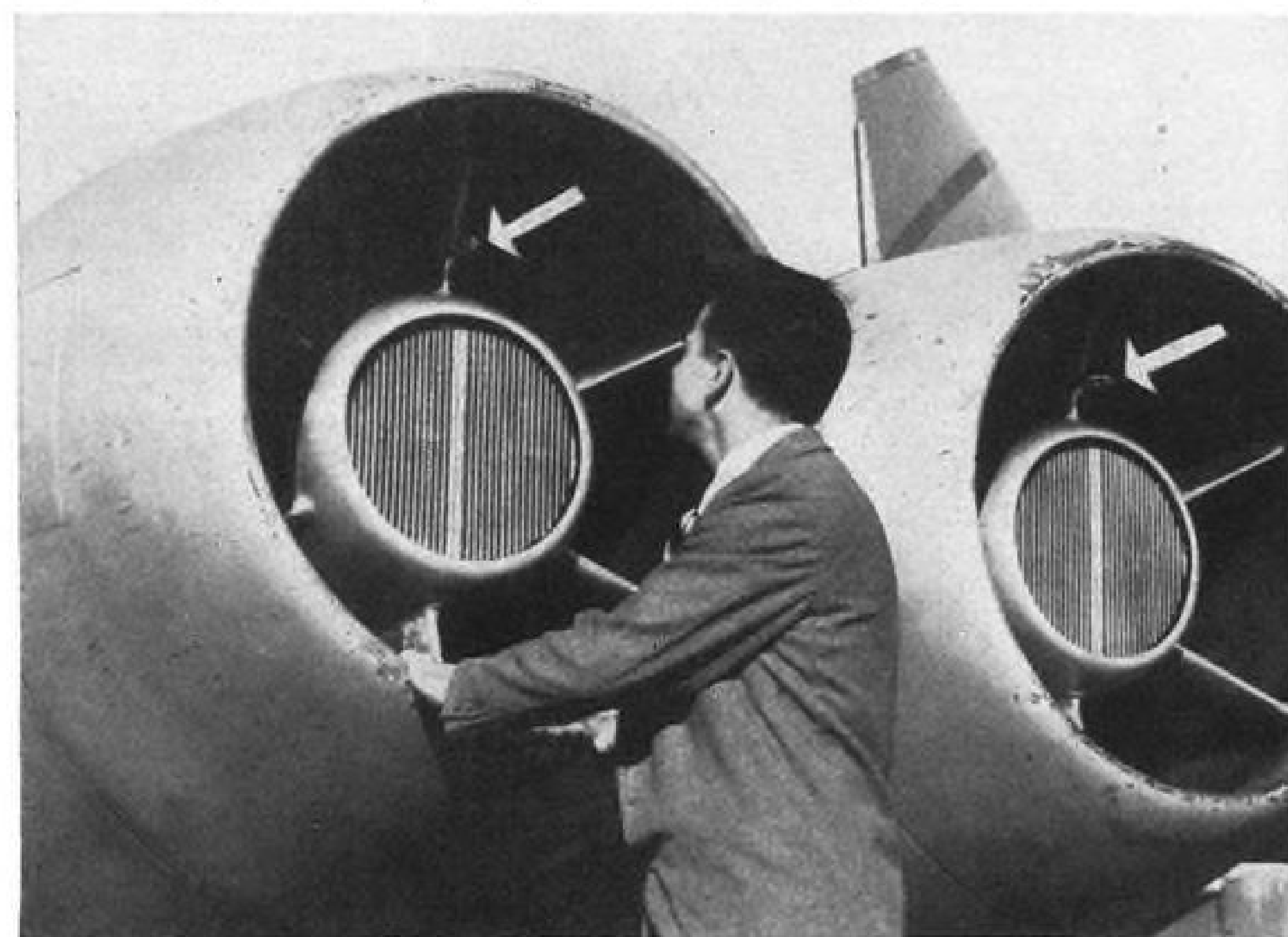
The Yardney Silvercel aircraft battery has been adopted as original equipment on the new Sikorsky S-59 gas-turbine-powered helicopter, according to Yardney Electric Corp., New York.

The battery was chosen after a series of rigid competitive tests and evaluations, the company says, in which the Silvercel unit's light weight and long-life tipped the scales.

The Yardney battery chosen for the S-59 weighs 26 lb., compared with 80 lb. for a conventional-type lead-acid aircraft battery. According to Yardney, the lead-acid units had a capacity of 34 amp.-hr., a life of about three days, and were able to start the turbine only nine times before failure.

The Silvercel unit has been in service in the XH-39, military version of the S-59, under identical conditions for more than 18 months without any maintenance or servicing and has given more than 300 starts without a failure.

It is rated at 40 amp.-hr. and has a nominal capacity of 24 volts.



Pitots for B-52 Thrust Measurement

Arrows point to pitot heads built into air intakes of the J57 turbojets installed on a Boeing B-52. The pitots provide engine intake air pressure for the plane's new pressure ratio indicators (AW Apr. 25, p. 69) which measure jet thrust by comparing intake and engine exhaust pressures. Need for the instrument became pronounced with the development of twin-spool turbojets, where a small change in compressor speed can result in large thrust variations over important power ranges. This ruled out conventional thrust-measuring systems based on rpm. and tailpipe temperature. Boeing engineers tried modified machmeters as pressure ratio indicators on prototype B-52 flight tests. Orders for the production instrument systems were subcontracted to Minneapolis-Honeywell Regulator Co. and AiResearch Manufacturing Co.

Aero Commander • AT-7 • AT-10 • AT-11 • C-43 • C-45 • Bonanza • Twin Bonanza • T-34
Air Cobra • King Cobra • H-13 (Helicopter) • Flying Fortress • Super Fortress • C-97
Cessna 140 • Cessna 170 • Cessna 180 • Cessna 190 • Cessna 195 • Cessna 305
Cessna 310 • B-24 • B-32 • B-36 • C-81 • C-87 • L-5 • Catalina • PB2Y • T-29A
Convair 240 • Convair 340 • Helldiver • Seahawk • P-40 • P-42 • P-60
P-62 • A-20 • A-24 • A-26 • B-19 • B-23 • C-32 • DC-3 • C-48 • DC-4
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AD Series • Skyraider • Gunner • Forwarder • C-82 • C-119 • XC-120
ZPN (Blimp) • AF2W • ZP2K (Blimp) • ZP5K (Blimp) • F4F • TBF-6
TB3F • Lodestar • H-23 (Helicopter) • A-28 • A-29 • AT-18 • B-34
B-37 • B-38 • C-36 • C-37 • C-63 • Constellation "049"

what do these famous aircraft have in common?

Constellation "749" • Super Constellation "1049"
PV-1 • PV-2 • P2V Series • XR-60-1 • B-26
Mars • P4M-1 • P5M • PBM • Martin 202
Martin 404 • AJ-1 • B-25 • P-51 • T-28
C-125 • P-61 • Apache • XF-12
Rainbow • P-47 • Seabee • Fireball
HSL (Helicopter) • Navion • PT-22
Courier (Helicopter) • Learstar • Super
Constellation "1049 G" • HUP-4
(Helicopter) • PT-25 • H-21
(Helicopter) • XT-37 • H-19
(Helicopter) • T-35 • F-84F
• YC-130 • XP5Y
C-130A • XV-3 (Helicopter) • T-37 • XFV
Super Navion
S2F • R3Y
• RF-84F

Reads like a roll call of American aviation, doesn't it? From small single-seaters to giant bombers and ponderous blimps, all have one thing in common—LORD bonded-rubber engine mountings to isolate power plant vibrations. This roll call indicates the past and present use of LORD engine mountings. As new milestones in aircraft propulsion are attained—in turboprop, jet and reciprocating—LORD will continue to prove its ability to produce new mountings with greater control over propeller disturbance and engine vibration. They will assure less flight fatigue, greater passenger comfort and protection to aircraft structure. Look to LORD for the best in vibration control.

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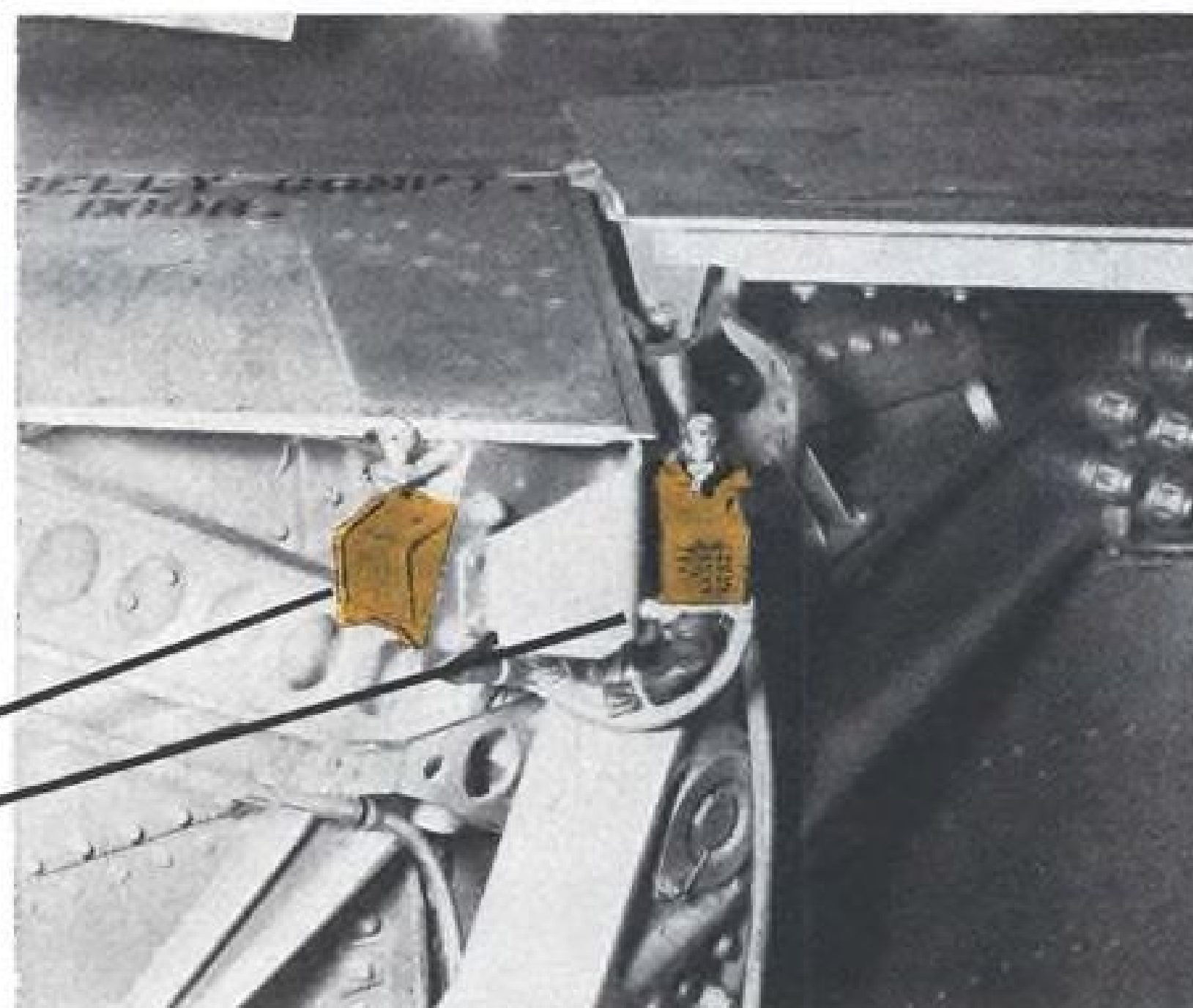
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Two Electro-Snap Hermetically-Sealed Switches control latching on landing gear doors of the RB-66 Air Force-Douglas Bomber.



Hermetically-Sealed Limit Switch
Chosen for Dependability in Any Environment

In today's modern aircraft, remote "fingers" tell when closures are properly "buttoned up" for high speed flying. This Electro-Snap Door Lock Indicator Switch is a typical example. It controls landing gear door position, lights an indicator on the instrument panel when doors are securely latched, and "cuts out" the door motor.

To match the all-altitude, all-temperature performance of the aircraft it serves, the switch is hermetically-sealed. Both electrical and mechanical parts are sealed in a dry, inert gas for dependable operation in any environment. Temperature cycling can't cause condensation inside the case; the switch can't freeze

because all moisture is sealed out. Hermetic sealing protects the switch from dirt, corrosive atmospheres, oil saturation, tampering and mis-adjustment.

Characteristics remain constant from -100°F. to $+250^{\circ}\text{F.}$ * The unique tipping-action actuator operates dependably even when the outside case is coated with ice.

It's little wonder that Electro-Snap Hermetically-Sealed Limit Switches are first choice on so many modern aircraft—for all kinds of switching jobs where dependability is a "must". For complete details about the many types available, see our catalog in Sweet's and send us a description of your requirements.

*Higher temp. models also available

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Write for Data sheet HM-12



Bomb Bay Switch
One of the many variations of the famous Electro-Snap Landing Gear Switch.



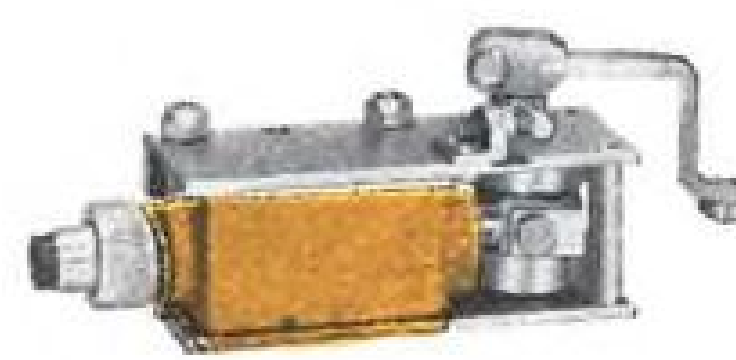
Flap Switch
When flap closes and depresses actuator, switch simultaneously operates four 10 amp, 30v DC circuits.



Rocket Switch
Now used in today's newest fighters for indicator and sequence circuits in rocket tubes.

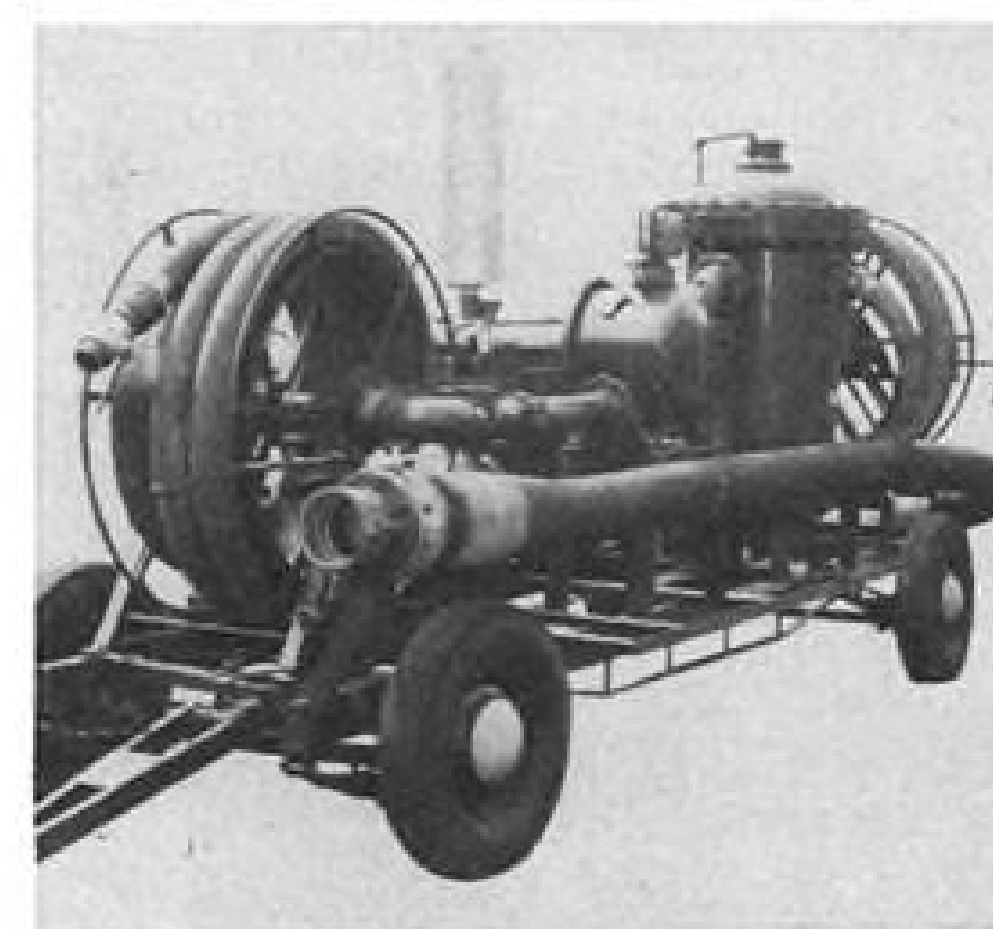


Fuel Tank Transfer Switch
Extra-dependable four circuit hermetic switch for use in cockpit. Fits AN type toggle mounting.



Turret Switch
Rotary actuator gives long over-travel, flexibility in mounting. Extremely compact, lightweight case.

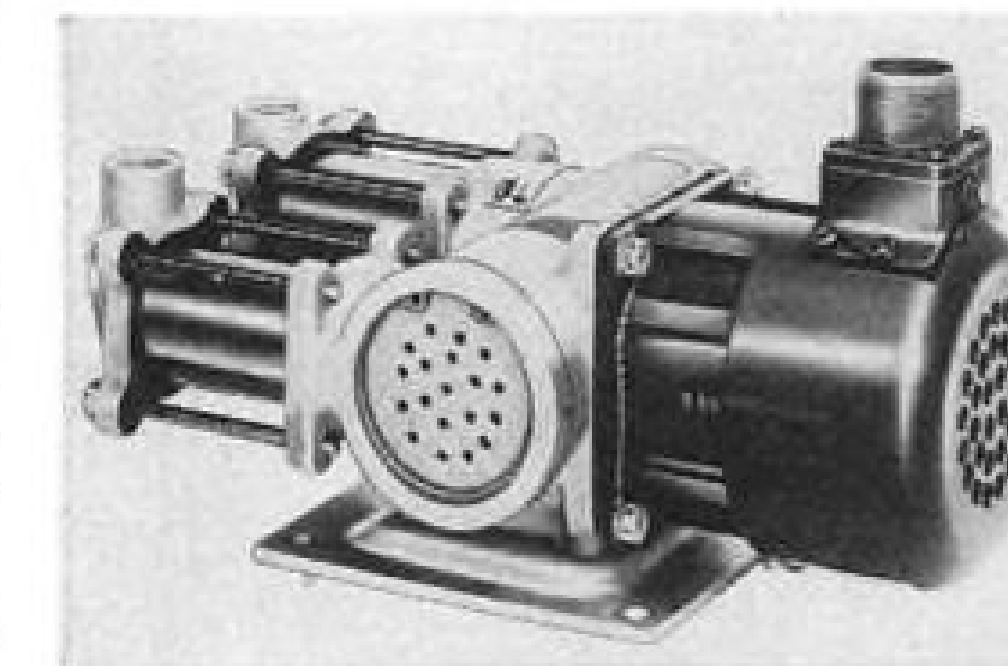
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Model RR-10900-B two-stage piston-type air pump is rated for 1,000 hr. service life and 300 hr. continuous operation at 60,000 ft. Rated capacity is 575 cubic inches per minute (0.0025 lb./min.) free air delivery at 32 in. Hg absolute inlet pressure. First stage pump's displacement is 2.165 cu. in. per stroke and the second stage pump's is 0.685 cu. in. per stroke. Crankshaft operates at 2,700 rpm.

Each of the reciprocating pumps has



Single-Point Fueler-Tester

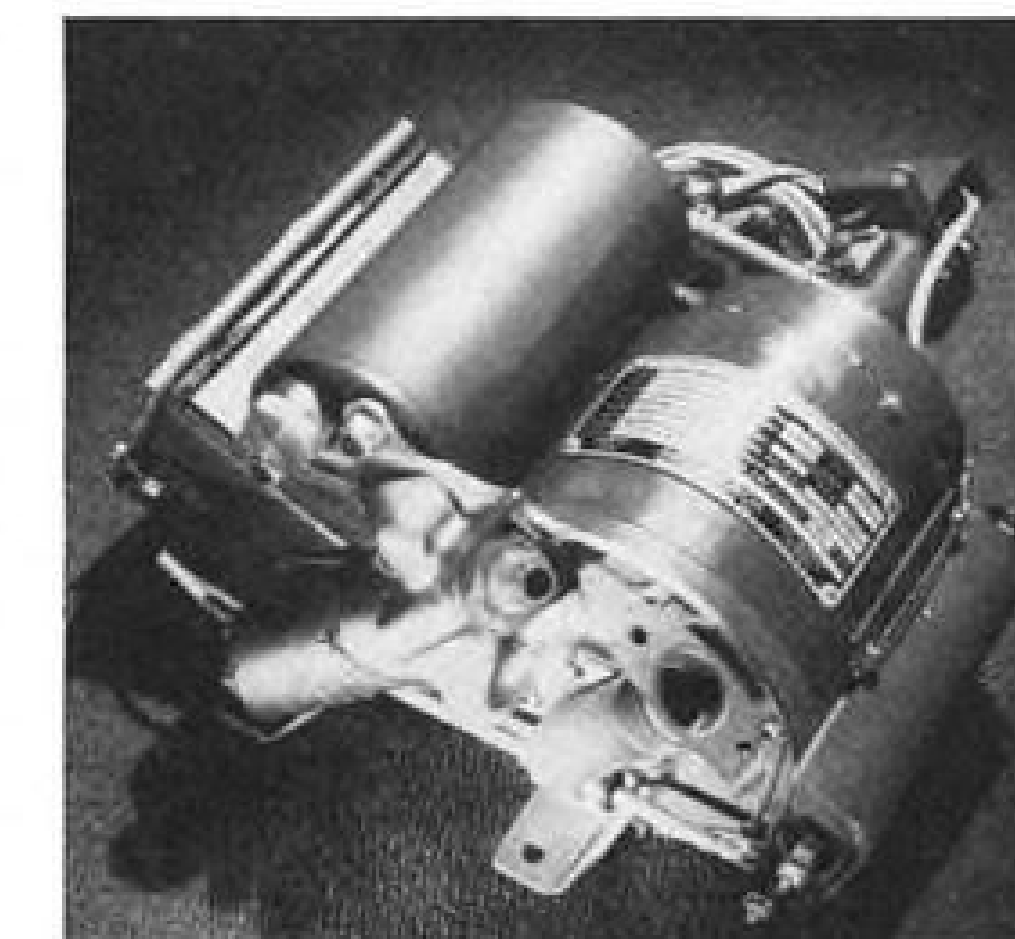
Aircraft fueling system can test single-point fuel manifold systems at low pressure and flow rates without danger. If the system checks out satisfactorily, the unit can be switched over to fueling at normal rates and pressures.

Fuel-A-Plane, built for Lockheed Aircraft Corp. and Lockheed Air Terminal, has a filter, air eliminator, drippage and expansion pressure relief receptacle, fuel flow meter and static bonding cable reel. Diesel powerplant uses an air starter to lessen fire hazard.

Harman Equipment Co., 3605 E. Olympic Blvd., Los Angeles 23, Calif.

phase, 400 cps., 2.3 amp., continuous duty.

Lear-Romec Division, Lear, Inc., Elyria, Ohio.



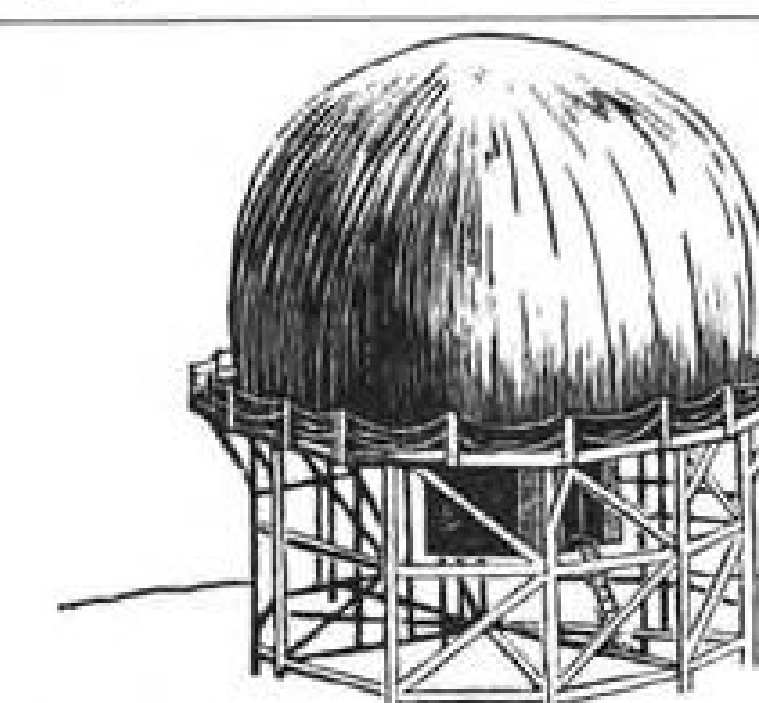
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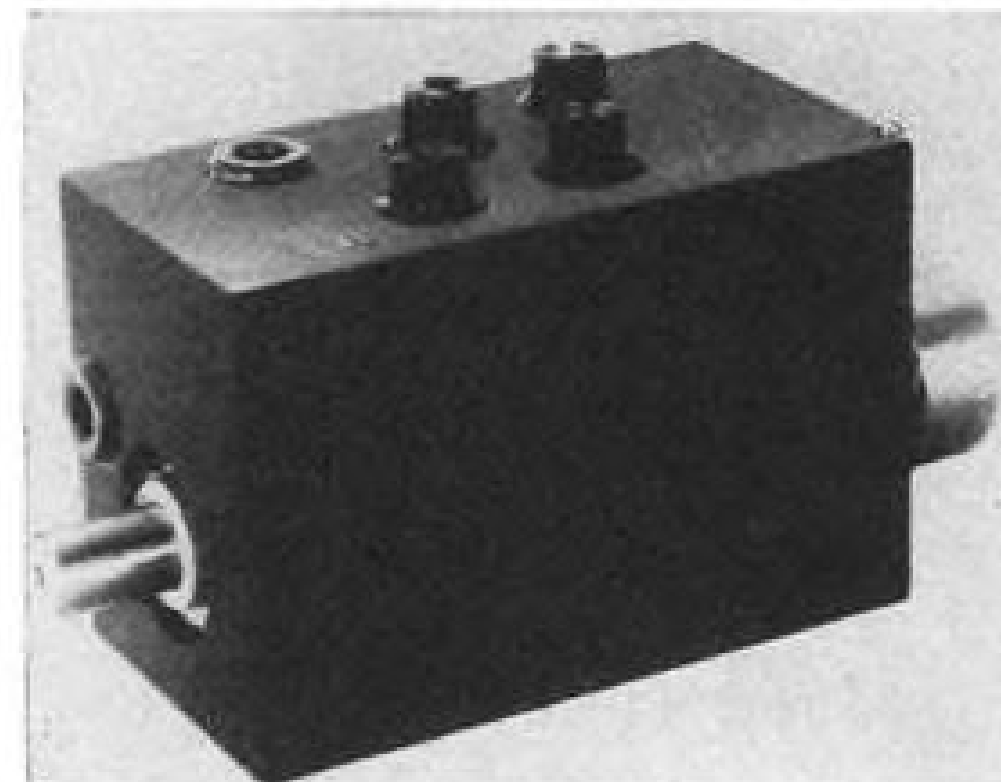
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ALL REPLIES WILL BE HELD IN STRICT CONFIDENCE.

erator rotating at about 24,000 rpm. An output shaft turned by a pinion gear system can operate the missile's controls mechanically or turn a pump for hydraulic power up to 2.5 hp.

AiResearch Manufacturing Division, Garrett Corp., Los Angeles, Calif.



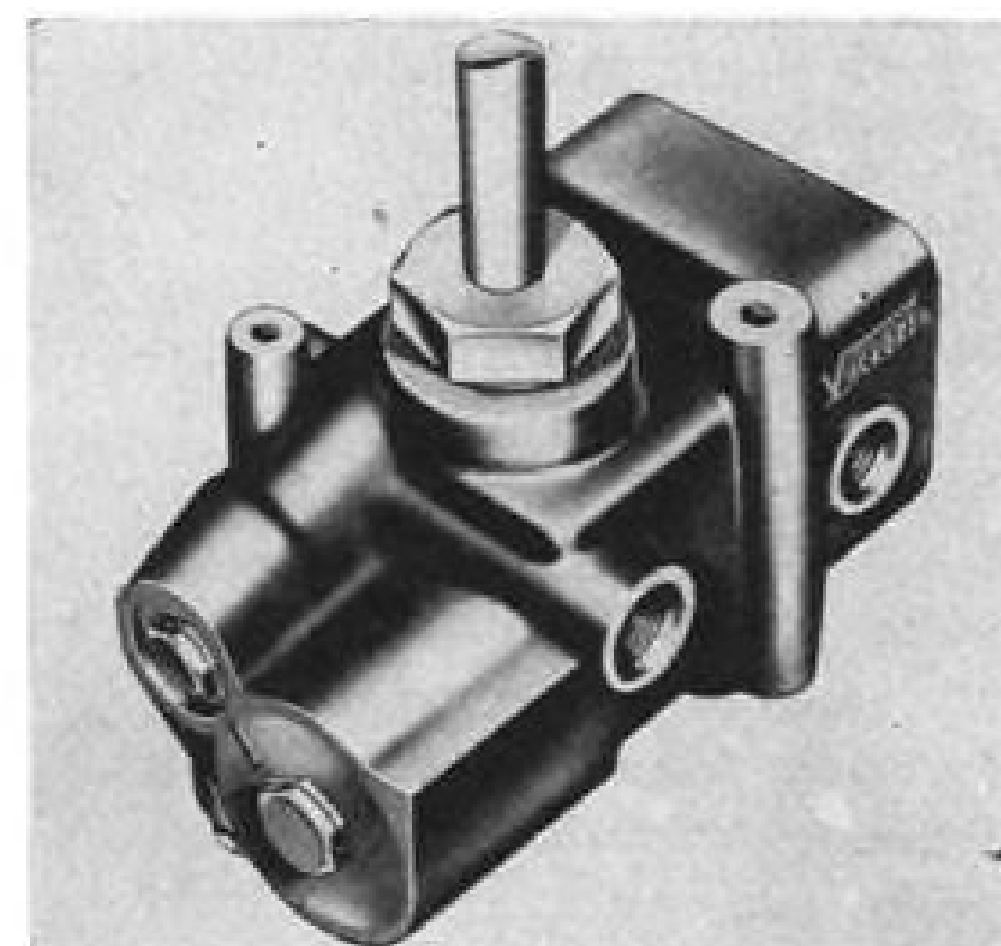
Follow-up Servo Valve

Model CO-5 servo control valve is designed for follow-up positioning systems where mechanical input signals are obtained from cams or linkages.

The unit features rectangular internal ports for linear flow at constant pressure drop, precision lap characteristics for positional accuracy, and hardened and lapped sleeve and spool construction. All hydraulic connects are at the top of the valve to permit multiple installations of cams or linkages in a minimum space.

Valve flow versus displacement characteristics are stated to be easily modified to suit individual power and stability needs.

Hydraulic Controls Co., 87 Terrace St., Roxbury 20, Mass.



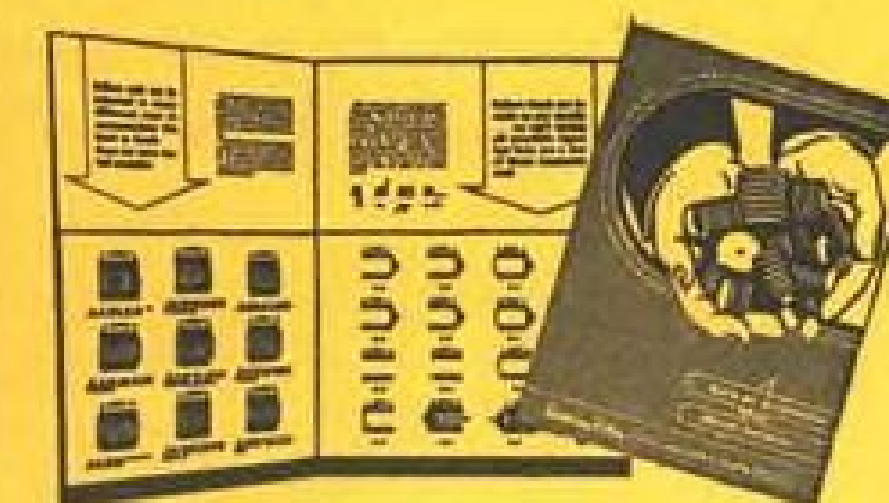
Caster Control for Nosewheels

All control elements are packaged in one housing in new series of rotary input, constant-gain steering valves for use on aircraft nosewheels. Valves can be mounted on the wheel strut, with rotary motion of the strut providing follow-up as the wheel is steered. This simplifies mechanical linkage. Unit provides static and dynamic steering. Nosewheel can caster freely while

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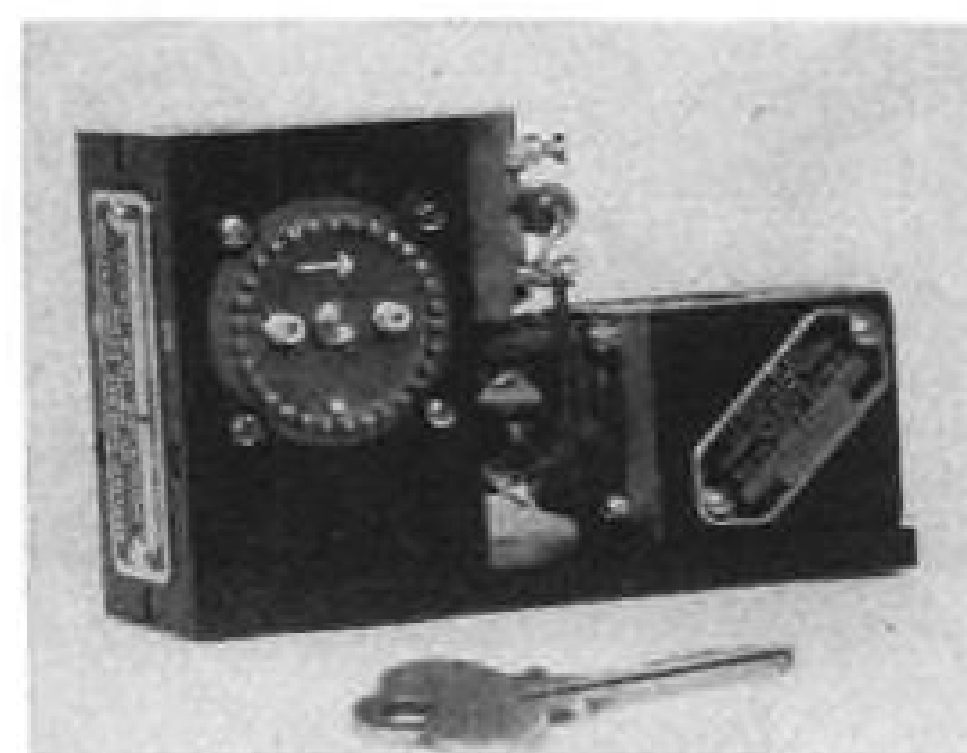
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the plane is not being steered, within a narrow deadband at neutral. This can be limited to about plus or minus one-half degree. Low actuating force and inherent anti-shimmy characteristics are also reported.

Vickers, Inc., 1400 Oakman Blvd., Detroit 32, Mich.



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Applied Science Corp., Princeton, N. J.

ALSO ON THE MARKET

Aircraft fuel tank filler cap, Model FC-3500, weighs 0.43 lb. Lever action automatically relieves pressures in the tank before it is unlocked. A 35-deg. turn removes the cap. Unit meets MIL-C-7244B (ASG).—Gabb Special Products Division, E. Horton & Son Co., Windsor Locks, Conn.

Mobaloy AH is a modified phenolic low-pressure laminating pre-preg that is hard and dense, having a specific gravity of 1.9 to 2. Material can also be made soft and tacky. Barcol hardness is over 70.—Mobile Plastics Division, Carlisle Corp., P. O. Box 72, Telegraph Rd., Mobile, Ala.

Cemented oxide tool material requires no coolant and shows good performance at speeds of 1,000 sfpm. and over, the maker says. Wear resistance is said to indicate a tool life of 25 to 1 over carbides. For finishing cuts, the material is said to reduce time materially, taking up where carbides leave off. The new material is available on a limited basis.—

Carboloy Department, General Electric Co., Detroit, Mich.

Leakproof fitting for use with Aeroquip No. 666 Teflon hose features high-degree of resistance to temperature from -100 F to +500 F. Available in all sizes and pressure ranges, item is fabricated in steel, stainless steel and aluminum.—Aeroquip Corp., Jackson, Mich.

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Altitude test chamber simulates pressure conditions to 350,000 ft. for environmental checking of missile components. Model 5500 Iono-Chamber has working area of 18-in. inside diameter by 30 in. deep. A coolant may be circulated to a shelf in the unit to conduct heat from the subject under test.—Hudson Bay Division, Labline, Inc., 3070 W. Grand Ave., Chicago 22, Ill.

Truck filters for fuming nitric acid features CPS-150 woven Teflon cloth element in stainless steel pressure housings. Slot-like pore of CPS-150 is 300 microns long by 150 microns wide. Other grades are available with 40 and 25-micron pores.—Porous Plastic Filter Co., Inc., 30 Sea Cliff Ave., Glen Cove, N. Y.

Pneumatic rubber gaskets to deaden noise from jet engine test cells can be fitted to doors with rectangular, rounded corners and circular openings. Normal operating pressure is 30 lb./sq. in. Valves are on the gasket's flat flange surface.—Continental Rubber Works, 1943 Liberty St., Erie 6, Pa.

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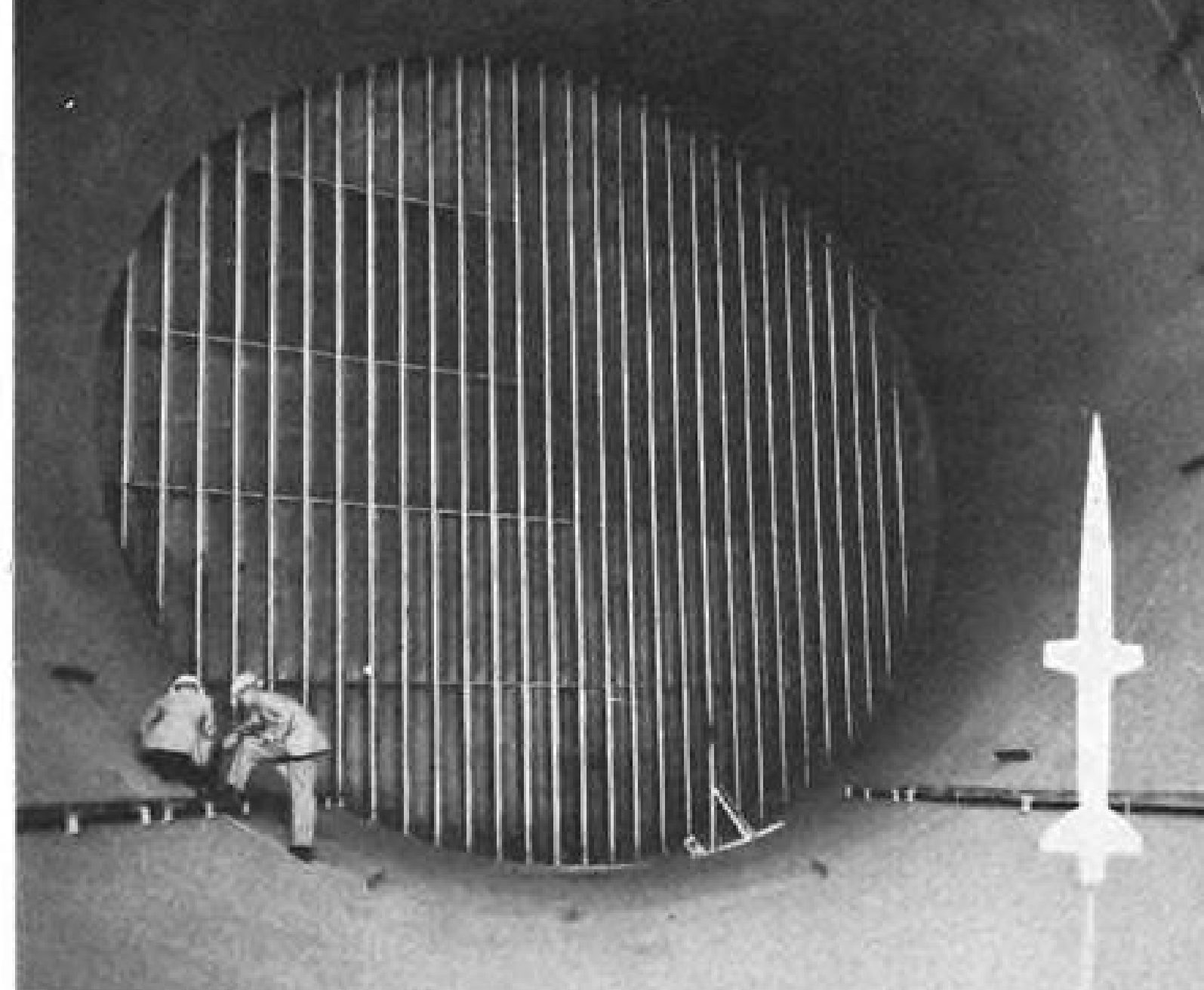
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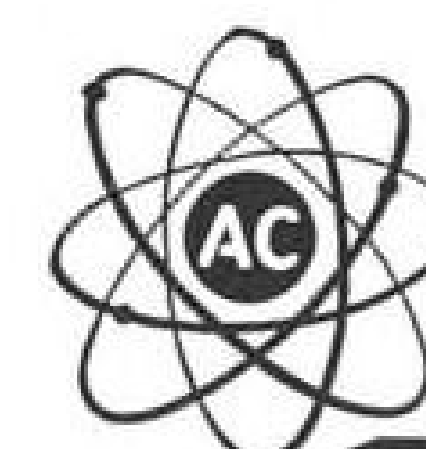
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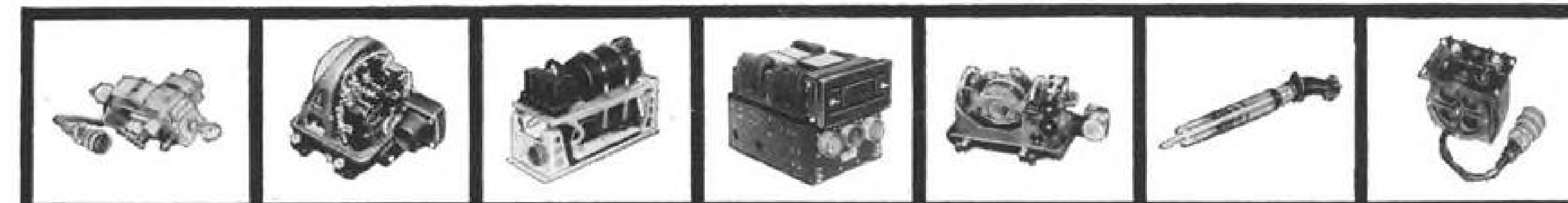
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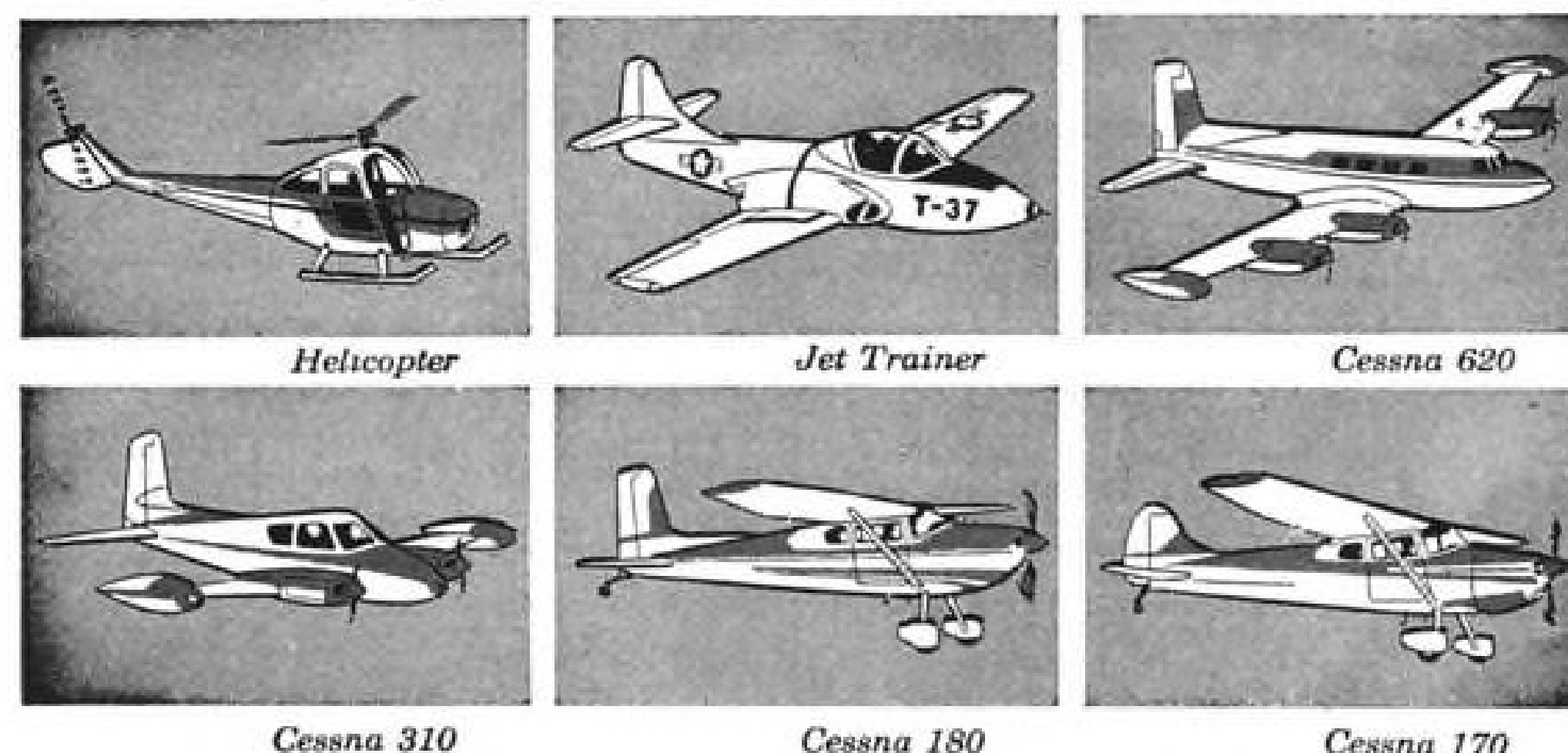
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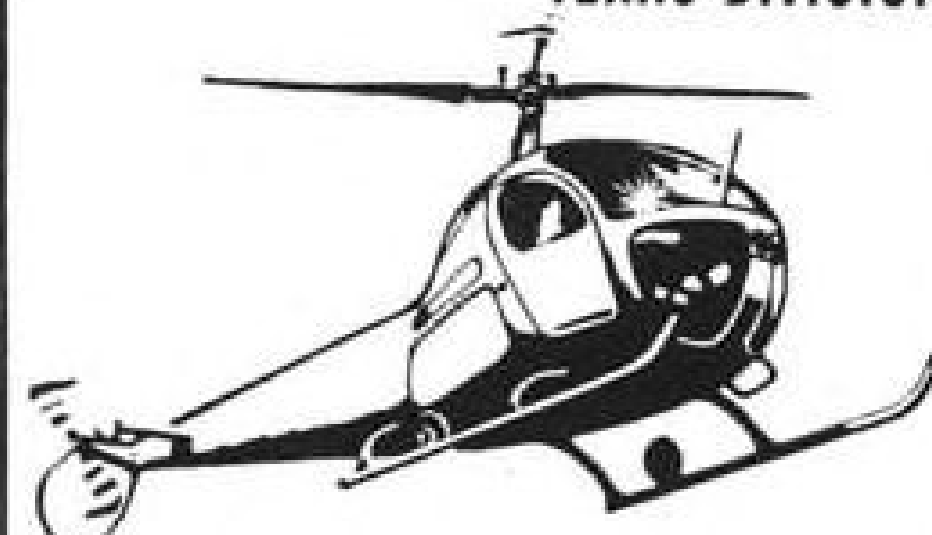
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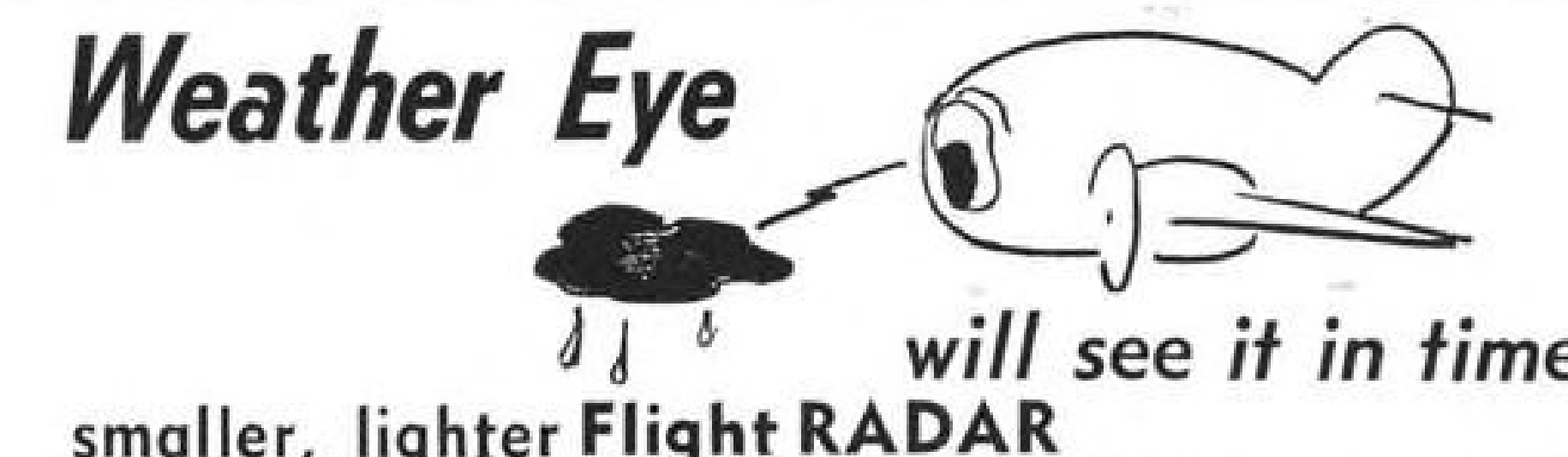
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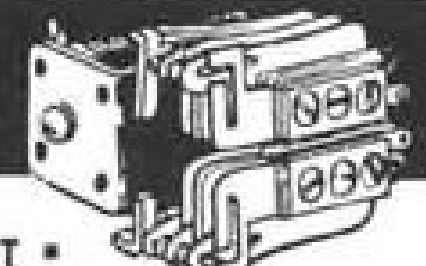
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314	RA-430	Key	120	RA-7964	Bearing
837	RA-474	Plug	584	RA-7964-10	Bearing
380	RA-665	Key	240	RA-7974	Belt
144	RA-707	Bolt	20	RA-7980	Impeller
14	RA-817	Spacer	25	RA-7980	Impeller
4,555	RA-823	Screw	14	RA-8051	Harness
4,247	RA-827	Bushing	8	RA-8065	Gear Assy.
108	RA-870	Nut	17	RA-8103	Shaft
173	RA-904	Plug	7	RA-8105	Nut
670	RA-1038	Seal	37	RA-8127	Nut
800	RA-1132	Bushing (Dowel Hole)	66	RA-8128	Washer
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3,450	RA-5525	Bolt	479	RA-8134	Elbow
1,650	RA-5525	Bolt	39	RA-8142	Manifold
27	RA-5802	Gear	51	RA-8143	Manifold
25	RA-5805	Gear	7	RA-8150	Gear
22	RA-5806	Adapter	27	RA-8168	Shaft
20	RA-6826	Gage	37	RA-8173	Shaft
4	RA-6826	Bolt	5	RA-8184	Valve
297	RA-5830	Slinger	748	RA-8186	Gear Assy.
144	RA-5830	Plug	15	RA-8188	Manifold Assy.
478	RA-6071	Cover	4	RA-8199	Housing Stud Assy.
35,721	RA-6203	Flange	3	RA-8202	Head
492	RA-6452	Support	402	RA-8202	Head
759	RA-6498	Sleeve	484	RA-8203	Finger
82	RA-6650	Gear	863	RA-8207	Support
8	RA-6667	Gear	86	RA-8209	Gear
58	RA-6676	Gear	17	RA-8215	Crank Case Stud Assy.
19	RA-6682	Gear	11	RA-8226	Bolt
20	RA-6715	Gear	711	RA-8231	Pump Assy.
450	RA-6721	Transfer	2	RA-8231	Housing Assy.
16	RA-6724	Gage	29	RA-8232	Piston
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12	RA-7426	Housing Stud Assy.	24	RA-8291	Ignition
12	RA-7428	Shaft & Plug Assy.	20	RA-8307	Wiring Assy.
13	RA-7491	Adapter	1,111	RA-8314	Screw
11	RA-7504	Shaft	1,300	RA-8320	Ring
30	RA-7505	Nut	1,309	RA-8320-05	Ring
86	RA-7506	Plug	1,424	RA-8320-10	Ring
508	RA-7536	Valve	900	RA-8320-15	Ring
50	RA-7585	Adapter	2,971	RA-8363	Ring
164	RA-7586	Bearing	1,575	RA-8363-05	Ring
119	RA-7604	Valve	550	RA-8409	Baffle
360	RA-7605	Seat	975	RA-8412	Clamp Assy.
570	RA-7605-05	Seat	12	RA-8671	Shaft Plug Assy.
151	RA-7605-10	Seat	94	RA-8856	Flywheel Assy.
60	RA-7605-15	Seat	1,903	RA-8897	Spring
240	RA-7605-20	Seat	1,061	RA-8898	Spring
86	RA-7607	Nut	1,768	RA-8899	Washer
23	RA-7626	Spacer	5	RA-8915	Baffle Assy.
37	RA-6731	Gear Assy.	9	RA-8919	Gear
95	RA-7654	Sleeve	99	RA-8963	Pipe
203	RA-7670	Nut	35	RA-8964	Pipe
1	RA-7758	Gear Assy.	65	RA-8996	Rod Assy.
45	RA-7805	Nozzle	5	RA-9155	Gear Assy.
651	RA-7807	Cylinder Stud Assy.	205	RA-9331	Plug
6,106	RA-7841	Bearing	41	RA-9814	Plug
6,704	RA-7861	Insert	8,082	RA-9816	Gap
105	RA-7903	Slinger	254	RA-9903	Plug
1,451	RA-7904	Ring	38	RA-9991	Crankshaft Assy.
40	RA-7909	Cylinder Assy.	984	RA-10118	Bushing
221	RA-7928	Rocker Assy.	10	RA-10151	Housing
110	RA-7928	Bearing	32	RA-10769	Tea Intake
404	RA-7962	Bearing	88	RA-10974	Cylinder

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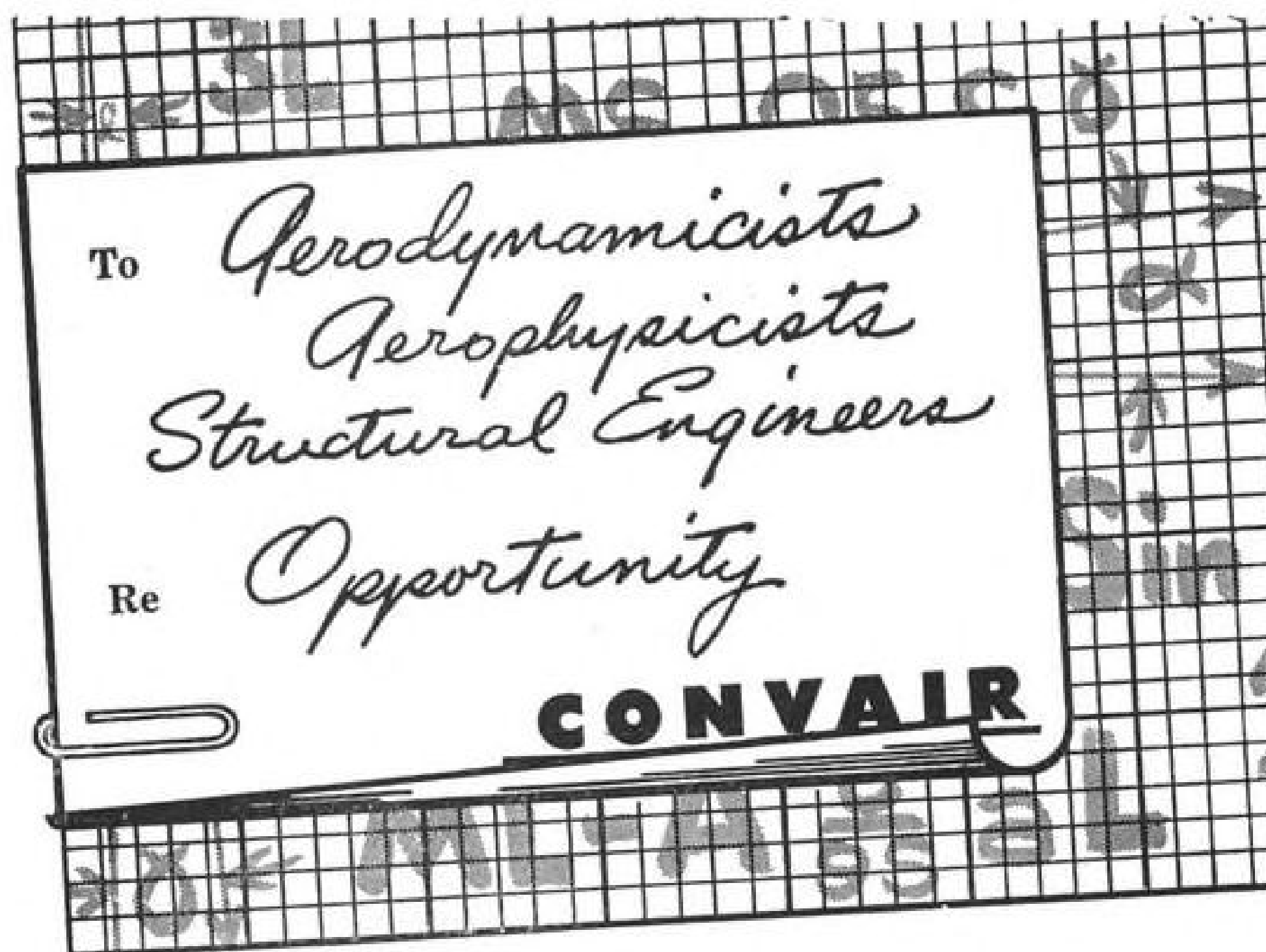
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CONVAIR
A DIVISION OF GENERAL DYNAMICS CORPORATION
FORT WORTH, TEXAS

WHO'S WHERE

(Continued from page 9)

W. E. Smith, formerly with Cessna Aircraft Co., has joined Field Engineering & Service Division, Aircraft Radio Corp., Boonton, N. J., to handle sales and engineering of military products.

G. Rex Shields, aviation sales manager Axelson Manufacturing Co., Division of U. S. Industries, Inc., Los Angeles, Calif., covering expanded line of aircraft items.

Ronald Ellison, Bristol Aeroplane Co., Ltd., test pilot, has joined the sales department of Bristol Aircraft, Ltd., a new subsidiary.

Richard R. Prothero, sales engineering staff, Weber Aircraft Corp., Burbank, Calif.

W. Jesse Harber, Jr., manager, General Electric Co., Syracuse, N. Y., in charge of cathode ray tube manufacture; Brooks A. Kafka, sales manager, cathode ray tube sub-department.

Lincoln Van Camp, general manager, Menasco Manufacturing Co., Burbank, Calif.

Other appointments: Erson A. Scott, controller-assistant secretary; Elmer D. Blank, works manager; George B. Phillips, industrial relations manager; William R. Browne, production planning manager and Walter M. Kell, quality control manager.

Dr. H. Guyford Stever, former USAF chief scientist, associate dean, School of Engineering, Massachusetts Institute of Technology.

Vincent O'Connell, eastern district passenger sales manager, Air France.

Zeke R. Smith, chief engineer-applications, Potter & Brumfield, Princeton, Ind.

Dr. Wingate A. Lambertson, assistant to the manager, research branch, Research & Development Division, Carborundum Co., Niagara Falls, N. Y.

H. F. Penfold, general sales manager, Rust Industrial Co., Inc., Manchester, N. H.

Fred L. Roberts, advertising and publicity manager, Microcast Division, Austenal Laboratories, Inc., N. Y.

Alphonse J. Graffeo, contract administrator, National Co., Inc., Malden, Mass.

C. L. Davis, planning manager, Aeronautical Division, Minneapolis-Honeywell Regulator Co., formerly deputy director of procurement and production, Air Materiel Forces, Europe.

Brig. Gen. William R. Wendt, (USMC, ret.), assistant to director of applied physics laboratory, Johns Hopkins University, Silver Springs, Md., previously head of air intelligence, office of Naval Intelligence.

Norman J. Asher, former research engineer in Office of Naval Research, administrator for research and preliminary design, Piasecki Helicopter Corp., Morton, Pa.

William F. Arnoldy has been transferred to Townsend Co.'s Aircraft Sales Division, technical liaison, with headquarters in Santa Ana, Calif.

Dr. A. M. Zarem, resigned as assistant director-manager, Southern California Division, Stanford Research Institute, to open a private consulting practice at 727 W. Seventh St., Los Angeles, Calif.

Scott C. Whitney, director of regulatory proceedings, Frontier Airlines.

Joseph W. Powers, assistant chief engineer, Genisco, Inc., Los Angeles, Calif.

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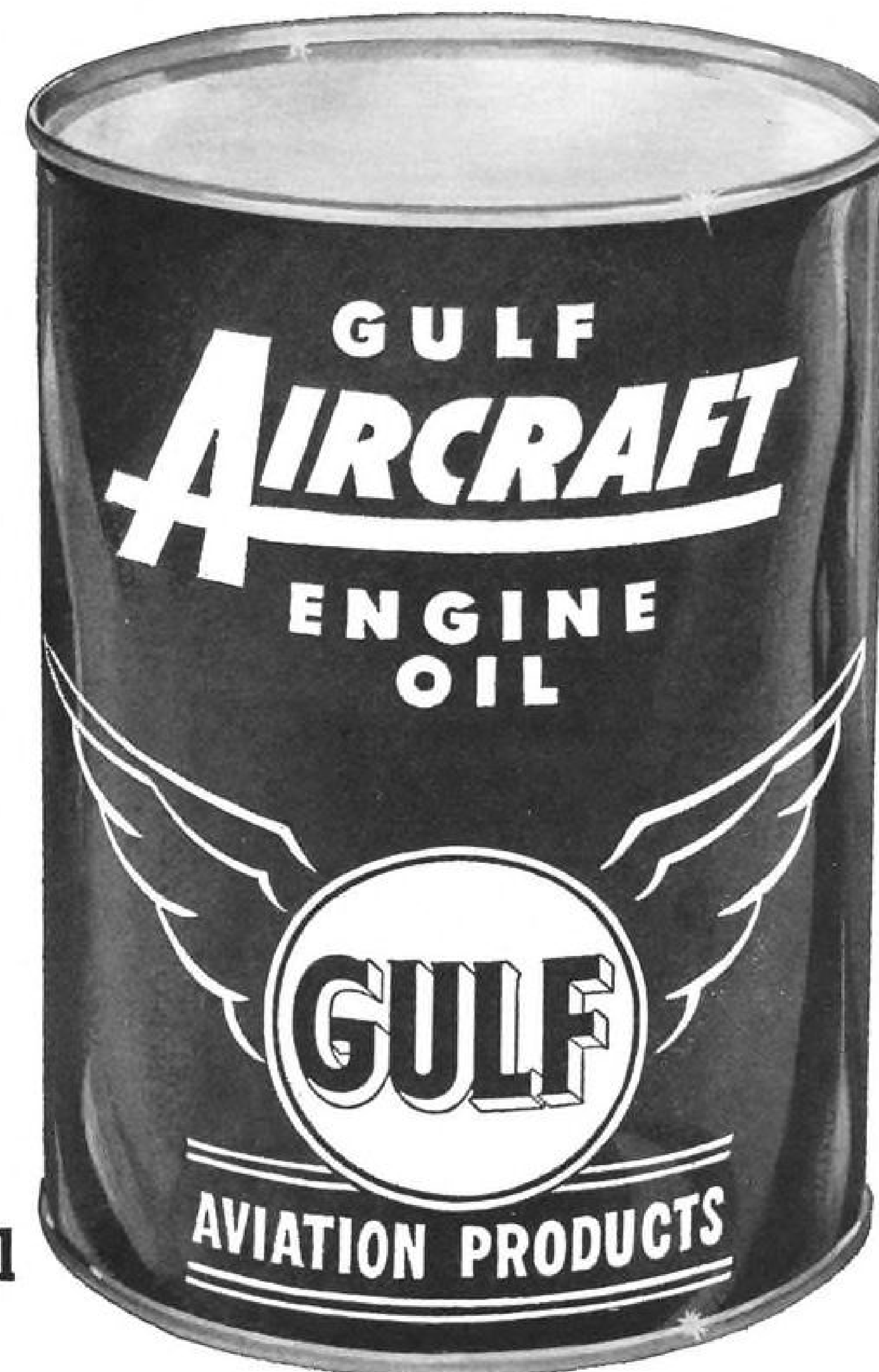
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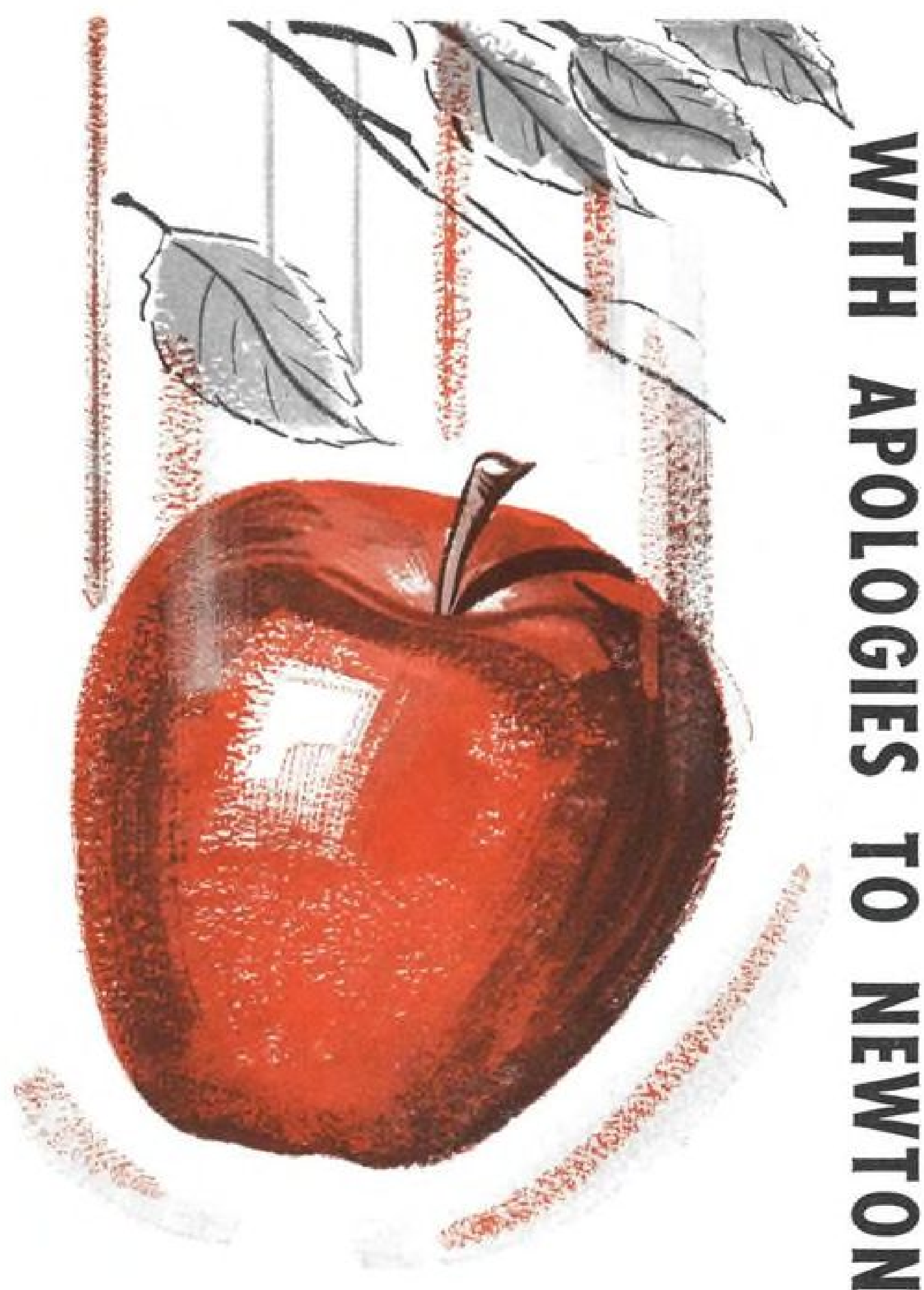
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DALLAS, TEXAS

AIR TRANSPORT

Continental Buys Jets for New Routes

Four Boeing 707s, 12 Viscounts, five DC-7Bs ordered as western carrier maps plans for services.

By Craig Lewis

Denver—Continental Air Lines moved quickly last week to establish itself as a major competitor on its new western routes with a \$50 million purchase program for turbojet, turboprop and piston equipment.

Continental has ordered Boeing 707, Vickers Viscount and Douglas DC-7B aircraft to serve the new Chicago-Kansas City-Denver-Los Angeles routes awarded last month in the Denver service case (AW Nov. 21, p. 99).

The new equipment program will give Continental a fleet of aircraft which will be competitive with those of American Airlines, United Air Lines and Trans World Airlines, the three carriers Continental must compete with for business on the routes between Chicago and Los Angeles.

The \$21,300,000 order for four Boeing 707 turbojet transports will give the regional airline jet service between Chicago, Kansas City, Denver and Los Angeles at least three months in advance of any other airline, according to Robert F. Six, president of Continental. Delivery of the 707 is scheduled to start in May 1959, and service on Aug. 1 of that year.

Delivery Schedule

The Boeing 707, which will be powered by the Pratt & Whitney J57 turbojet, will cut in half current operating times between points on Continental's new route. It will carry 118 passengers and 7,000 lb. of mail and cargo and will have a range of 3,000 miles.

Continental's \$18,100,000 order with Vickers is for 12 Viscount 810D turboprop transports. The 53-passenger Viscounts are scheduled for delivery between March and September 1958, and will be used on present Convair and DC-3 routes as well as on the new east-west routes. Service is scheduled for July 1958.

The Viscount will be powered originally with the Rolls-Royce RDA 7/1 Dart engine rated at 2,100 hp. and producing a cruising speed of 363 mph. Within a year, these engines will be replaced with the RDA 8 Dart engine with 2,500 hp., giving the airplane an ultimate cruising speed of 400 mph.

The Douglas order for five DC-7Bs

replaces a previous order for DC-6Bs and is scheduled for delivery in March 1957. They will be placed in service on the new routes in April, carrying 64 first class passengers or 94 coach passengers.

New Markets

Continental considers the DC-7B a transitional aircraft and looks forward to an all-turbine operation over all but its shortest routes. The Douglas transports have been ordered to fill equipment needs in the period before turbine equipment is delivered.

Earlier this year, the airline ordered three Convair 440 Metropolitan transports which will be delivered next March. Currently, Continental has five DC-6Bs, including two on lease, six Convair 340s and 21 DC-3s. Delivery of the new Convairs will allow the carrier to dispose of part of its DC-3 fleet.

Continental's new routes add only 1,200 miles to the carrier's present 5,000 mile system, but they nearly triple the population market Continental will be able to tap. With these new markets come inevitable problems in converting from an essentially short-range operation to one which involves long, high density routes.

Continental's present system, recently augmented by acquisition of Pioneer

Air Lines, covers an area bounded by Denver, Kansas City, Tulsa, Dallas, Houston, San Antonio and El Paso. The nature of the system and its traffic characteristics largely call for a short-range type of operation with DC-3 and Convair 340 equipment.

Interchange Services

Most of the regional airline's long-range traffic is on its DC-6B interchanges with American from Texas to the West Coast and with United from Tulsa and Denver to Seattle which connect the system with markets in the Middle West and West Coast. The fact that both Continental and American have ordered the 707 will facilitate further development of interchange services. A Convair interchange is operated with Braniff between Denver and St. Louis.

The regional character of Continental's system has inhibited development of aircoach service, since there are few routes with enough range and traffic density to make coach service profitable. No decision on the use of the 707 in coach service has been made by the airline, but the DC-7B will be operated as a coach as well as first class aircraft. As the Viscount and later the 707 go into service, the DC-7B can be shifted to all coach operation.

Selection of the Viscount over the Lockheed Electra is a good indication of Continental's plans for its present system. The Vickers transport fits in



VICKERS VISCOUNT turboprop transport model with markings of Continental Air Lines.

RDA 8 for Viscount

The Viscount 810D will be redesignated the Viscount 840 after the RDA 8 engines are installed. The Rolls-Royce engines will be derated to 1,800 eshp. for takeoff, according to Charles Gardner of Vickers-Armstrong, Ltd. Since the RDA 8's maximum is 2,500 eshp., Vickers claims that 100% temperature accountability is assured for the airplane. In addition, the Viscounts which Continental will receive will be of heavier construction than the Model 800 which British European Airways will operate over European routes beginning early in 1957.

better as a replacement for the Convair and a partial replacement for the DC-3 than the larger Electra. Six told AVIATION WEEK. Continental's smallest routes will require the carrier to keep a minimum of 12 DC-3s until an economical DC-3 replacement is developed.

Service Problems

Problems involved in expanding its operations to include the new Chicago-Los Angeles route will probably keep Continental from inaugurating service before summer. One problem is equipment for the period before the DC-7B is delivered. The carrier will be able to work some DC-6B aircraft out of its interchange patterns to start the new service.

A bigger problem is establishment of

Continental in both Chicago and Los Angeles. Ticket and operating facilities must be built at both points, and space is a critical problem. In addition, the airline plans to set up maintenance facilities at Los Angeles. Time needed to negotiate and establish these facilities will probably delay the start of service about five months after the January date approved by the Civil Aeronautics Board.

Once service is started, Continental has another major problem in establishing identification in both cities. Some identification exists in Los Angeles because of interchange operations, but the airline plans a major promotional campaign to put itself before the public as a competitor on the newly-awarded routes.

Promotion Plan

Present plans call for a major newspaper promotion in Los Angeles and Chicago, tied in with radio, television and billboard advertising and a direct mail campaign. In sixty to ninety days, this program will taper off to a normal comprehensive advertising schedule.

Continental will do some advertising in the major eastern cities it figures will generate through traffic, but most of its efforts will be concentrated in the immediate markets served. The carrier figures it can offer a better set of schedules for all points on the new route than its bigger competitors who have to worry about transcontinental service. It also plans to sell an individual, personalized type of service which Continental feels is characteristic of a smaller carrier and which it intends

to preserve when operations are expanded.

Continental figures that business will more than double in the next five years from the new routes and expansion of present services. This year, the carrier will make about \$15 million. Traffic and revenue have tripled in the past five years, including a 30% increase from the merger with Pioneer last spring.

Traffic Gains

Figures for the first nine months of this year show revenue of \$11.7 million compared with \$8.9 million for the same period of 1954. Net income this year was \$231,645, down from \$372,111 for the nine month period last year.

The reduction is attributed largely to expenses involved in the acquisition of Pioneer Air Lines which was merged with Continental's operation Apr. 1, 1955.

Traffic showed substantial gains in the period. Revenue passenger-miles increased from 121.9 million in 1954 to 163.6 million in 1955. Cargo traffic made a 50% gain to nearly one million ton-miles, reflecting development of the cargo market potential in an area where surface transportation is inadequate due to mountainous terrain.

Along with plans for expansion of its route system, Continental is negotiating with Denver airport authorities for space for a new headquarters facility. The project will cost \$7 million and will include maintenance and office space in a plant expansion designed as part of the general Denver airport program.

Minetti Replaces Lee on CAB; Rizley Expected to Resign Soon

Washington—G. Joseph Minetti, a New York Democrat, has been named by President Eisenhower to succeed Josh Lee as a member of the Civil Aeronautics Board. Minetti's appointment becomes effective when Lee's second six-year term expires Dec. 31.

Minetti, 48, is now a member of the Federal Maritime Board to which he was appointed by the President in August 1954. He previously had been Commissioner of the Department of Marine and Aviation and Commissioner of the Board of Transportation of New York City. Minetti is a member of the law firm of Danahy, Delaney and Minetti of New York.

Failure to re-appoint former Sen. Josh Lee, an Oklahoma Democrat, was not unexpected in industry and Government circles. Lee lost his chances of remaining on the Board once Republican Ross Rizley became the second member from Oklahoma in February (AW July 18, p. 11). Policy of the Eisenhower Administration has been not to re-nominate Democratic incumbents to independent agency posts.

Lee's departure from CAB along with Rizley's expected resignation to accept a Federal judgeship may lead to a complete re-alignment of Board voting. The majority has consisted of Rizley, Lee and Vice Chairman Joseph P. Adams against the minority votes of Chan Gurney and Hammar Denny.

Dismissal of Lee and the choice of Minetti as his replacement immediately drew criticism. Sen. Mike Monroney (D-Okla.) who as chairman of the Senate Commerce Committee's



G. JOSEPH MINETTI

aviation subcommittee, has accused Secretary of Commerce Sinclair Weeks and Under Secretary Louis S. Rothschild of masterminding a Commerce Department plan to seize control of aviation.

Sen. Monroney said the reappointment of Josh Lee was blocked "first because he was a Democrat who served under Truman, and second because Rothschild wanted his buddy from Maritime Commission days, G. Joseph Minetti, of Brooklyn, appointed so that the long arm of the Commerce Department can reach out to further control aviation."

Although Monroney expressed great concern over Josh Lee's being "punished," he was more distressed over the fact Oklahoma is apparently going to lose its representation on the CAB. Monroney said, "They are not handing 'our' seat to a 'Democrat,' but they will have another Republican seat (Rizley's) soon."

Braniff Orders Nine Lockheed Electras

Braniff International Airways last week announced its third aircraft order of the year, nine turboprop Lockheed Electra transports with delivery beginning in May, 1959.

The order, made two weeks to the day after Braniff's order for Boeing 707 jet airliners (AW Dec. 5, p. 127), stipulated that the Electras be powered by Allison 501 turboprop engines. Cost of the Electras with spare engines and parts will be \$22 million.

Braniff, which also ordered seven

Douglas DC-7Cs, this year, became the third U.S. airline to order the Electra (American Airlines has ordered 35; Eastern, 40). It will place the 400 mph. transport on both domestic and international schedules, including the recently-awarded Southwest, Mid-South and Washington/New York routes (AW Nov. 28, p. 12).

A Braniff spokesman said the Electra will cut time on Omaha-Minneapolis flights by 24 min.; Dallas-Houston by 17 min., and Kansas City-St. Louis by 15 min.

Maximum operating altitude of the Electra will be 30,000 ft. with a gross takeoff weight of 110,000 lb. It will be qualified to operate from runways of only 4,850 ft.

Seating capacity of Braniff's Electras will be 66 in the first-class configuration; up to 91 in the tourist configuration, and 75 in the combination coach/first-class arrangement.

P.O. Airmail Test Upheld by Court

Post Office Department's experiment of shipping first-class surface mail by air has been upheld by the U.S. Court of Appeals.

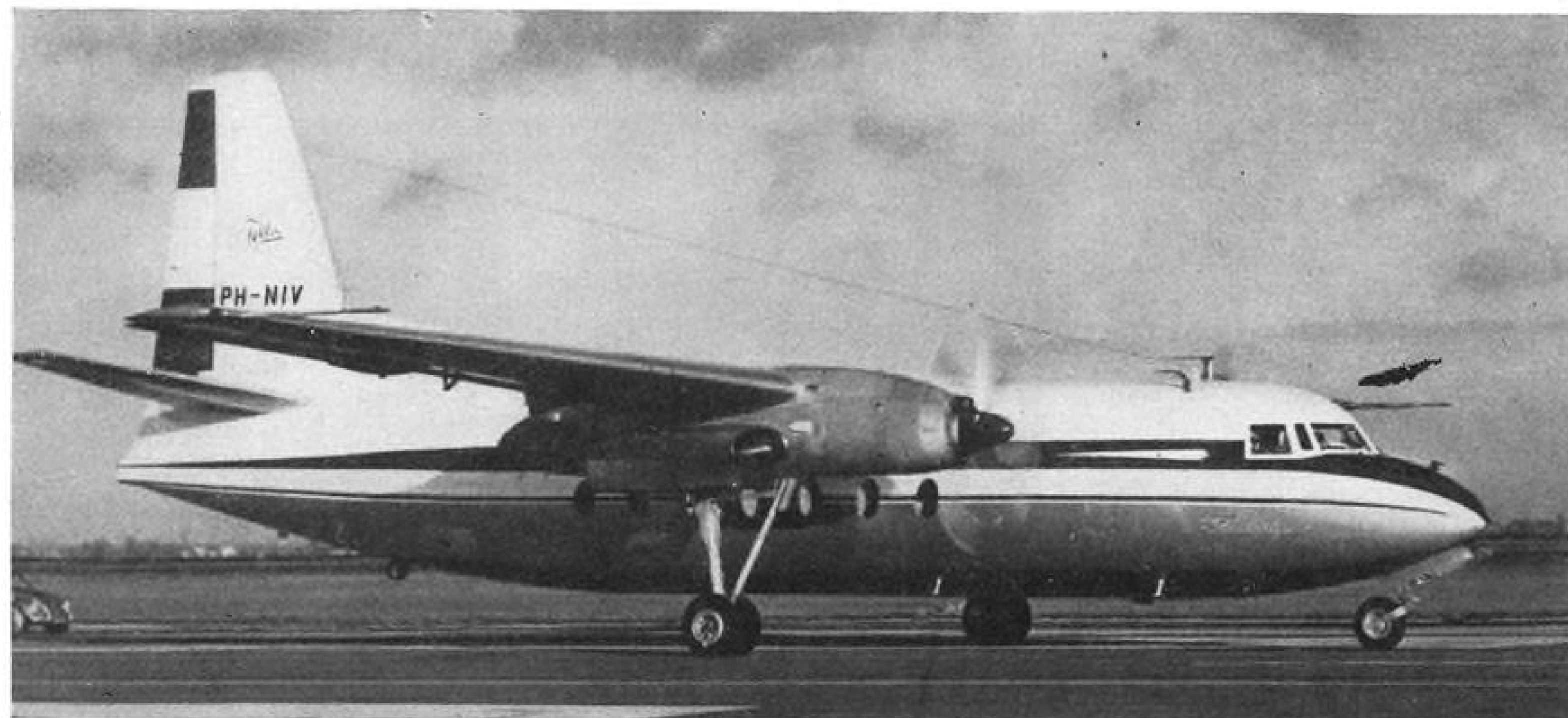
The decision provides for a continuance of the experimental program and reverses a District Court order granted in favor of the Atchison, Topeka and Santa Fe Railroad and 12 other rail carriers who had fought the proposition.

The unanimous decision of the three-man Appeals Court concluded that "the experimental program for carrying ordinary first-class mail by air is within the statutory authority of the Postmaster General and is authorized by law."

An immediate expansion of the surface-mail-by-air program is now anticipated by the scheduled airline industry. The experimental program, which was inaugurated on Oct. 6, 1953 with service between Chicago, New York and Washington, today covers more than 200 airline cities, has speeded deliveries from 12 to 24 hours and resulted in substantial savings to the Post Office Department. The airlines have grossed more than \$25 million for the carriage of surface mail at rates averaging less than 50% of the airmail compensatory rates.

Damon Predicts Gains

Ralph S. Damon, president of Trans World Airlines, predicts the heaviest airline traffic in history in 1956. He said TWA expects to fly four and a half million passengers in 1956 which will be an increase of 12½% over the estimated 4 million passengers the airline carried this year.



Fairchild to Build Fokker Friendship

Fairchild Engine and Airplane Corp. announced last week it will begin construction of Fokker F-27 Friendship turboprop transports for sale in the U. S. and South America under agreement with the Royal Netherlands Aircraft Factories Fokker. Fairchild plans to begin delivery of the 40-passenger, local-service transports in 1957. West Coast Airlines has an option for six Fokker F-27s.

Safety Record

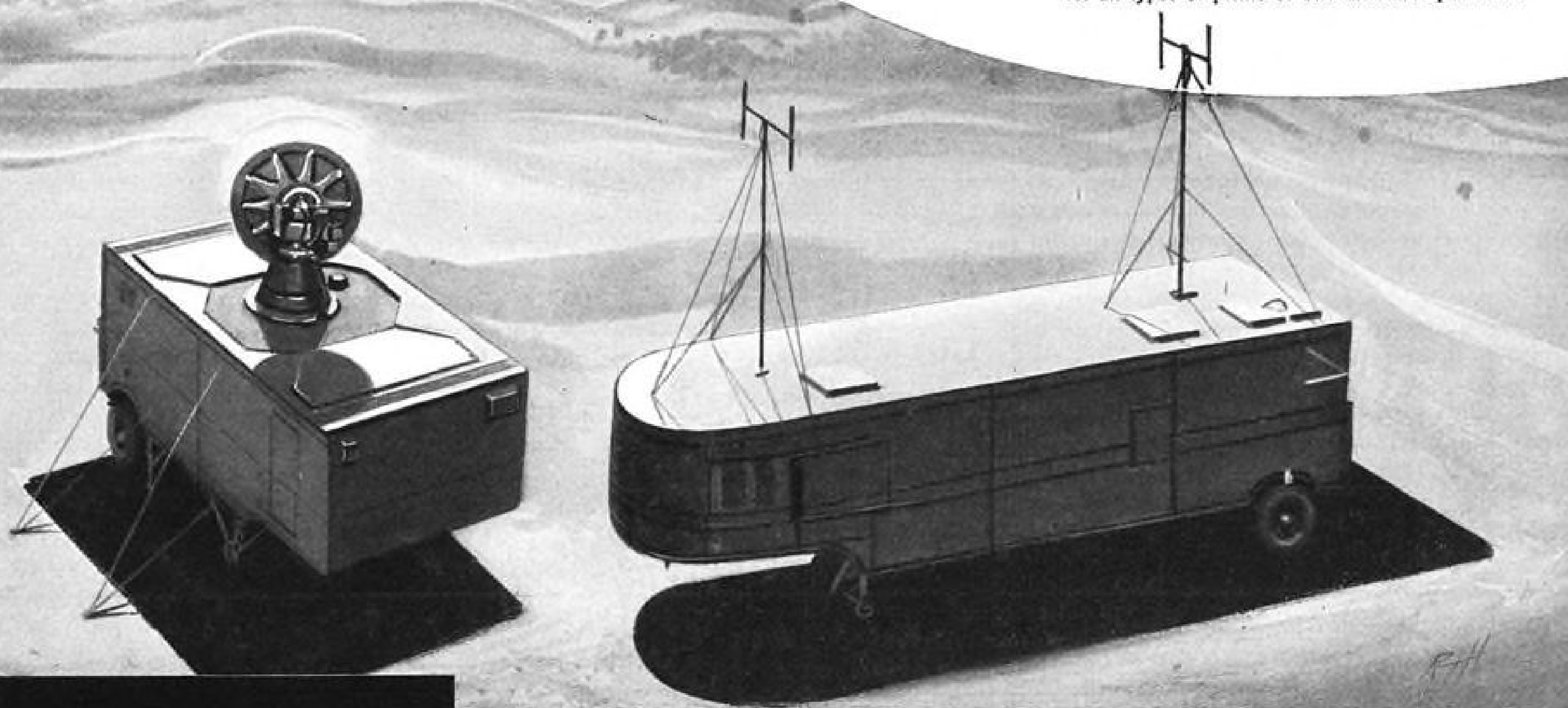
U. S. domestic and international scheduled airlines' passenger fatality rate was .61 per 100 million passenger-miles during the 12 month period ended Nov. 1955, according to the Air Transport Assn. This compares with the fatality rate of .08 in 1954, the lowest in industry history.

ATA reports the air carriers flew more than 41 million passengers over 24 billion passenger-miles from Dec. 1954 through Nov. 1955. During this period there were seven accidents resulting in a total of 164 fatalities, 146 passengers and 19 crew-members. The crash of a domestic coach flight on Nov. 1, killing 39 passengers and 5 crew, was not included in the safety computation because it was sabotage.

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ICAO Will Spend \$1.14 Million In 1956 Technical Aid Program

Technical civil aviation assistance will be furnished to 27 countries and two regional areas, Latin America and the Middle East, by the International Civil Aviation Organization during 1956 at a cost of \$1,146,750.

The program includes training of air controllers, meteorologists, mechanics and other technical personnel necessary for the operation of a civil aviation organization. ICAO noted that aviation offers very speedy transport in return for a much lower capital outlay than is necessary for the construction of roads and other surface means of transportation.

In less developed countries, nationals are trained in their own countries where the number requiring instruction is large. Fellowships have been granted to permit study in advanced nations.

The 1956 regional programs includes: **• Middle East.** Safety will be emphasized in this project where the training will be carried out at several small ICAO centers. Technical personnel include experts in personnel licensing and training, aircraft maintenance and certification, and a check-pilot examiner. This will help Middle East states, which have similar aviation problems, to improve their training methods, and standards for licensing personnel. Fire fighting and rescue training instructions also will be given.

• Latin America. An aviation training center established by ICAO and Mexico in 1953 is being converted into a regional center for all of Latin America. ICAO estimates that the new center will supply about one-half the requirements in this region for newly-trained personnel during the next two years. The center has already graduated more than 200 mechanics, air traffic controllers, aeronautical inspectors and radio operators.

Typical of the programs in individual countries are these projects:

• Afghanistan. Continuing advice will be given in radio operations and repair, meteorology and airport management. Afghanistan has purchased considerable equipment and aid will be given in its installation and operation. Airport construction assistance is also scheduled. The ICAO program civil aviation aid program started in 1952.

• Ethiopia. ICAO will continue to operate a school for aircraft and engine mechanics, radio operators and maintenance personnel, air traffic controllers and meteorologists. The school has already graduated 200 technicians, but the rapid development of aviation in Ethiopia requires more personnel.

• Lebanon. Emphasis in 1956 will be on improvement of air traffic services, communications and meteorology. Six fellowships are provided for Lebanese nationals.

• Syria. The program will be broadened to aid in the examination of pilots, provide advice on aircraft inspection and the organization and administration of Syrian airways.

Other programs will be conducted in Egypt, Guatemala, Indonesia, Iran, Iraq, Burma, Chile, China, Dominican Republic, Ecuador, El Salvador, Finland, Greece, India, Israel, Japan, Pakistan, Paraguay, Philippines, Saudi Arabia, Thailand, Venezuela and Yugoslavia.

Los Angeles Traffic Outstrips Expansion

Los Angeles—The increase in air traffic at International Airport here is moving at a faster pace than the facility's expansion program. The Airport Commission's annual report shows that more than three million passengers used International's facilities during Fiscal 1954-55, a gain of 17.7% over the previous year, and 144% over 1947 when airline operations began at the airport.

Estimates based on population growth and increased air travel indicate the already-inadequate International Airport will service 5-million passengers by 1960.

Meanwhile, the large passenger operation has jammed passenger terminals built nine years ago and intended as temporary service facilities for a five-year period, according to Ralph P. Cousins, president of the Board of Airport Commissioners. Bond issues to finance an expansion program repeatedly have failed to obtain approval of voters.

Plans call for a self-liquidating bond issue at the June, 1956, primary election and, if approved, will allow construction of a passenger terminal area five times the size of the present area, additional runways, an airfreight and airmail center and maintenance quarters.

Every Phase Gains

During the last year every phase of International's activity showed record gains.

Revenue from Los Angeles International Airport and the San Fernando Valley Airport (the two airports operated by the Los Angeles City De-

partment of Airports), totaled \$2,231,055 and registered a 20% gain over last year.

Major source of this revenue was International Airport, with \$1,951,349 in revenue.

Direct operating expenses of the Department of Airports were \$695,891 and depreciation amounted to \$449,958. This left a net profit of \$1,085,206, an increase of \$336,506 over 1953-54.

In addition to the 17.7% rise in passenger traffic, increases over the previous years were: air freight, 15.1%; air express, 20.2%; air mail, 9.6%.

The report pointed out the expanded revenues at the Los Angeles airport more than offset the reduced income at the San Fernando Valley Airport, which dropped from \$349,934 last year to \$279,106 this year due to the transfer of Lockheed flight operations to Palmdale. The valley airport is being developed as a civilian and business-aircraft center. Total investment during the fiscal year was \$237,236 more than revenue received.

350 Flights Daily

Interesting highlights of operations at International pointed out in the report include:

• Eleven airlines serve the airport, operating more than 350 daily flights to major cities throughout the world. The airlines employ 6,000 persons at an annual payroll of \$37 million-plus. They have invested well over \$12 million in improvements of their properties on grounds leased from the airport. Airline rentals, landing fees, etc., constitute one fourth of the airport's revenue.

• More than 110-million pounds of air freight, express and mail were handled during 1954-55. By 1960, estimates indicate that the airport will handle 180-million pounds of air mail and cargo.

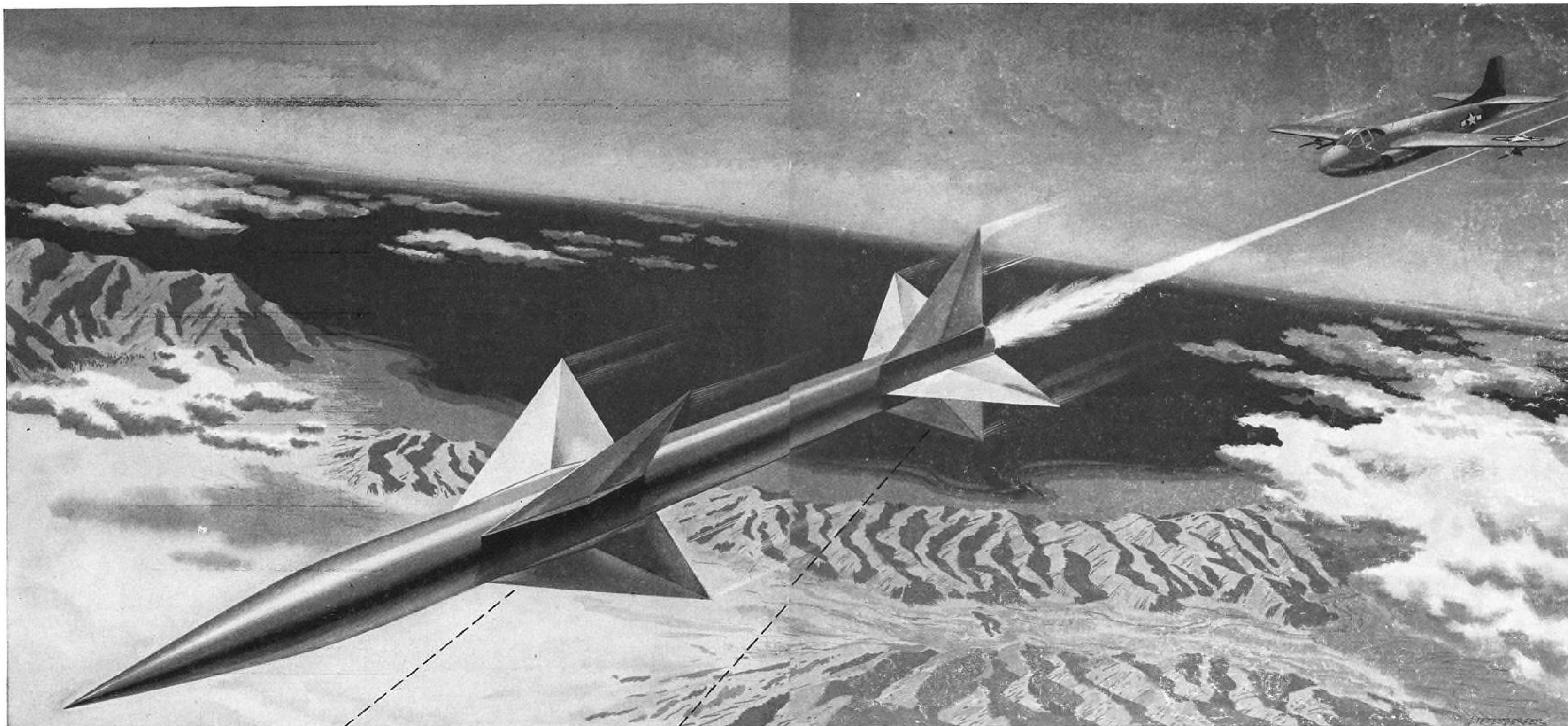
• Airport owns approximately 3,000 acres, 1,935 of which are presently in use. The remaining 1,000 acres are ready for immediate development to complete the airport by 1960.

• Los Angeles International has one of the best safety records in the country—no passenger fatalities in nine years of airline operation.

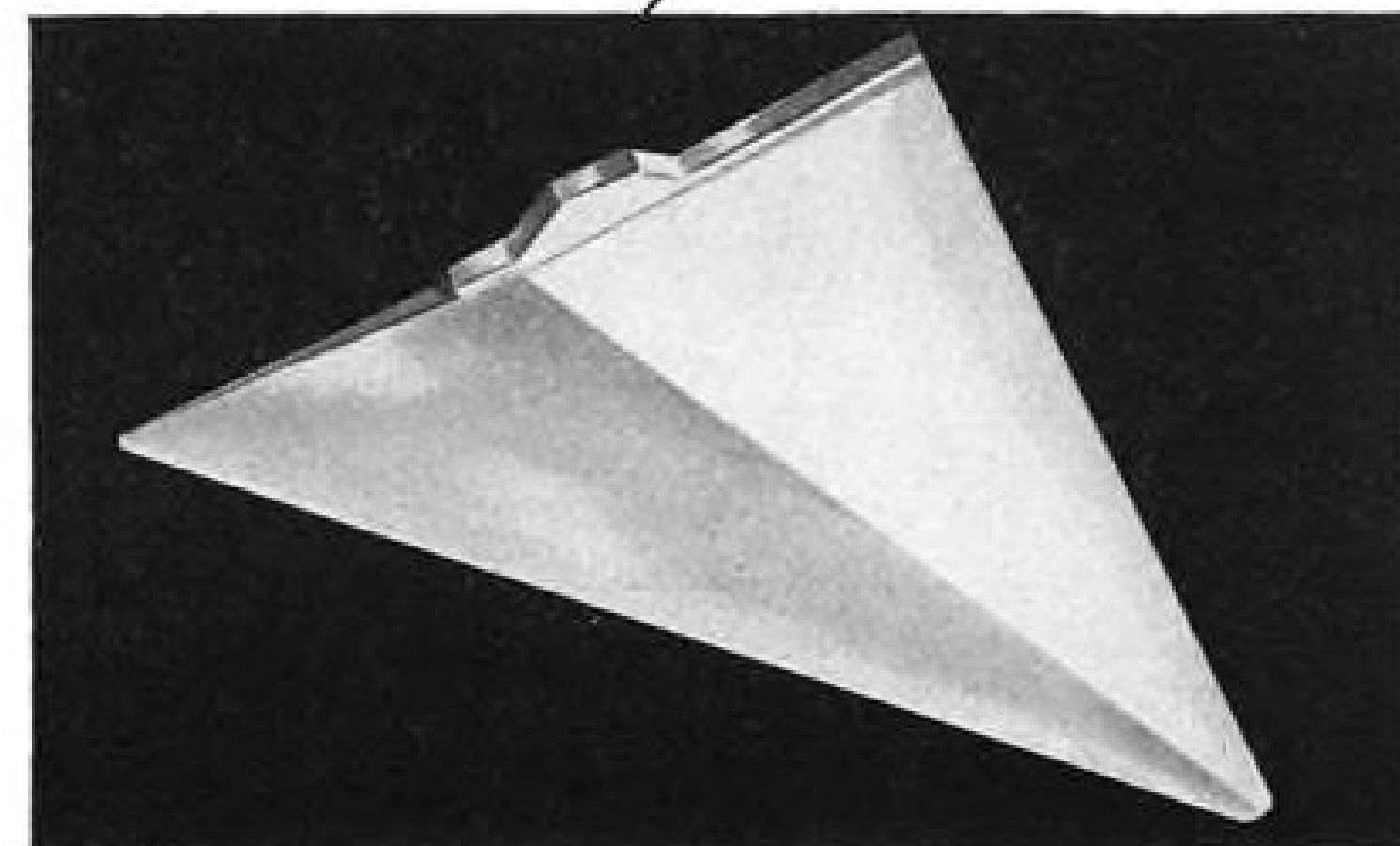
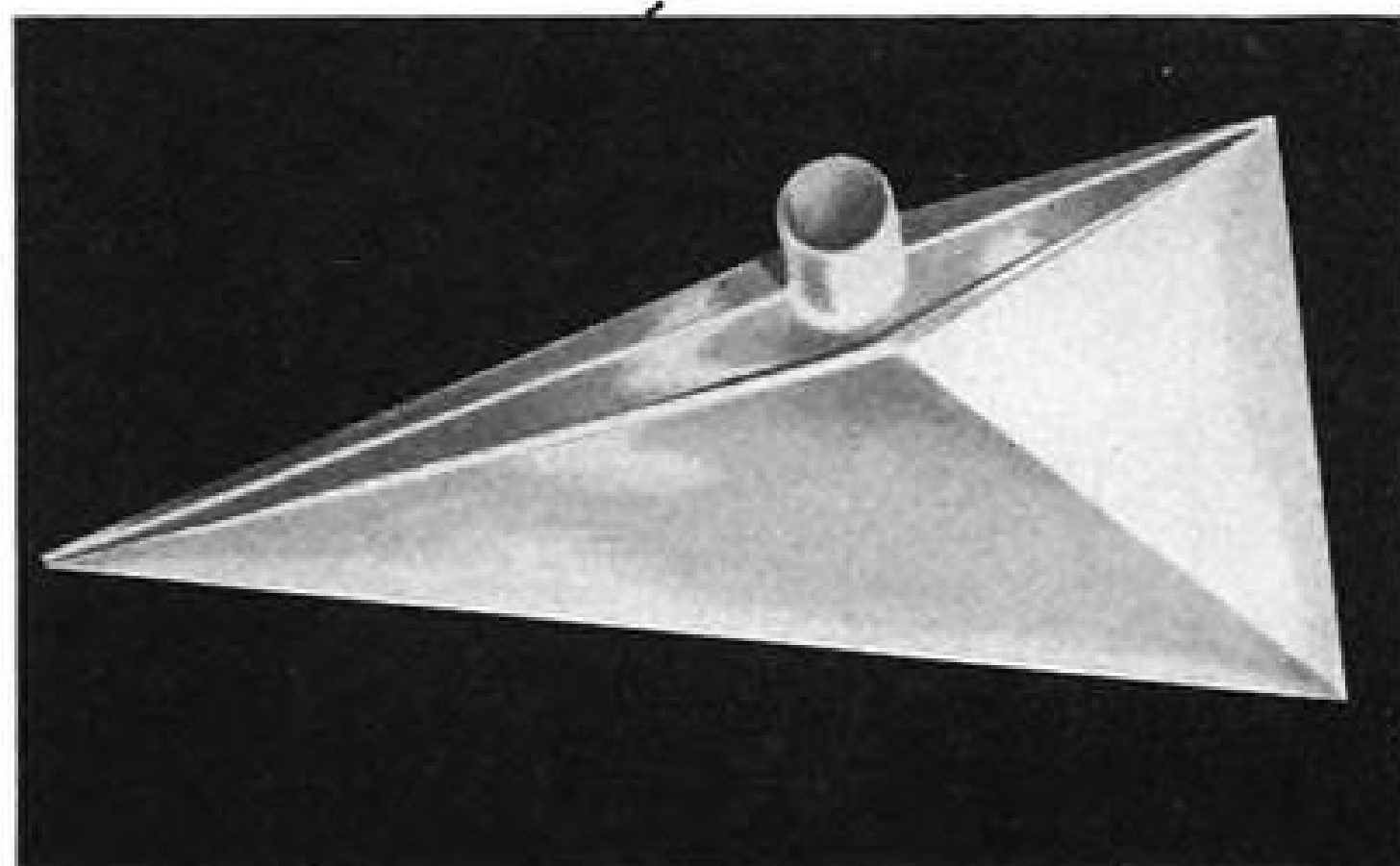
• Auto parking brought over \$400,000 in revenue in Fiscal 1954-55.

Japan Buys DC-8s

Japan Air Lines has ordered four Douglas DC-8 jet transports which will be put in service on the carrier's transpacific route in early 1961. The first DC-8 is to be delivered in September 1960 to JAL and the fourth by March 1961. It is the second foreign DC-8 order. KLM has ordered eight.



How much machining did these Kaiser Aluminum forgings require?



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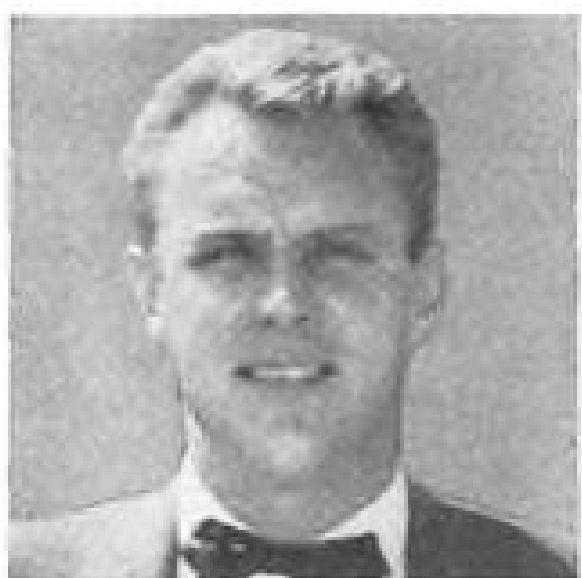
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Don Vest, Vest Aircraft & Finance Co., P. O. Box 5306, Sky Ranch Airport, Denver, Colorado.



Gene Hudman, Stonnell and Halladay Aircraft Sales, Carolina Division, Municipal Airport, Charlotte, North Carolina.



Peter Graves, Southern Ohio Aviation Sales Co., Dayton Municipal Airport, Vandalia, Ohio.



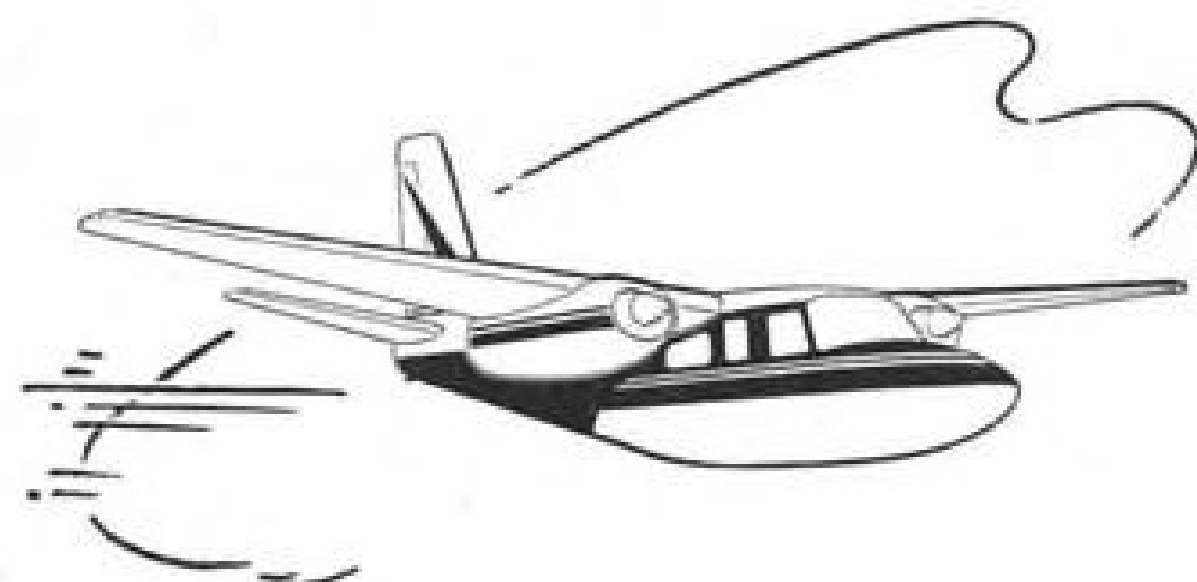
John Wilsdon, Executive Flying Corporation, P.O. Box 122, Lambert Field, St. Louis, Missouri.



Charles H. E. Westerman, British Colonial Airlines, Calle Lopez No. 1 — Despacho 502 Mexico, (1) D.F., Mexico.



H. Warren Halladay, Stonnell and Halladay, 843 Washington Building, Arlington Towers, Arlington, Virginia.



B. G. Vandre, Van's Air Service, Municipal Airport, St. Cloud, Minnesota.



Robert F. Wood, Newport Air Park, Newport, Rhode Island.



A. M. "Sime" Bertolet, Reading Aviation Service, Inc., Municipal Airport, Reading, Pennsylvania.



Art Meurer, Arthur Meurer Co., Inc., LaGuardia Field, New York, N. Y.



J. B. Redwine, Fairfax Aviation, Inc., 3301 Fairfax Trafficway, Fairfax Airport, Kansas City, Kansas.



Max R. Brand, Aero Commander Dist. (Downtown Airport), Hangar 3, Municipal Airport, Tulsa, Oklahoma.



O. B. Collan, National Aero Sales Corp., Midway Airport, Chicago, Ill.



Dale Ropp, Jr., Aero Southern Corp., 601 Broadway, Nashville, Tennessee.



W. H. "Bill" Buchanan, Sales Manager, Johnsons Air Interests, Inc., Horlick-Racine Airport, Racine, Wisconsin.



Louis Humphreys, Executive Aircraft Corporation, Municipal Airport, Pontiac, Michigan.



H. Leiber Wheeler, Buffalo Aeronautical Corporation, Buffalo Municipal Airport, Buffalo, New York.



John A. "Jack" Baumann, Santa Monica Aviation, Santa Monica Airport, Santa Monica, California.



Herrol Bellamy, L. B. Smith Aircraft Corp., Miami International Airport, Miami, Florida.



Lucien M. Taillac, Trans-Aire Corporation, Pan-Air Building, New Orleans Airport, New Orleans, Louisiana.



Joseph H. Frost, Jr., Commander Sales Company, Terminal Building, International Airport, San Antonio, Texas.



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Built-In Steps for Viscount

Built-in passenger steps will be installed on a number of Vickers Viscounts on order by Capital Airlines and offered as standard equipment on aircraft scheduled for the American market. Weight penalty of the hydraulically-operated steps is 260 lb.

Cylinder Failure Blamed in Crash

Failure of an unairworthy R2800 engine cylinder was the probable cause of the crash of an American Airlines Convair 240 near Fort Leonard Wood, Mo., on Aug. 4, 1955 which killed 40 persons, according to the Civil Aeronautics Board.

In its investigation of the American accident, CAB found:

- No. 12 cylinder of the right engine was not airworthy and failed near its base after less than six hours of operation, causing a fire that the crew could not control.

- Procedures that were recommended by Pratt & Whitney, manufacturer of the R2800, and specified in American's overhaul manual had been countermanded by verbal instructions approved by the carrier's engineering department and were not being followed by the carrier's inspectors in handling of cylinders.

CAB said that a laboratory study of the No. 12 cylinder by the National Bureau of Standards revealed that several fatigue cracks had joined to form a single large crack. Reviewing the history of the failed cylinder, the Board said it had been installed in October 1954 and operated for approximately 1,052 hours when eight of its hold-down studs failed. The cylinder was removed from the engine

in disassembly at the carrier's Tulsa overhaul base and ticketed for stud failure, according to the Board. However, it was noted, three days later the same cylinder was put back in service in the aircraft that was involved in the accident.

CAB said that company personnel testified that the practice had been to check flanges visually, although American's overhaul manual specified and the engine manufacturer recommended that the flanges of all cylinders going through overhaul be inspected for flatness by use of a surface plate and feeler gage. It was shortly after the accident, according to the Board, that American initiated a series of changes in overhaul procedures and in personnel assignments, all pointed toward more stringent supervisory control of work done.

CAB Orders

(Dec. 1-7)

GRANTED:

Aerovias Sud Americana, certificated overseas all-cargo carrier, exemption of 30-day airport notice for service on its Route No. 113 at Managua, Nicaragua; San Jose, Costa Rica; Guayaquil, Ecuador; and Quito, Ecuador.

Cordova Airlines an exemption to engage in scheduled air services between Cordova and Middleton Island, Alaska.

ORDERED:

Piedmont Aviation, Inc., issued a perma-

nent certificate of public convenience and necessity for Route No. 87.

Piedmont Aviation's temporary authority to serve or suspend service at various points extended.

Ozark Air Lines issued a permanent certificate of public convenience and necessity for Route No. 107.

Ozark Air Lines' temporary authority to serve or suspend service at various points extended.

National Airlines' final mail rates set for domestic operations set at the rates proposed by the Board's show cause order for the period July 14, 1947 through Jan. 14, 1948 and for its entire service system during the period Jan. 15, 1948 through Dec. 31, 1951.

Investigation and suspension of reduced fares filed by Peninsular Air Transport, Inc., applicable between Miami, Fla., and New York, Newark and Philadelphia.

APPROVED:

Central Airlines' application for authority to omit service at Woodward, Okla., on all flights operated over Segment 1 of Route No. 81 on Sundays and on all flights in excess of one round trip per day from Monday through Saturday.

Interlocking relationships between United Air Lines and Vernon Stouffer. Stouffer may serve as a director of United while serving as a director of Pioneer Steamship Co.

Interlocking relationships between United Air Lines and Thomas F. Glead. Glead may serve as a director of United Air Lines while serving as a director of American Mail Line, Inc.

DISMISSED:

Investigation of increased first class fares filed by Agent J. B. Walker on behalf of Northeast Airlines as the fares were cancelled.

Shortlines

► Hunting-Clan Air Transport has moved its London operations to the Airwork Air Terminal in Brompton Road, becoming the sixth British independent airline to use the Airwork facilities as their London terminal.

► International Air Transport Assn. reports interline revenue transactions for the first nine months of 1955 totalled \$269 million or a gain of 28% over the same period in 1954.

► KLM Royal Dutch Airlines has signed an interline agreement with Aeroflot, the Russian airline, for through booking between London and Moscow. The two carriers will interchange passengers at Prague.

► Seaboard & Western Air Lines has been approved for landing rights at Gander, Newfoundland, on its New York-Germany route by the Canadian Air Transport Board.



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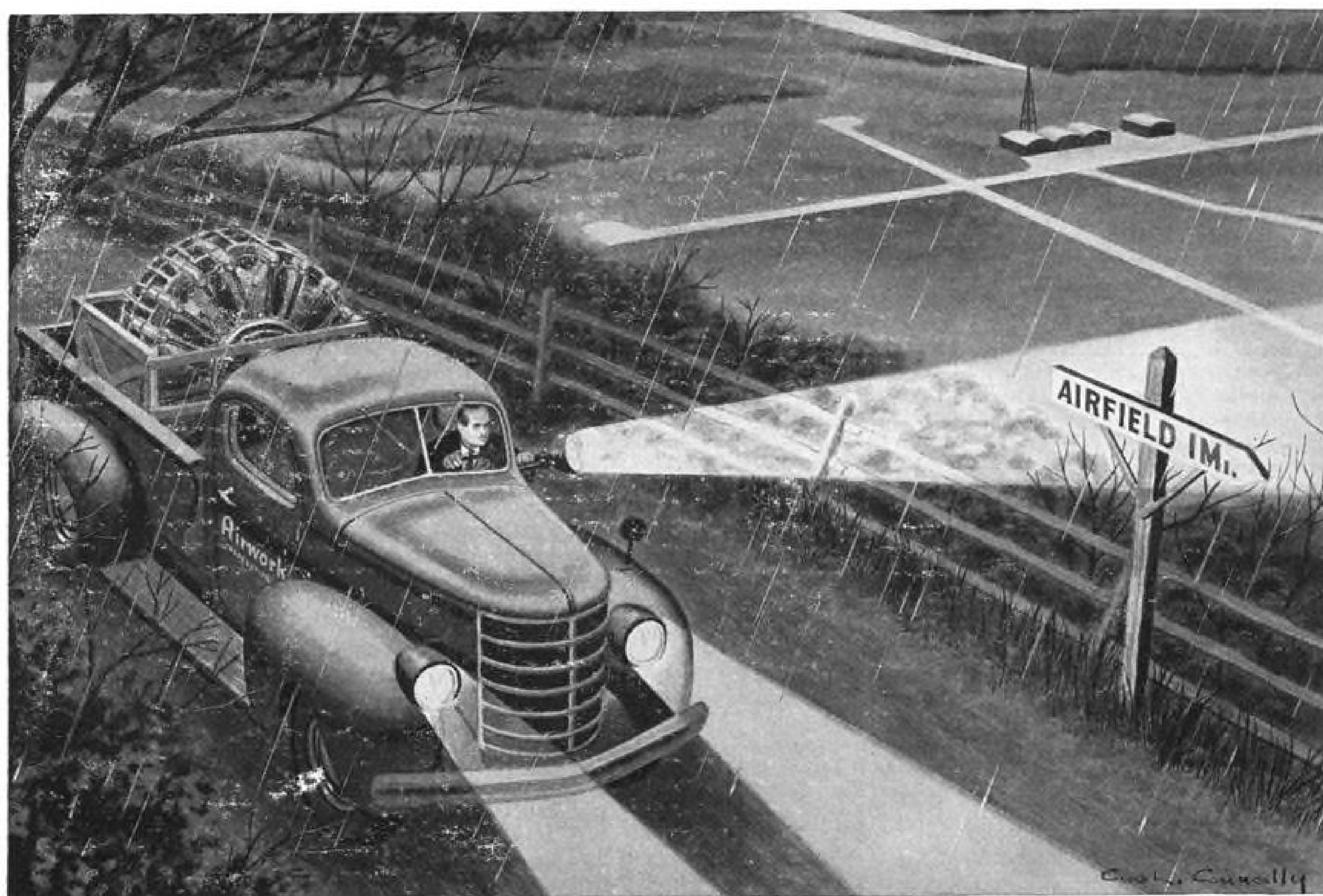
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Airline Traffic—October 1955

	Revenue Passengers	Revenue Passenger Miles (000)	Revenue Passenger Load Factor	U. S. Mail Ton-Miles	Express Ton-Miles	Freight Ton-Miles	Total Revenue Ton-Miles	Per Cent Revenue Available Ton-Miles
DOMESTIC								
American Airlines.....	678,632	393,999	68.39	1,621,282	1,163,687	6,423,758	46,941,382	61.71
Braniff Airways.....	150,760	56,600	63.54	.....	150,466	292,412	.....	.....
Capital.....	228,385	72,549	60.37	254,818	293,470	381,762	7,862,227	45.59
Colonial Airlines.....	36,690	9,133	50.13	13,755	10,115	35,291	907,723	49.45
Continental Air Lines.....	58,764	21,399	54.54	63,648	27,965	110,839	2,252,021	46.43
Delta Air Lines.....	184,733	78,947	61.89	265,255	293,355	592,357	8,721,595	58.09
Eastern Air Lines.....	554,998	256,816	55.99	832,448	550,439	1,315,501	28,703,456	44.69
National Airlines.....	84,611	53,055	55.92	242,697	61,750	358,564	6,055,735	55.71
Northeast.....	47,726	9,531	63.32	14,621	21,285	31,834	928,810	61.70
Northwest.....	114,017	75,396	59.98	383,980	259,703	612,805	8,649,653	53.89
Trans World.....	352,176	266,397	66.70	1,021,364	924,276	2,233,924	29,679,513	61.64
United Air Lines.....	503,408	341,915	69.71	1,927,460	1,419,327	3,722,909	39,903,731	61.09
Western Air Lines.....	100,418	46,321	58.58	225,412	80,469	180,929	4,914,218	54.30
INTERNATIONAL								
American.....	10,589	7,370	65.01	11,486	341	235,324	1,013,201	65.13
Braniff.....	2,613	5,502	33.69	32,948	.....	66,279	729,695	35.59
Caribbean Atlantic Airlines.....	8,601	703	50.07	951	.....	2,515	67,509	47.51
Colonial.....	1,964	1,522	49.11	105	.....	4,583	168,220	52.03
Delta Air Lines.....	3,582	4,046	39.96	7,741	.....	60,498	484,219	34.28
Eastern.....	14,244	19,945	53.26	67,880	.....	86,098	2,267,494	48.19
National.....	8,362	4,480	48.81	8,279	4,450	44,665	517,063	45.69
Northwest.....	7,554	15,142	47.93	793,670	17,686	643,138	3,067,758	59.32
Pan American World Airways	.....	.....	.....	.....	.....	.....	.....	.....
Alaska.....	6,801	7,790	62.47	32,887	.....	290,883	1,136,710	52.67
Atlantic.....	77,977	89,404	56.49	902,966	.....	2,016,210	12,334,413	59.15
Pacific.....	20,559	60,504	68.58	1,095,769	.....	1,361,820	8,894,074	67.49
Latin America.....	78,328	76,748	59.78	306,172	.....	3,348,663	11,264,289	59.30
Pan American-Grace Airways.....	11,281	12,918	53.75	45,010	.....	206,122	1,675,554	51.62
Trans World Airlines.....	22,074	53,411	58.66	667,593	.....	858,016	7,176,822	68.34
United Air Lines.....	7,415	18,491	77.26	87,624	.....	54,769	2,064,093	66.66
LOCAL SERVICE								
Allegheny.....	33,944	5,503	46.47	6,590	22,429	.....	553,724	47.36
Bonanza.....	10,607	2,340	47.59	3,212	2,433	4,654	231,512	42.19
Central.....	8,511	1,571	32.25	3,675	2,093	6,323	162,236	28.94
Frontier.....	16,697	3,965	43.76	14,836	8,793	56,983	459,779	53.29
Lake Central.....	11,867	1,762	36.26	2,051	16,172	.....	177,626	34.65
Mohawk Airlines.....	30,629	5,520	52.68	4,388	8,035	8,832	546,675	52.18
North Central Airlines.....	42,362	6,406	50.72	16,663	34,307	.....	662,501	45.96
Ozark Air Lines.....	25,553	3,911	37.53	7,694	18,074	.....	391,330	38.08
Piedmont.....	34,226	6,390	54.88	13,717	13,192	15,196	653,018	55.04
Southern Airways.....	15,080	2,599	43.72	7,440	16,506	.....	272,340	42.28
Southwest Airways.....	24,596	5,011	58.03	.....	4,496	8,252	.....	.....
Trans Texas Airways.....	15,444	3,529	42.99	12,350	6,558	14,136	369,366	39.36
West Coast Airlines.....	17,726	3,184	43.16	4,177	2,545	5,375	299,545	49.93
HAWAIIAN CARRIERS								
Hawaiian.....	32,027	4,465	59.33	3,580	.....	126,470	536,498	52.37
Trans Pacific Airlines.....	14,625	1,936	47.67	936	.....	9,243	165,711	48.88
CARGO LINES								
Aerovias Sud Americana.....	.....	.....	.....	.....	.....	642,758	642,758	60.39
Flying Tiger Line.....	6,785	20,626	70.65	.....	.....	6,245,398	8,308,011	76.86
Slick.....	1,107	2,271	74.39	38,085	.....	6,305,141	6,570,376	75.34
Riddle Airlines.....	.....	.....	.....	.....	.....	1,373,302	1,373,302	94.09
HELICOPTER								
New York Airways.....	2,338	47	61.04	811	1,414	465	7,070	56.46
Los Angeles Airways.....	532	22	30.56	3,530	1,127	.....	6,330	38.47
Helicopter Air Service (Chicago).....	.....	.....	.....	2,315	.....	.....	2,315	40.76

* Not available.



THE PRESIDENT DROVE THE TRUCK

The phone call came through long after the plant closed, and all but the executive staff had gone home. That was over six hours ago. Now, it was midnight on a dark and lonely mountain road.

One more curve in the endless series of uphill turns. Then the headlights picked up the small airstrip . . . the crippled plane . . . the anxious looking men awaiting in front of the hangar.

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COCKPIT VIEWPOINT

By Capt. R. C. Robson



Rainy Night Over New York

(Part II)

(This is the second in a series of columns on air traffic control. In the first column [AW Dec. 12, p. 142], the scene was set on a Boston-New York flight with weather and heavy Sunday night traffic into LaGuardia.)

To get a feeling for the amount of traffic involved in approaches to this single airport it should be noted that many New York holding patterns were occupied up to 12,000 ft. This indicates 20 to 30 aircraft awaiting their turn and requiring voice communications to control their progress.

Here we digress for a moment to consider the average residential telephone. It is generally a private line. In the suburbs a two-party line is occasionally found, and in rural areas a dozen phones may be on one circuit. But even this is relative luxury compared with the 20 or 30 party-line systems with which air traffic now operates.

Despite separate frequencies for various sectors and control functions around metropolitan airports, the overload on most channels is immense. It is no longer a question of cutting down the wordage—we are now concerned with the number of syllables per message.

Airspace Waste

Each aircraft must report leaving altitudes, or fixes, upon receipt of a clearance. If 10 aircraft are to be laddered down in a holding stack the controller will, theoretically, issue 10 clearances (one at a time, of course) and receive 10 replies. The cycle should consume about 100 seconds. But this is theoretical. Actually, the process takes three or four minutes at best. Thus, by the time Number 10 transmission is completed, the next clearance for Number One is overdue by several minutes; he has not been able to descend to the next lower altitude. This wastes airspace.

There were several reasons for transmission delays on the night of Oct. 30. Identical trip numbers on different airline flights resulted in confusion and "wrong numbers," an eternal problem. New arrivals in the stack habitually interrupted clearances to announce their arrival. This was the result of not monitoring the frequency before beginning to talk, but the fast pace of such an operation does not lend itself to leisurely conversation. As a practical matter any pilot who waits long enough to make sure the air is clear before pressing his "mike" button will simply never get a word in edgewise. Another source of interference came from centers and controllers in adjacent cities using the same frequency.

Additional Voice Frequencies Not Enough

There also were delays because the controller could not contact an aircraft. Many flights were getting close to the end of their holding fuel and found it necessary to call their company stations for information regarding weather and traffic at their alternate, as well as other airline matters.

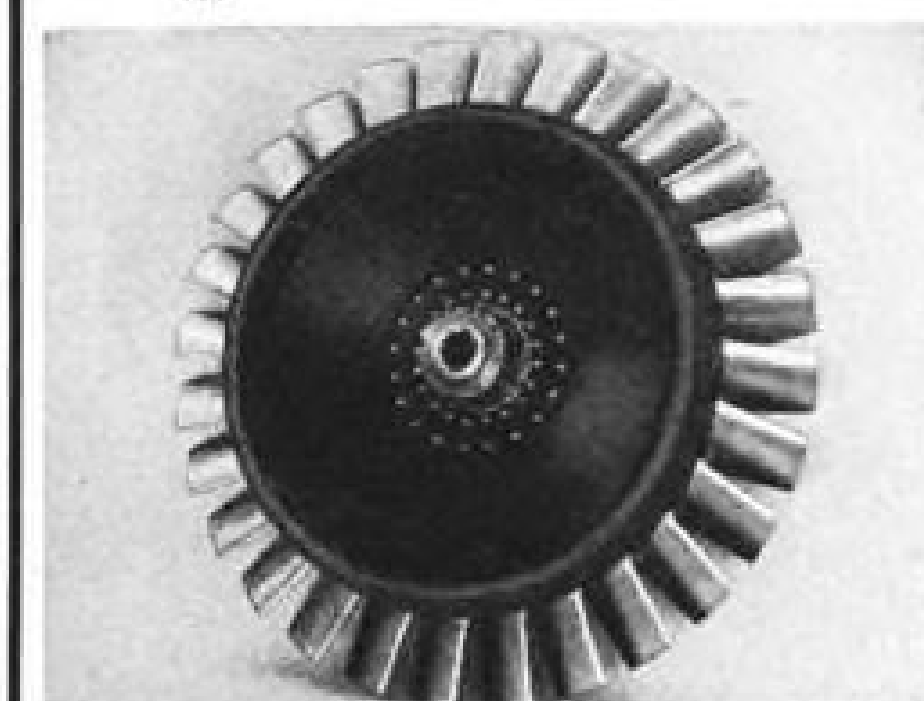
Practically no airline aircraft carry dual VHF transceivers. Therefore some flights were "off the air" at clearance time and the entire traffic system was delayed until they returned to the center frequency. It is true that HF equipment is carried by airliners but, as a practical matter, it is impractical to use anything but VHF.

It is evident that party-line, voice communications can no longer cope with the air traffic situation. If more traffic is to be flown such things as automatic transmissions and signal systems, telemetering and similar "instantaneous" processes must be used. Many of these methods are used elsewhere; they must now be brought into the aviation picture. Additional voice frequencies and more "live bodies" will no longer suffice.

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America has homework to do!



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But there's one thing you *can't* be proud of. And it's a shame you share with just about every other community in America.

The homes where far too many people live are a disgrace. Slums, semi-slums, housing blight are with you. Fixing them up is the homework to be done.

If your town is like most in the U. S., here's what the figures show: 1 out of every 10 homes are rock-bottom slums. Nearly one-half urgently need basic repairs.

But slums are something that is happening on the other side of town, you may say. The problem isn't mine.

Slums are YOUR homework

Distance is no barrier against the threat and cost of housing blight.

Your taxes go up because it takes more money for your town to fight the diseases and delinquency and poverty spawned in the slums. The security of your family goes down because the slum is the natural parent of crime.

Where your business comes in

Every firm has a responsibility toward the town where it's located. Part of it is to support community improvements as any other good citizen would.

Some slums are beyond repair. They must be torn

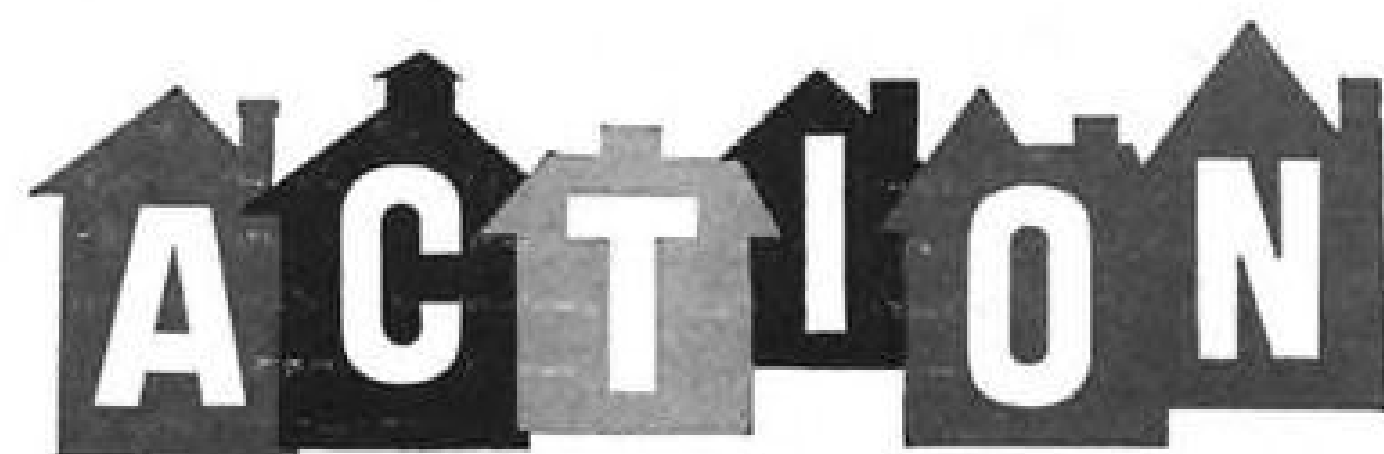
down and a fresh start made. Others can be made to conform to accepted living standards. So it is up to you to get behind every sound program which seeks to provide adequate housing for all our people.

Civic and individual groups must have business backing . . . *your* firm's backing if they are to succeed.

Follow the course of Action!

A group of Americans from every walk of life has joined together in a non-profit organization to combat home and community deterioration, A.C.T.I.O.N., the American Council To Improve Our Neighborhoods.

Send today for a free copy of "ACTION." It explains what A.C.T.I.O.N. is and proposes to do. It lists booklets, research, check-lists, and other material which can help you. Address P. O. Box 500, Radio City Station, New York 20, N. Y.



American Council To Improve Our Neighborhoods

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EDITORIAL

One Step Toward Better Air Traffic Control

The major issue at stake in replacement of Frederick B. Lee as head of the Civil Aeronautics Administration by his deputy administrator, Charles J. Lowen, Jr., is the future of air traffic control.

For more than six months CAA has been the focal point of a rapidly growing crisis in air traffic control. During this period CAA has been the target for a rising volume of bitter criticism on this score by airline pilots, airline management and the military. It is the airlines, corporations, Air Force and Navy that do the vast bulk of Federal airways flying in instrument weather when the air traffic jam gets tightest and most dangerous.

AVIATION WEEK warned last August:

"A much more vigorous approach to the air traffic control problem is necessary now if aviation is to avoid the tragic consequences of more mid-air collisions, economic strangulation of airline revenue and blunted efficiency of Strategic Air Command and Air Defense Command operations."

Gen. Curtis LeMay, commander of Strategic Air Command, angrily threatened to push for military control of the airways system unless it was modernized to meet current and future military needs. Lt. Gen. Joseph Smith, commander of the Military Air Transport Service, publicly attacked the Federal airways and traffic control system as inadequate. Gen. Smith's public blast was delivered before the Washington meeting of the Radio Technical Commission for Aeronautics, whose members are experts on the airways problem. Comments of airline pilots and operations executives working within the present traffic control framework are for the most part unprintable. Air traffic control problems have been the theme of more than one recent meeting of top level airline management, and the Air Transport Assn. has been deeply concerned.

Pressured Into Action

Last summer, CAA under Lee's leadership fought a bitter rearguard action against integrating Air Defense radar into a common traffic control system. Only heavy pressure from other agencies forced CAA into the Deer Island (Boston) experiment that will eventually lead to an all-radar airway between Boston and Norfolk. CAA's most recent five-year airways improvement plan has been rejected by the Air Coordinating Committee's Nav-panel as "too little, too late."

Uneasy over the CAA situation, Under Secretary of Commerce Louis Rothschild brought in Lowen, first as a special consultant last May and then as deputy CAA administrator in August.

Lowen, like Lee, is a pilot and a Republican. He served with the Air Transport Command in World War II, then went with Capital Airlines after the war and later managed the municipal airport at Denver. One of Lowen's first conclusions at CAA was that air traffic control was its most critical problem and a fresh and more vigorous approach to solving this problem was ur-

gently required. He drafted a plan of action including establishment of an air traffic control operation separate from the traditional CAA Office of Federal Airways. Lowen also wanted to recruit fresh traffic control talent to operate the new group. Lee vigorously opposed Lowen's air traffic control proposals.

New Approach

On Oct. 10, just after Gen. Smith's criticism, AVIATION WEEK again warned:

"If CAA does not take necessary action immediately (on air traffic control) Congress will have to designate some other agency to solve the problem."

Under Secretary Rothschild did not wait for the possibility of congressional pressure. Stirred by reaction from airline management and the military, he took what he considered the necessary action at CAA. With the President's approval he fired Lee and replaced him with Lowen. This action was a clear endorsement of a new and more vigorous approach by CAA to the air traffic control problem.

Lowen and top level Commerce Department officials are firmly committed to a program of improved traffic control. It will indeed be surprising if an independent traffic control group is not established soon in CAA, headed by top notch experts in the field. It is likely that Lowen in picking a deputy will get a man who has practical experience in air traffic control problems both as a pilot and in the bureaucratic maze of Washington.

Lowen's Problems

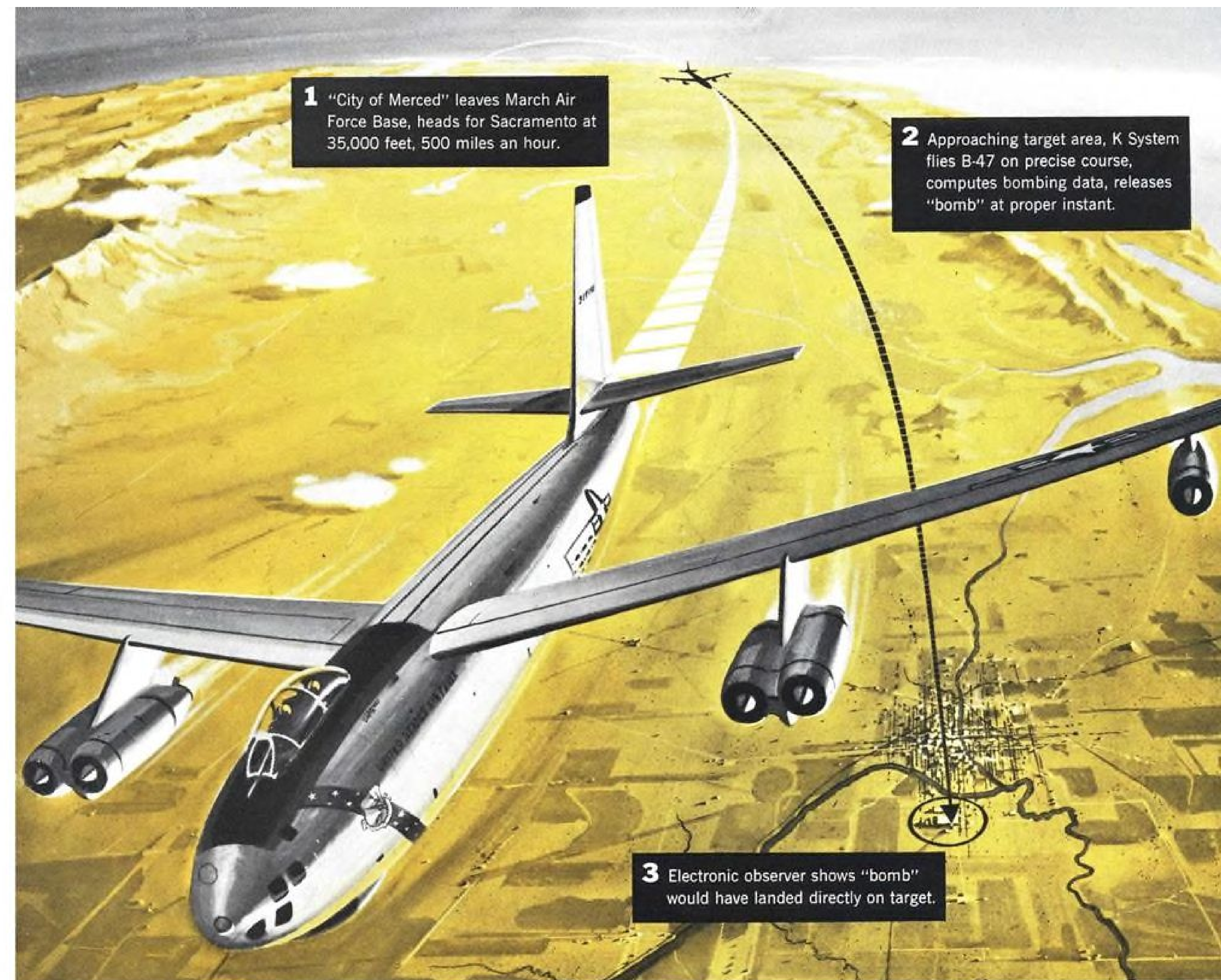
Lowen will find, like other CAA administrators who have preceded him, that his biggest roadblocks in making progress are likely to arise within his own organization where an entrenched bureaucracy has been slumbering oblivious to the vast technical changes that have spurred aviation. There are a great many capable people in CAA. One of Lowen's toughest tasks will be to find them and weld them into a solid, technically competent team that is firmly dedicated to solving, not sloughing off, aviation's critical problems.

Lowen also will find widespread external support for a vigorous and technically sound attack on the problems of air traffic control.

The metal is being cut at Seattle, Santa Monica and Burbank on a great fleet of jet transports. The airlines are placing billions of dollars in orders for these planes in the expectation that they will be able to carry the American public in them safely and swiftly by 1960.

Unless the Civil Aeronautics Administration takes the lead now in building a Federal airways and air traffic control system that can handle these jet transports, American aviation will drift steadily toward the worst crisis in its history.

—Robert Hotz



"CITY OF MERCED" CREW WINS SAC COMPETITION

B-47 Team Pinpoints Sacramento "Target"

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■ Piling up more points than any other team in the contest, the men of the "City

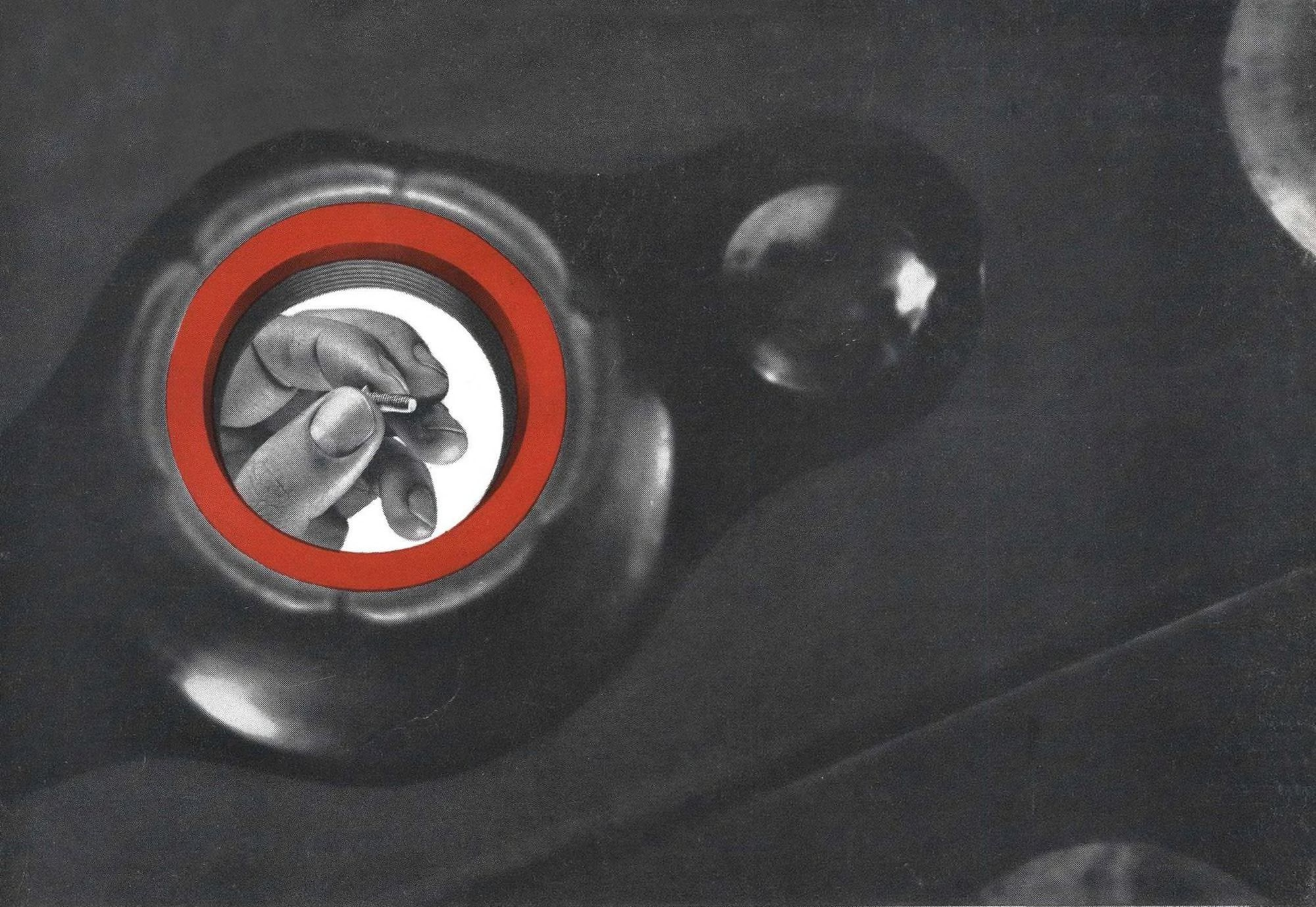
of Merced" earned the title of "the world's deadliest bomber crew." On one of their runs the target was the northeast corner of an industrial plant in Sacramento. Flying nearly seven miles above the earth and at a speed of nearly 500 miles an hour, the "City of Merced" dropped its "bomb" within a stone's throw of the designated target.

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