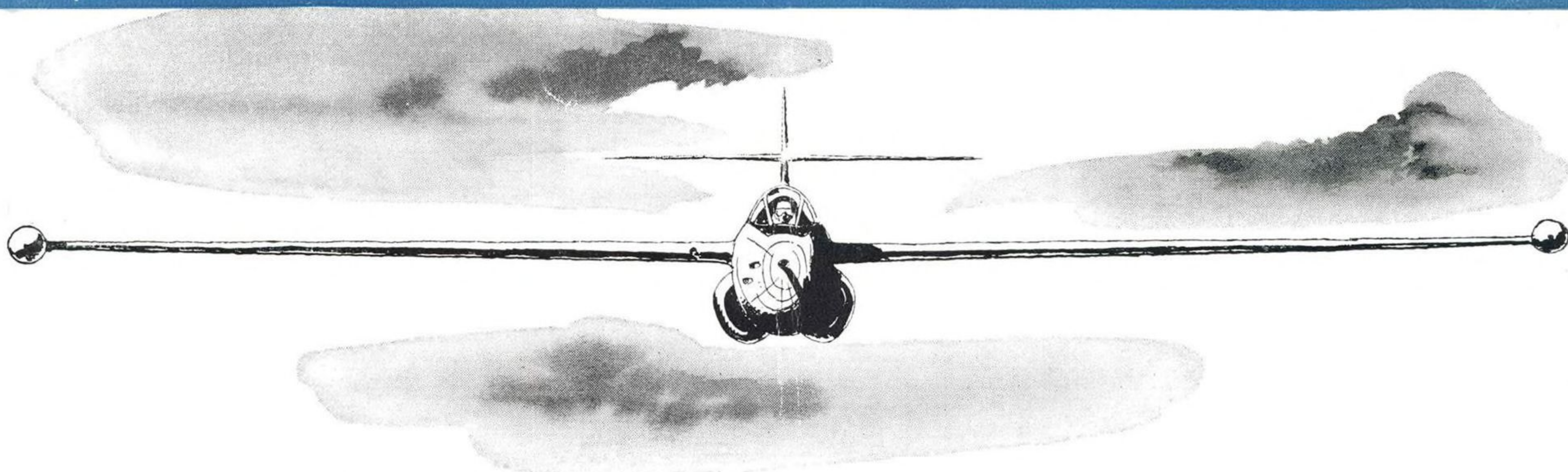


AVIATION WEEK

DEC. 14, 1953

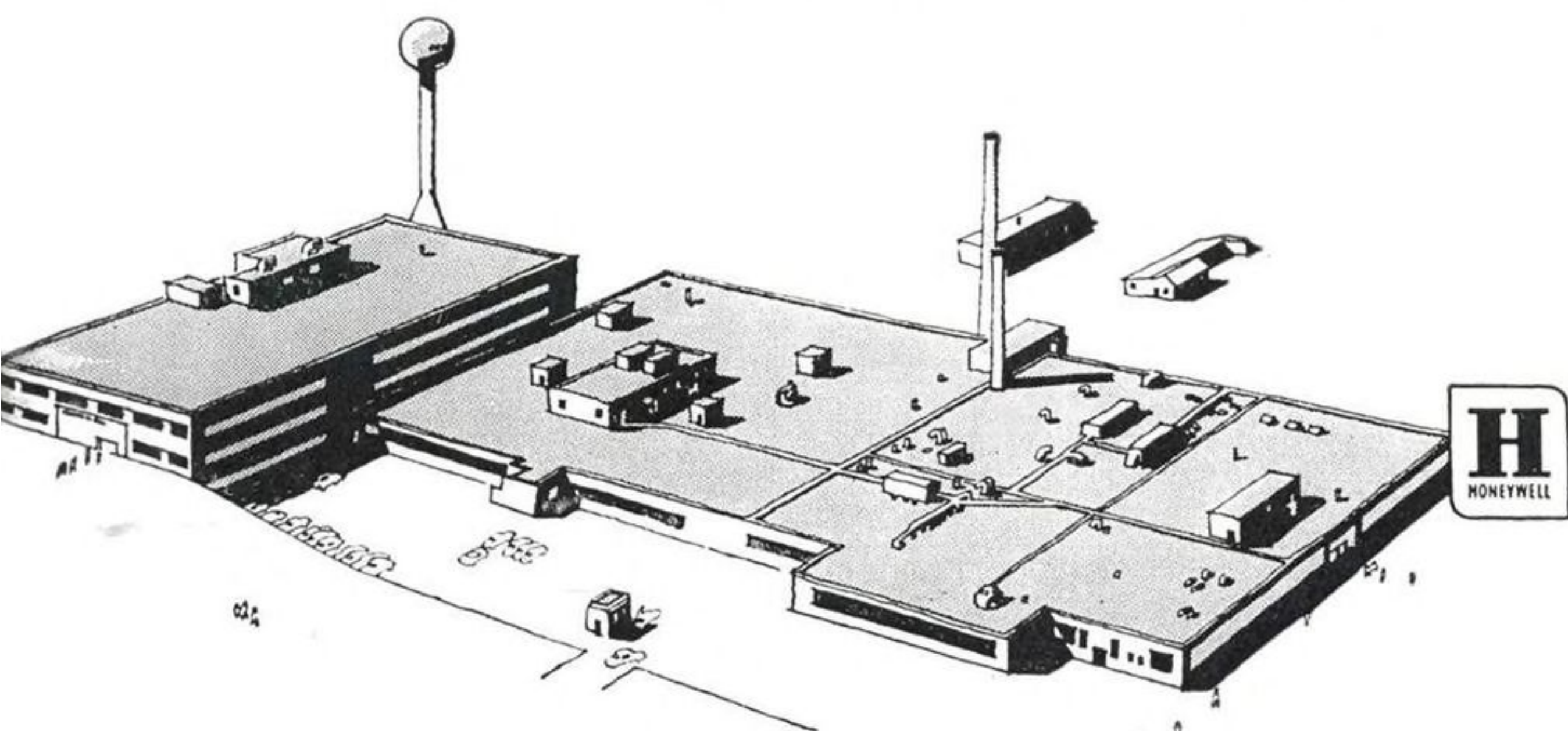
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Bird's-eye view of Honeywell's new 500,000 square foot plant, where 5,000 employees work exclusively on Aeronautical Controls.

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Aeronautical Division

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They said
he was
too young...



Aviators of world renown had studied the project for years. They favored elaborate equipment, and crews of two or more. They were skeptical when, in February 1927, they heard of the plans of a certain single-minded young man from Missouri.

He made it in May—alone. The man they said was “too young”... the man who had never navigated over the sea... loaded two tons of fuel into an untried plane and took off from a soggy field near New York. He had a compass and a pack of sandwiches. Thirty-three hours later he landed in Paris. Making history.

In a young industry, Youth is a priceless asset!

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RESEARCH KEEPS

B.F. Goodrich

FIRST IN RUBBER



B. F. Goodrich brakes stop fast fighter

REPUBLIC'S RF-84-F Thunderstreak lands on B. F. Goodrich brakes... brakes designed to retract into thin, swept wings. And made lighter to help save weight for the supersonic fighter's cameras and guns.

A new kind of brake block developed by B. F. Goodrich engineers almost doubles the kinetic energy of the brake. It's a light magnesium shoe with the lining cemented on. It means that a smaller brake can be used, cutting the weight way down. The brake also has a narrow cavity tube that gives more braking pressure with less fluid, and of course with more weight saved. And because the expander tube applies pres-

sure directly to the brake blocks, extra parts and linkages are not necessary.

The B. F. Goodrich Expander Tube brake does a better job of braking. Elimination of the rivets makes it possible to use more of the brake lining. It permits full, positive braking down almost to the metal backing. The braking action applies equal pressure over the full circle of the drum, giving better power, better load distribution.

Landings are safer and smoother with BFG brakes. They respond smoothly and quickly to minimum pressure, take emergency overloads better, cannot lock or grab. Ventilated shoe dissipates heat more rapidly. Retractor spring action

eliminates wear due to drag. Relining can be handled with a screwdriver and wrench.

Aviation products to come from BFG's research and engineering include: tires, wheels and brakes; heated rubber, pneumatic and electric De-Icers, inflatable seals, Avtrim, Pressure Sealing Zippers, Plastilock adhesives, fuel cells, Rivnuts, accessories. The B. F. Goodrich Co., Aeronautical Division, Akron, Ohio.

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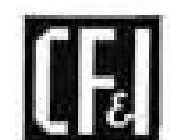


THIS NEW ROEBLING BOOKLET is the only practical and accurate manual ever offered designers and engineers on the physical characteristics of airplane control cord.

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Aviation Week

Volume 59

December 14, 1953

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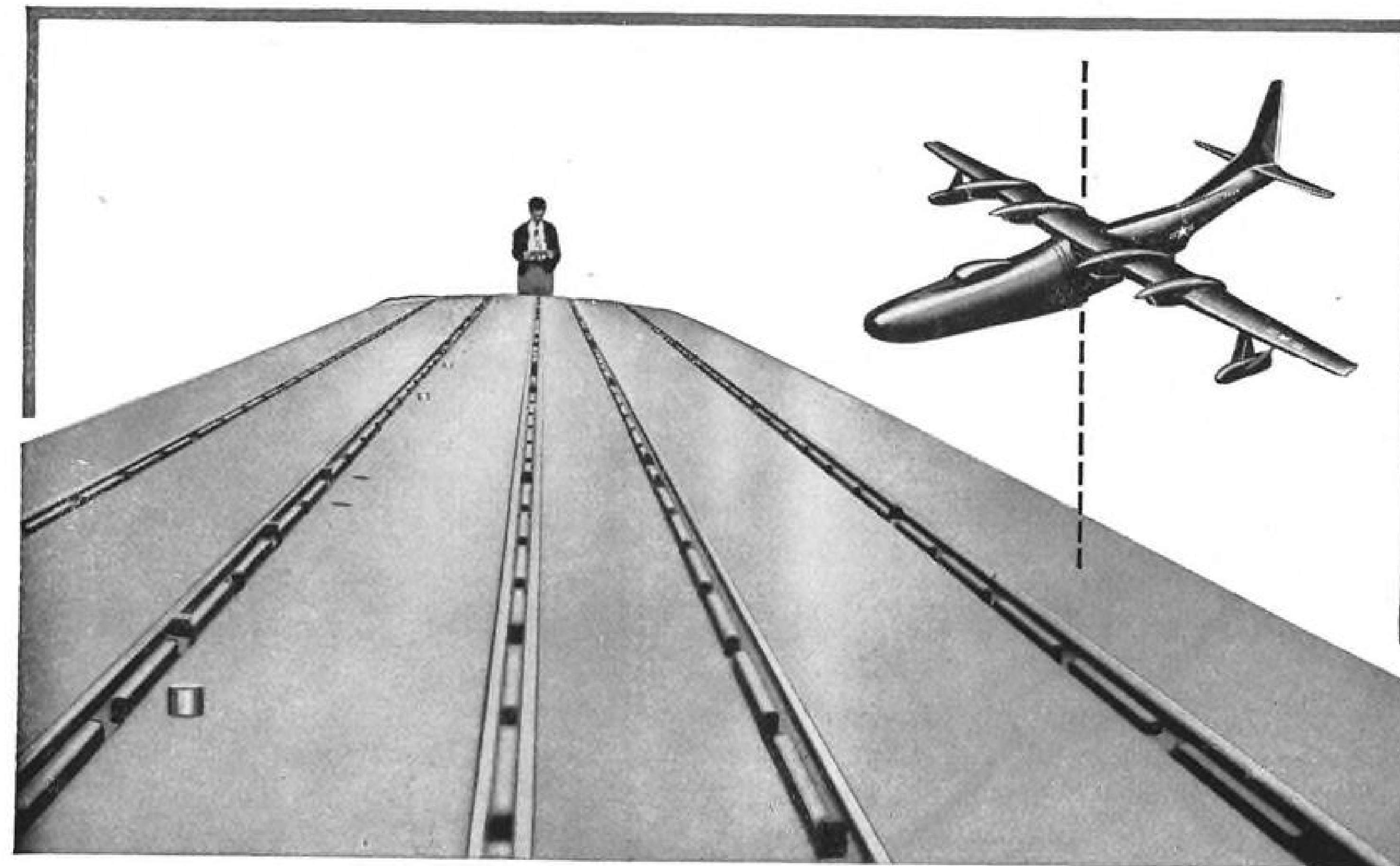
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NAVY'S R3Y-1 FEATURES MAGNESIUM CARGO DECK

"Fastest flying boat" demonstrates extruded magnesium's combination of light weight and toughness for better flooring



MAGNESIUM EXTRUDED CARGO DECK SECTION of the new Convair-built Navy R3Y-1 "Tradewind" now in production at San Diego. Magnesium provides the R3Y-1 with a tough, yet lightweight, easily installed cargo deck for heavy-duty service.

In all its 40-year history, water-based aircraft has never been appraised in terms of speed or maneuverability. The big lumbering transports of past years were reputedly slow and cumbersome in flight. This was true primarily because of their great weight.

Today, however, Convair and the U. S. Navy present the "Tradewind" as the fastest flying boat in aviation history. Its turbo-prop engines provide a top speed of more than 350 mph... enable it to take off in 30 seconds with full load.

One factor that contributes greatly to the increased speed and easy handling of this giant seaplane is the extensive

use of magnesium in its design. Take as an example, the cargo deck. It's made of magnesium ZK60A extrusion alloy. It's light in weight. (Magnesium is the world's lightest structural metal!) And it's strong and rugged enough for heaviest duty. This combination of qualities makes magnesium perfectly suited for this application.

There are other instances, too, in this and in other aircraft, where magnesium has helped designers solve some of their weight and speed problems. Have you considered magnesium for your uses? For more detailed information, contact your nearest Dow sales office, or write directly to THE DOW CHEMICAL COMPANY, Magnesium Department, Midland, Michigan.

you can depend on **DOW MAGNESIUM**



NEWS DIGEST

Domestic

A Martin-built B-57A crashed near BelAir, Md., last week while on an Air Force acceptance flight. A civilian AF inspector was killed and an Air Force pilot injured.

Thermal barrier will be solved within the next seven years, allowing aircraft builders to begin production of planes capable of 2,500 mph. and faster, forecasts Mundy I. Peale, president of Republic Aviation Corp. He mentions Republic's transonic F-105 as a "very highspeed airplane you will be seeing in 1956 or 1957."

Project Volscan, nearly automatic air traffic control developed by the Air Force Cambridge Research Center, last week fed B-29s and F-86s into four separate airports near Boston in USAF's first public demonstration of its new system. Designed to funnel up to 120 aircraft per hour into position for final approach and landing, Volscan-computed instructions can be transmitted orally to individual aircraft, transmitted to a cockpit instrument or fed to automatic pilots. (AVIATION WEEK Aug. 17, p. 283).

Allison J35-A-35 turbojets soon will power Northrop Aircraft's F-89D, an engine change that is expected to increase the all-weather interceptor's current service ceiling of more than 45,000 ft. Northrop reports the powerplant improved Scorpion performance at all altitudes and speeds, boosted rate of climb and reduced fuel consumption during flight tests.

Turbine test facility will be built by Garrett Corp.'s AirResearch Manufacturing Division at Phoenix (Ariz.) Sky Harbor Airport and operated under a USAF contract. Plans for the \$4,150,000 facility call for construction of 30 test cells for components of turbojets, turboprop and piston engines. Scheduled completion date: Jan. 1, 1955.

President Eisenhower has appointed Ralph S. Damon, president of Trans World Airlines, and Preston R. Bassett, president of Sperry Gyroscope Corp., to five-year terms on the National Advisory Committee for Aeronautics.

Civil aircraft production since World War II has outnumbered output of military planes in the U. S. by 75,670 to 37,797—a ratio of more than two to one, according to Aircraft Industries Assn. Military contracts now account for more than 90% of the industry's



Japs Sign Beech Mentor License

Japanese officials are seen with Beech Aircraft Corp. personnel in Wichita, Kans., following recent signing of an agreement permitting Fuji Heavy Industries, Tokyo, to build the Beech Mentor military trainer (Aviation Week Nov. 2, p. 7). Shown on the production line, where T-34 Mentors are being made for USAF, left to right: Michael G. Neuberger, manager, Beech Export Division; K. Maeda, assistant manager, Aircraft Division, C. Itoh & Co., Tokyo, Beech dealer; Virgil Adamson, Beech administrative engineer; Kazuo Shirakawa, Fuji vice president, and John P. Gaty, Beech vice president-general manager. Fuji now is tooling up on T-34.

business, AIA says, but civil planes still are rolling off assembly lines at a rate of from 12 to 13 every 24 hr.

Fairchild Engine & Airplane Corp. will purchase substantially all assets of Speed Control Corp. and operate the Wickliffe, Ohio, company as a separate division. Plans call for volume production of Specon units at Fairchild Engine Division, Farmingdale, N. Y.

Record employment at Chance Vought Aircraft's Dallas factory totals more than 13,800 persons with an annual payroll exceeding \$50 million, passing the World War II peak of 13,516.

Aircraftmen Co. has received a \$150,000 loan from Small Business Administration, the maximum for individual grants. The loan carries 6% interest, will be used for working capital and to help the California aircraft parts producer retire its mortgage.

New \$10-million air terminal at Philadelphia last week was dedicated by approximately 350 aviation, civil, business and government leaders.

Financial

National Airlines expects to show net earnings of between \$5.5 million and \$5,750,000 for the fiscal year scheduled to end June 30, an increase of at least

\$1.5 million over last year, president G. T. Baker reports. Included in the projected earnings: \$4-million gross profit from the sales of two DC-6s and three DC-4s.

International

Twin-engine Bristol 170 operated by Spanish Aviacion y Comerico Co. crashed and burned in mountains 60 mi. north of Madrid Dec. 4, killing 23 persons and injuring 10.

British aircraft exports increased sharply during the first 10 months of 1953 to \$153,145,000, compared with \$29 million for all overseas shipments last year. Total forecast for 1953: \$182 million.

Sabena Belgian Airlines reports a net profit of \$667,747 during fiscal 1952 from operating and miscellaneous revenue totaling \$27,805,562. Expenses added up to \$26,863,069.

Scandinavian Airlines System has ordered two additional Saab-90 Scandia transports, increasing its fleet of the twin-engine Swedish airliners to eight. The new order calls for 1954 delivery.

Firefly T. Mk. 5, new trainer version of the anti-submarine aircraft produced by Fairey Aviation Co. of Australia, is under evaluation by the Royal Australian Navy.

AVIATION WEEK, December 14, 1953



ENGINE-DRIVEN G-E ENERGIZER, 28-volt, 500/1000-amp, mounted on 4-wheel trailer incorporates a completely self-contained power plant and weather-proof housing. Shown here starting an F-84 jet.

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SELF-CONTAINED, HEAVY-DUTY G-E power plant, driven by industrial-type gasoline engine, fills requirements for 28 to 35-volt aircraft ground power source.

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VERSATILE GROUND POWER supplied by G-E Aircraft Energizers meets every need for starting jet or reciprocating engines, ground checking and testing of instruments, factory production testing, and auxiliary power supply for repair areas.

FOR COMPLETE INFORMATION, contact your nearest G-E Apparatus Sales Office or write for Bulletins GEA-5589, 5988, 5989, 5990. General Electric Co., Section 765-2, Schenectady 5, N. Y.

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GROUND POWER SUPPLY PROBLEMS

GENERAL  ELECTRIC



G-E Frequency Changer Energizer, 400-cycle (above)
G-E Motor-driven Energizer, 500/1000-amp, 28-volt (below)

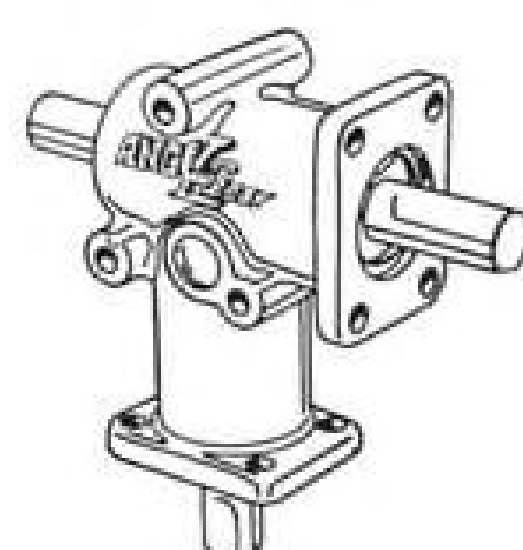


Navy Type NC-5 Energizer manufactured by the Consolidated Diesel Electric Corp., Stamford, Conn., equipped with G-E AC and DC generators and control.





SERVES IN NAVY'S HUP-2



This right angle drive is part of the control system for the fuel shut-off valve. ANGLgear is often the choice when compact design and high capacity are required. These qualities make it a favorite among designers—specified equipment in many aircraft.

Model R-300 is rated at 1/3 hp at 1800 rpm—Model R-320 at 1 hp. Both models have hardened gears and ball bearings, are lubricated for life. Both are made with 1:1 ratio and with 2-way or 3-way shaft extensions.

ANGLgears are described fully in the I.A.S. Aeronautical Engineering Catalog. Refer to this publication for complete information, or write us direct.



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7—Beech Aircraft; 9—(top) Boeing Airplane; (center, bottom) Wide World; 17—Lockheed; 19—Douglas; 23—Piper Aircraft; 36—Erwin J. Bulban; 42—Boeing Airplane; 48, 49—Curtiss-Wright.

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- SAVE WEIGHT

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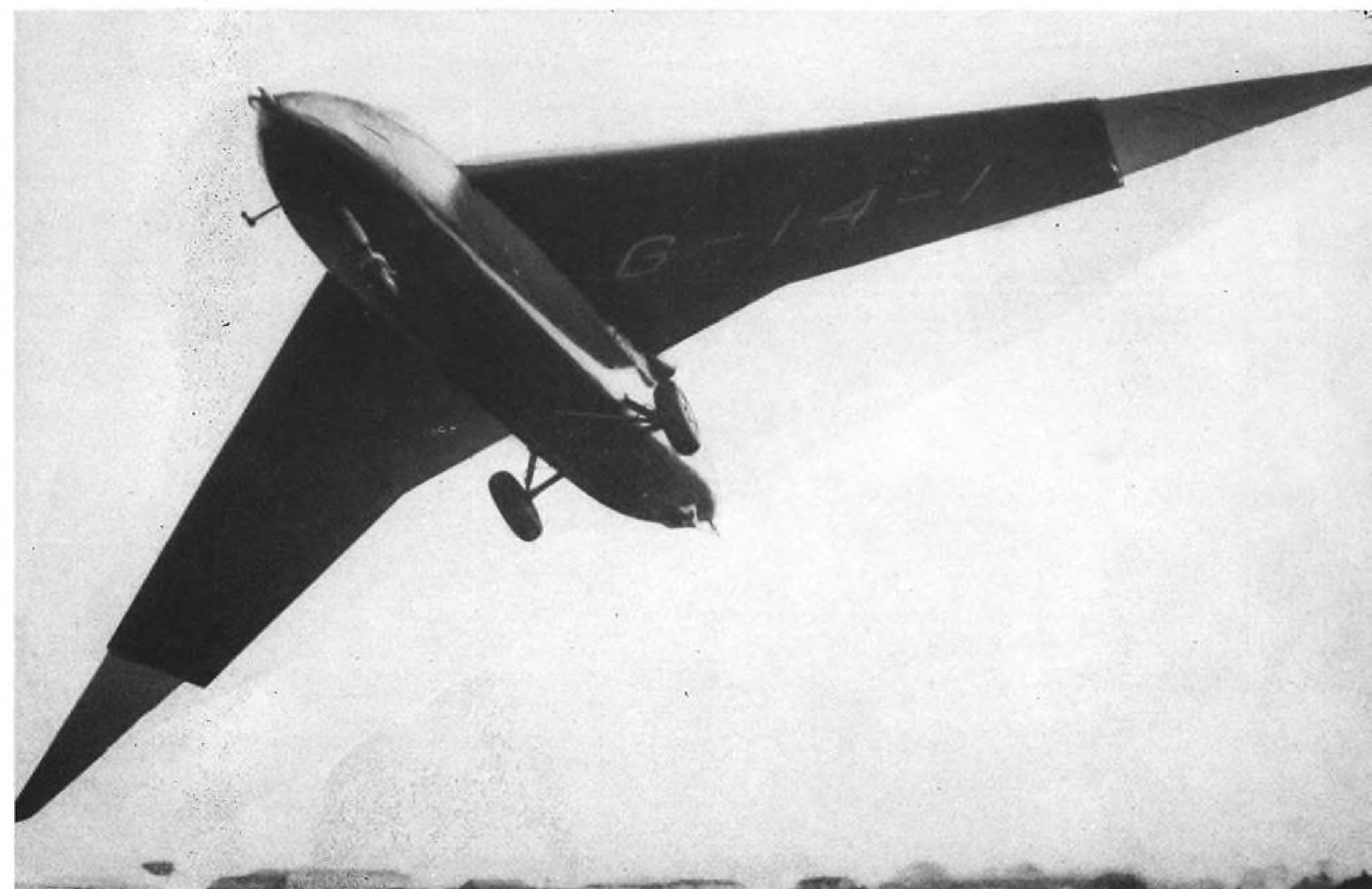
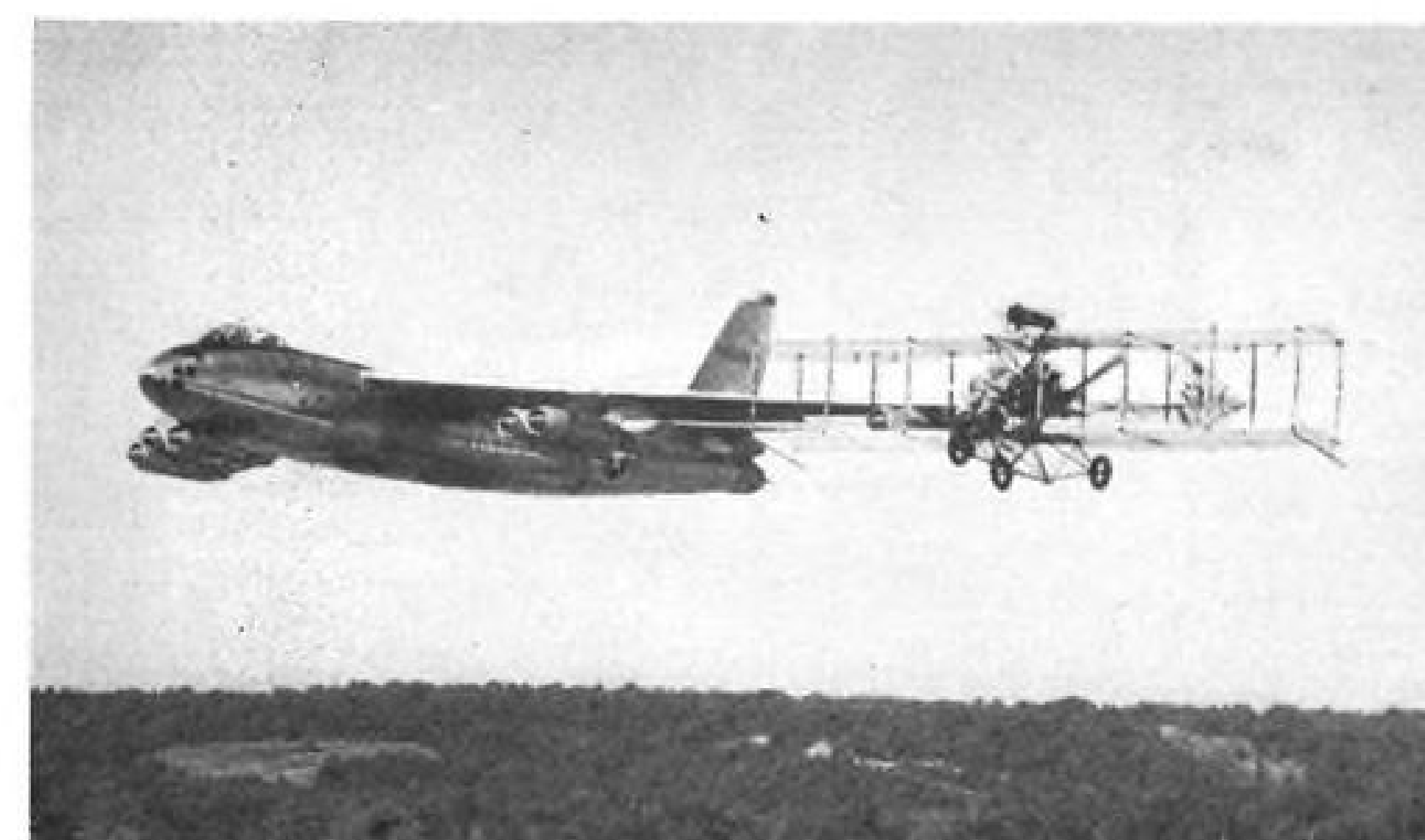
AVIATION WEEK, December 14, 1953

Plane Progress In the News Here, Abroad

THEN AND NOW—Boeing sweptwing six-jet B-47B Stratojet flying by a 1912 pusher biplane piloted by Early Bird owner Billy Parker epitomizes aviation progress in the past 50 years.

NAVY TESTS STEAM CATAPULT—Grumman F9F-6 Cougar jet fighter is seen being launched by a British-designed, U. S.-modified steam catapult at Naval Air Materiel Center, Philadelphia, Pa. The catapult is said to be approximately six times more powerful than current hydraulic types and is capable of launching high-performance planes while carrier steams downwind.

SHERPA DISPLAYS NEW WING—Short Sherpa (below) shows a plan view of its novel aero-isoclinic wing having movable tips which act as combination ailerons-elevators. The Turbomeca jet-powered craft has no horizontal tail. Sherpa will handle research problems on highspeed, high-altitude military projects.



INDUSTRY OBSERVER

► Aerojet of Azusa, Calif., has developed a high-powered rocket motor using liquid oxygen and liquid hydrogen as fuel. Basic propellant combination has been studied on a small scale for several years but the Aerojet project is the first time a large motor has been operated on this fuel. Aerojet rocket has missile applications.

► Rensselaer Polytechnic Institute at Troy, N. Y., is developing a new type of ramjet engine aimed at overcoming principal drawback of current types—the need for rocket boost to operating speed. RPI design incorporates a mechanical inlet valve and explosive ignition. Operating cycle resembles pulsejet engine in some respects.

► Bell Aircraft Corp. reports successful experiments to alleviate skin friction at high supersonic speeds by injecting small quantities of liquid helium at leading edge of a wing. Liquid helium injections at high supersonic speeds lubricated the skin surface and reduced heat transfer to wing structure resulting from skin friction by about 50%.

► North American Aviation, Inc., reports Sabre production is now operating at a rate of 26 fighters a week despite the United Auto Workers (CIO) strike. Second F-100 Super Sabre production model is nearing completion.

► General Electric Co. Gas Turbine Division has established a computing center at its Evendale, Ohio, plant to handle complex reduction of jet engine test data. Direct teletype links the Lynn, Mass., jet engine plant, where most development work is done, with the Evendale computer center, and supplies raw data while tests are being run. Answers are back in Lynn "before the engine cools," according to GE engineers.

► Comparative direct operating costs per plane-mile of different type airliners the first half of this year, excluding depreciation, were: Douglas DC-3, 43 cents; Convair 340, 58 cents; Martin 4-0-4, 63 cents; Douglas DC-4, 66 cents; Convair 240, 68 cents; Lockheed 049, 72 cents; Douglas DC-6B, 73 cents; Douglas DC-6, 74 cents; Lockheed 749, 90 cents; Lockheed 1049, \$1.01, and Boeing Stratocruiser, \$1.37. Figures are averages of those reported to Air Transport Assn. by member airlines for their own domestic routes.

► First official mention of the Loki anti-aircraft missile (AVIATION WEEK Mar. 2, p. 83) was made at the recent American Rocket Society annual meeting in New York. C. E. Bartley of Grand Central Aircraft was cited for his work on the Loki in receiving the C. N. Hickman Award. Loki is a solid-propellant, barrage-type flak missile based on the German World War II Taifun. Bartley works in the Rocket Division of Grand Central which has been active in exploring solid propellants.

► Two big problems still facing guided missile manufacturers are recovery from test missions and impacting on the target in combat missions. Although some missiles are now advertised as "recoverable," a high percentage of the recoveries are actually crash landings with little left of basic equipment except scrap metal. Impacting problems occur when missiles are dived steeply onto the target and experience structural failures in the resultant supersonic dive before hitting the objective.

► Roy Hurley, chief executive of the Curtiss-Wright Corp., estimates that the total weight of jet engines can be reduced by as much as 3,000 lb. by substituting titanium for stainless steel in their construction. Edgar Nason, sales manager of Elastic Stop Nut Corp., reports that use of titanium in nuts for the Republic F-84F is saving 150 lb. in each airframe and that from 700 to 1,000 lb. could have been eliminated in each plane if use of titanium had been anticipated in basic airframe design. Nason says if other firms follow Republic's switch to titanium nuts his firm would need 2,400 tons of titanium annually to meet aircraft demand.

► Marine Corps officials report that the Desert Rock atomic tests in Nevada last spring proved that airborne assaults by helicopter are feasible with offensive use of atomic weapons.

WHO'S WHERE

In the Front Office

G. S. Williamson has been elected vice president-manufacturing of Garrett Corp.'s AiResearch Manufacturing Division, Los Angeles. C. W. Reynolds is new vice president of Garrett public, industrial relations.

Randolph M. Lee has become director of the Hawaii Aeronautic Commission, succeeding Rear Adm. Peyton L. Harrison (USN Ret.), who retired this month.

Air Vice Marshal Alfred C. H. Sharp (RAF Ret.) has been elected executive vice president and a director of Industrial & Management Associates, Inc., Boston.

Philip E. Spindell has been elected vice president-engineering of Template Reproduction & Engineering Co., Philadelphia, taking over Treco's engineering services for aircraft and other industrial fields. Paul Mueller is new vice president-manufacturing.

John M. Hawkins and Bert M. Harsh have been elected vice president and director, respectively, of Hawthorne Flying Service, Moultrie, Ga.

Matthew J. Betley has been appointed vice president-general manager of Aeroquip Corp., Jackson, Mich.

Brig. Gen. Luther S. Smith (USAF Ret.) has joined Temco Aircraft Corp., Dallas, as special assistant to the president.

Changes

Lawrence E. Williams, former vice president of McDonnell Aircraft Corp., is new Washington representative for Piasecki Helicopter Corp., Morton, Pa.

W. C. O'Connell has become general manager of General Electric Co.'s aircraft gas turbine department, Lynn, Mass. New gas turbine section managers: C. R. Plum, marketing; H. J. Service, manufacturing; C. A. Newman, employee and plant community relations; D. J. Wait, finance; W. O. Meckley, engineering.

Kenneth C. Gordon has been appointed manager of commercial sales for Boeing Airplane Co., Seattle. Other changes: D. M. B. Martin, military sales manager; G. W. Taylor, domestic sales manager; Kenneth J. Luplow, foreign sales manager; William H. Cook, senior project engineer for pilotless aircraft; Harvey D. Gunning, administrative engineer for the pilotless aircraft program.

W. C. Gage is new sales manager of Aviation Division, Flexonics Corp., Maywood, Ill.

Honors and Elections

Lewis K. Sillcox, honorary vice chairman of New York Air Brake Co., has been elected president for 1954 of the American Society of Mechanical Engineers.

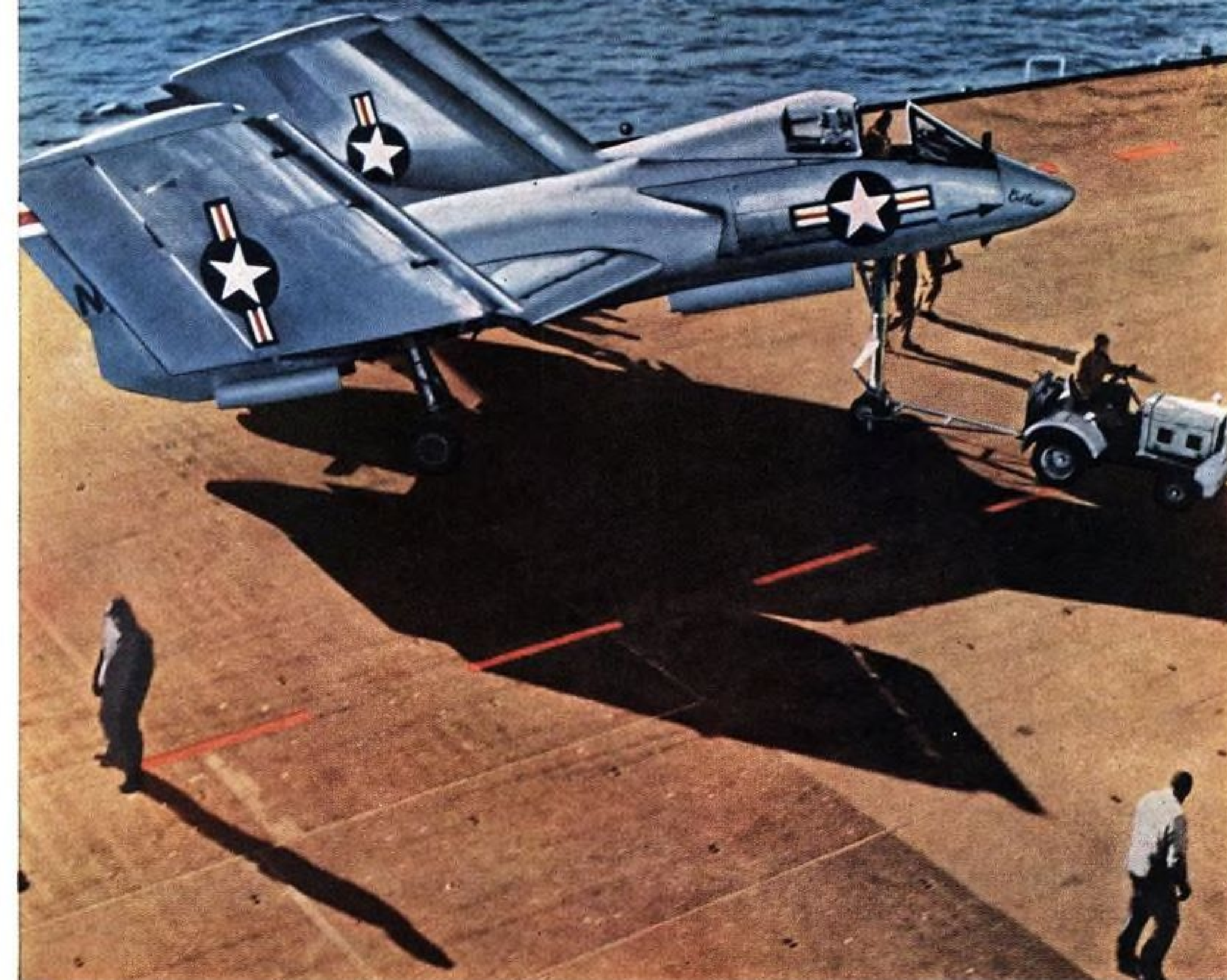
Dr. Marshall Holt, assistant chief of Alcoa's Engineering Design Division, is new national president of the Society for Experimental Stress Analysis.

Russell F. Holderman, chief pilot for Gannett Newspapers, has been cited by Civil Aeronautics Administration for his "solid contribution to aviation" during 40 years of flying.

CUTLASS ABOARD A CARRIER AT SEA

"Spotting a Cutlass"

The Navy's sleek, twin-jet F7U-3, with swept-wings folded, is towed to its spot on a carrier flight deck during tests at sea. The Cutlass is designed to be a top-performance member of America's Air Power team.



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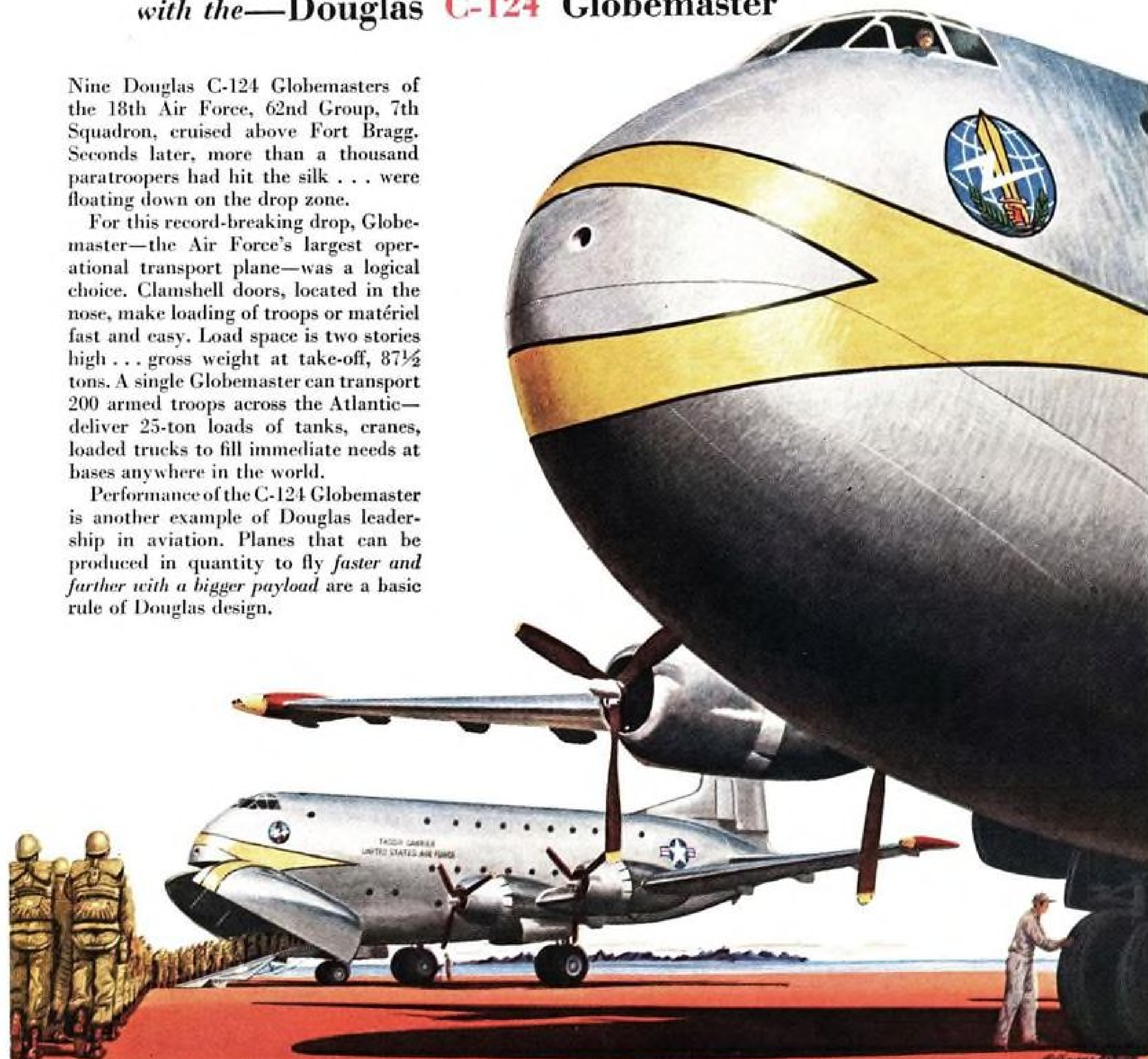
World record para-drop—more men,
in less time from fewer planes

with the—Douglas C-124 Globemaster

Nine Douglas C-124 Globemasters of the 18th Air Force, 62nd Group, 7th Squadron, cruised above Fort Bragg. Seconds later, more than a thousand paratroopers had hit the silk . . . were floating down on the drop zone.

For this record-breaking drop, Globemaster—the Air Force's largest operational transport plane—was a logical choice. Clamshell doors, located in the nose, make loading of troops or matériel fast and easy. Load space is two stories high . . . gross weight at take-off, 87½ tons. A single Globemaster can transport 200 armed troops across the Atlantic—deliver 25-ton loads of tanks, cranes, loaded trucks to fill immediate needs at bases anywhere in the world.

Performance of the C-124 Globemaster is another example of Douglas leadership in aviation. Planes that can be produced in quantity to fly faster and farther with a bigger payload are a basic rule of Douglas design.



Enlist to fly in the U. S. Air Force

Depend on **DOUGLAS** First in Aviation

Washington Roundup

New Political Issues

Adm. Arthur Radford's report on the three-month reconsideration of strategic military plans by the new Joint Chiefs of Staff (see p. 20) is expected to stir up political criticism from three angles in the next congressional session:

- **Democrats who opposed the review** as unnecessary can point out that its main accomplishment was what they predicted last spring—a delay in the defense buildup. Radford said the new recommendations, with exception of increases for continental defense, "do not represent any material change from those developed in previously approved plans."

- **Air power advocates**, such as Sen. Lister Hill, can be counted on to challenge the "balanced forces" concept. "Our security and that of the free world cannot at this time be entrusted to an unbalanced . . . concept of forces," Radford said.

- **Democrats who protested the tentative cutback** in the Air Force goal from 143 to 120 wings will have additional reasons for protests against the new 127-wing goal. Radford held "The threat of war has not diminished."

Army-Navy vs. Wilson?

Outlook is that Army, instead of Air Force, will be in the forefront in next year's budget battle in Congress for the first time in recent years. Army is opposing Defense Secretary Charles Wilson's plan for a 10% cut in its personnel strength.

A 10% cut in Navy's personnel force also is indicated. If construction of a controversial fourth Forrestal-class carrier is approved, Navy may take the reduction quietly. This year, Navy obtained funds for construction of a third Forrestal-class carrier and didn't put up opposition to Wilson's slash in other funds. Percentage-wise, Wilson cut deeper into Navy aircraft procurement funds this year (64%), than into Air Force's (53%).

The fourth carrier, as well as other "major weapons," is going to be passed on by the Joint Chiefs of Staff, for the first time since USAF's determined opposition to the first carrier.

USAF Research Expansion?

Air Force will insist on a major expansion of its research and development testing facilities, but probably will run into opposition from Secretary of Defense Wilson. The Administration has been notably penny-pinching on construction works.

Through the years, Army and Navy have increased their research facilities: Army has 41 major installations, Navy 21. Air Force has only seven, some not completed.

This year, USAF's request for \$225 million for new research facilities was cut to \$21.6 million by the Secretary of Defense. By reallocation of funds, USAF increased this to \$42 million.

Assistant Secretaries Organize

Progress has been steady, but slow, in developing the offices of the three new key assistant defense secretaries:

- **Assistant Secretary for Supply and Logistics** (Charles Thomas) received his charter defining duties of the office in mid-August. Organization of the office was worked

out by October: a deputy assistant (Thomas Pike, former president of a California drilling firm); five directors and 11 staff directors. So far only one of the directors and five of the staff directors have been named.

- **Assistant Secretary for Research and Development** (Donald Quarles) was chartered in mid-November. Quarles is now working out the organization of his office.
- **Assistant Secretary for Applications Engineers** (Frank Newbury) has not received his charter. The intent of the office is to fill the gap between development and quantity production. Problem is to define its functions without overlapping.

ACC Survey Scored

Air Coordinating Committee's study on national aviation policy, which has been narrowed down to the civil aviation field, will be received coolly in some congressional quarters. Rep. Carl Hinshaw, second-ranking majority member of House Interstate and Foreign Commerce Committee, observed:

"ACC was established to meet on points which the various departments dealing with aviation had in common or on which there was conflict. It was not designed for the purpose of overall policy-making. That is not their business. They do not particularly represent the public viewpoint."

Military Fiscal Management

A Senate report in the near future is expected to demand tighter inventory control by the three services to cut unnecessary procurement. Already drafted by the staff, it is now being reviewed by a Senate Armed Services subcommittee.

Spare Parts Buying

A Senate Armed Services Investigating subcommittee may look into over-buying of aircraft spares and parts. Air Force last year took steps to reduce its purchases of extras, following criticism by Senate Appropriations committee members that 66% of the purchase of each aircraft was for spares and parts.

Strategic Metals

Senate's Strategic Metals subcommittee, headed by Sen. George Malone, will contend in a report to be issued soon that the Western Hemisphere could be self-sufficient in all but one of the 70 strategic metals and minerals—industrial diamonds. It will be pointed out that one plane-load of these would sustain a substantial mobilization effort. This stand runs into a snag with Navy's argument of the prime importance of keeping the sealanes open for strategic metals to sustain a war effort.

CAB Investigation

Top Administration spokesmen state that an investigation of Civil Aeronautics Board is a closed issue as a result of FBI findings.

However, a spokesman for the Senate's Permanent Investigating Committee reports that as far as this group is concerned the CAB matter is "not closed."

—Katherine Johnsen

Civil Aviation Faces Budget Slash in '55

- **White House pares \$20 million from CAA and CAB budgets, scheduled to go before Congress next month.**
- **Major changes include elimination of federal subsidy for airport construction, reduced salaries, expenses.**

The federal government will spend about \$20 million less on service and subsidy to civil aviation next year than the \$220-million level of the current fiscal year, if Congress goes along with recommendations of the President and Commerce Department next month.

Major changes in civil aviation's fiscal 1955 appropriations and other legislation slated for presentation to Congress include:

- **Civil Aeronautics Administration** budget will be about 40% less than \$200 million asked by former President Truman a year ago and 10% less than the amount appropriated by the Republican Congress last summer for fiscal 1954.

- **Airport construction** subsidy is eliminated. If airport aid later is decided necessary by the Administration, it will be requested as a supplemental appropriation. Congress will be asked to amend the original federal-aid airport program of eight years ago.

- **CAA salary and expense** budget will be cut from \$105 million appropriated for fiscal 1954 to about \$96 million. CAA will turn back about \$4 million of this year's appropriation.

- **User charges** will be levied on airlines and other operators in partial payment for CAA airways service (AVIATION WEEK Nov. 2, p. 71). The expected recommendation to Congress would cut net cost of CAA to the government by \$10 to \$25 million a year, depending upon the charge that Congress establishes.

- **Civil Aeronautics Board** direct subsidies to airlines will continue at the \$80-million level of this year. But the budget request may appear about 10% less because there is about a one-month lag in the accounting as a result of the switch in payment of subsidies from Post Office to CAB appropriation (AVIATION WEEK Sept. 21 p. 88).

Nearly all direct federal expenditures for civil aviation are contained in the CAA and CAB appropriations. Appropriations for fiscal 1954 were \$138 million for all CAA activities (including airport aid liquidation) and \$80 million for CAB subsidy, making a total of \$218 million. Additional miscellaneous

expenses such as administrative costs bring the total to about \$220 million.

Main reductions in the regular fiscal 1955 budget request of the President are about \$9 million in CAA salaries, expenses, and miscellaneous items, and approximately \$11 million in airport aid.

- **No Sudden Jar**—The aviation industry will not feel a sudden impact next July 1 when the reduced budget would go into effect. This is despite the 10% slash in CAA expenses and proposed elimination of subsidies for airport construction.

Reason the transition will not be drastic: Expense cutback and subsidy phaseout already are being accomplished gradually during this fiscal year.

CAA is halfway through its reduction from the \$105-million salary-and-expense expenditure rate of last June 30 to a planned \$96-million level for next June 30.

- **Airport Aid Stalled**—Commerce Department last spring won congressional agreement to abolish grants for new projects under the old federal-aid program this fiscal year. Since then, CAA's Airport Office has been eliminated, and activity has been confined to administration of the phaseout of \$12.5 million in previous contract commitments.

Aviation industry interests are trying to save the program, or revive it in a new form, through their activity on the Airport Advisory Panel of the Transportation Council—an industry committee advising the Commerce Department.

In an attempt to gain unanimity, the airport panel deliberated beyond the Dec. 1 deadline for the regular fiscal 1955 appropriation request.

The industry panel recommends that aid be given to some 2,000 airports over the next six years, that new airports generally be restricted to a single runway, and that no further money be allocated to terminal building construction.

Fate of program may depend upon the Apr. 1 recommendations of the President's aviation policy review by Air Coordinating Committee—under the chairmanship of Commerce Undersecretary Robert Murray.

- **CAB Subsidy Unchanged**—The President's Budget Bureau approved the entire airline subsidy program of Civil Aeronautics Board. CAB is, in effect, an agency of Congress rather than the President, so influence of White House and Commerce Department is confined to long-term policy guidance and appointment of the individual CAB members.

If CAB continues approving subsidy rate increases to local service airlines, as it has been since its Aug. 12 estimates of fiscal 1955 requirements for Budget Bureau, a supplemental appropriation may be required later this year.

UAC Severing Ties With Chance Vought

United Aircraft Corp. is disposing of its airframe manufacturing operations and has announced plans to separate from its Chance Vought Aircraft Division, Dallas, Tex., subject to approval of common stockholders.

UAC chairman Frederick B. Rentschler and president H. M. Horner have notified stockholders that Chance Vought will set up as an independently operating subsidiary Jan. 1. Stockholders will be asked to approve complete separation at their meeting late in April, and set the date it is to be effective.

Until the transition period is ended, expected by the end of 1954, certain UAC officers will act as board members of the new company. At the end of that period, all United officers will resign from the board of the new firm, and there no longer will be "legal or corporate connection between the new company and United," the company says.

Other three divisions of United—Pratt & Whitney Aircraft (engines), Hamilton Standard (propellers and accessories) and Sikorsky Aircraft (helicopters)—will continue unchanged.

The UAC letter to stockholders points out that Chance Vought has unfilled orders for approximately \$375 million. Company currently is building the Navy F7U-3 Cutlass fighter, A2U attack plane, Regulus guided missile, and recently won Navy competition for development of a new advanced day fighter.

Horner cited two main reasons for the proposed separation. The present relationship, he said, sometimes has prevented other airframe companies from taking P&WA into their confidence be-

cause of competitive factors. Also, the proposed change would give Chance Vought more freedom in dealing with the Air Force and other potential military and commercial customers.

The president said the separation would depend on "satisfactory operations by the subsidiary in fulfilling its defense program commitments and all other responsibilities during the transition period." He anticipated no developments that would prevent consummation of the plan.

CAA Hampers Plane Development: Loening

Designers and operators should be given a "completely free hand" in aircraft development and government certificates of airworthiness could be eliminated "right now" with little ill effect, aviation pioneer and consultant Grover Loening says.

Loening told National Aviation Trades Assn. that Civil Aeronautics Administration's rules and regulations are hampering development of new and more efficient aircraft by imposing upon designers an expensive procedure of testing, proving by theory, elaborate stress analyses and detailed drawings.

He points to the rapid development achieved in the automobile as an example of the "survival of the fittest," noting that cars never have had to undergo government certification.

- **Lesson for Government**—Loening also says that "again and again we must bring home the lesson to government and particularly to government Air Force, Army and Navy services that the path to an efficient Air Force is over the graves of obsolete aircraft and not on their wings."

He notes that the pool of fresh pilot, mechanic and technician material has declined substantially. Industry and government have done a poor job of selling an aircraft future to youth, he says.

- **Record for Instruments**—William Lear, board chairman of Lear, Inc., told NATA he believes every pilot should be able to fly on instruments before being granted a license.

"We say," Lear states, "accidents happen when the wings come off or the ship hits the ground, which is another classic example of the obvious obscuring of the truth. The accident happened when the man went on instruments."

Proof of this being a fact, he says, "lies in the record which shows that the greatest proponents of this philosophy of 'don't go on instruments' have been the most numerous victims."

During the NATA meeting at Wichita, Kans., Frank Shelton, Phoenix, Ariz., was elected president of the association.

Third Quarter Aircraft Backlog

	(In millions) Backlog Sept. 30, 1953	Quarter's new orders	Net sales during quarter	Backlog June 30, 1953
Complete aircraft and parts.....	\$11,966	\$815	\$1,243	\$12,394
For U. S. military customers.....	11,231	712	1,114	11,633
Other	735	103	129	761
Aircraft engines and parts.....	5,173	470	601	5,304
For U. S. military customers.....	5,033	440	552	5,145
Other	140	30	49	159
Aircraft propellers and parts.....	261	4	48	305
For U. S. military customers.....	234	-1	43	278
Other	27	5	5	27
Other products and services.....	878	128	172	922
Total	\$18,278	\$1,417	\$2,064	\$18,925

Aircraft Backlog: \$18.2 Billion

Aircraft industry had an \$18,278-million backlog of unfilled orders at the end of 1953's third quarter Sept. 30. A joint report of the Census Bureau and Civil Aeronautics Administration reveals that the backlog is 3% lower than the \$18,925 million reported June 30, end of the second quarter.

The backlog is 14% more than orders on hand at the end of the third quarter of 1952.

Order backlogs for complete aircraft and parts were 3% lower than the previous quarter, represented 65% of the total backlog. Orders for aircraft en-

gines and parts accounted for 28% of the total, were 2% below orders on hand at the end of the second quarter.

- **Parts Drop**—Unfilled orders for propellers and parts, 1% of the total backlog, were 14% lower than at the end of the second quarter.

Military orders comprised 94% of the aircraft, 97% of the engine and 90% of the total aircraft propeller backlogs, the report shows.

New orders during the third quarter amounted to \$1,417 million. This represented 8% of the total backlog at the end of the quarter.

Canadair to Produce Britannias for RCAF

(McGraw-Hill World News)

London—Canadair, Ltd., Montreal, will build a maritime reconnaissance version of the four-engine Britannia for Royal Canadian Air Force under license from Bristol Aeroplane Co., Ltd. (AVIATION WEEK Mar. 23, p. 27).

Licensing agreement calls for construction of an estimated 50 planes.

- **Powerplant Change**—Curtiss-Wright almost certainly will get a contract to supply Turbo Compound engines for Canadian Britannias, British sources say.

RCAF requirements call for prolonged low-level search operations, and the Proteus 3 turboprop, Bristol engine that will power the first batch of Britannias now on order for British Overseas Airways Corp. and Quantas Empire Airways (Australia), could not show adequate efficiency for prolonged low-level flight, observers here say.

- **Prime Target**—When Canadian production will start still is under discus-

sion. Eventually, however, Canadair probably will build civil Britannias.

Prime target for the civil planes would be the U.S. market. Advantages of nearby facilities for spares and repairs are cited as points favoring Canadian production.

U. S. Must Perfect Missiles, Putt Warns

Greater effort to perfect reliable and effective missiles to prepare the U. S. for "slide rule war" is urged by Lt. Gen. Donald L. Putt, chief of Air Force's Air Research and Development Command.

Unless that effort is made, Gen. Putt says, another war—should there be one—might find the U. S. "sorely lacking" in missiles.

"This adds to the concept of the hot war and the cold war a third one of equal importance—the slide rule war," the ARDC commander says.

- **Rocket Future**—Looking into the future of rocket power, Putt believes continued improvements in guided-missile technology eventually could

relegate the military airplane as it is known today to logistic support.

He spoke on "long-range applications of rocket power" at the Honors Night Dinner of the American Rocket Society in New York, a group of professional scientists and engineers who work in the field of jet propulsion.

► **Honors**—In presentations, during the evening, the ARS honored: David A. Young, Aerojet-General Corp., for contributions to the technology of liquid-propellant rocket motors; C. E. Bartley, Grand Central Aircraft Co., for advances in solid-propellant rocket motor development; Dr. H. S. Tsien, California Institute of Technology, for publications in the field of rocket science, and Alfred D. Goldenberg, Palm Springs, Calif., for his student activities in behalf of the rocket society.

Named fellows of the society were: Dr. Luigi Crocco, Princeton University; Dr. R. E. Gibson, APL, Johns Hopkins University; Dr. C. C. Furnas, Cornell Aeronautical Laboratory; J. W. Mullen, Experiment, Inc.; and William Smith, Bell Aircraft Corp.

Military Air Spending Tops Forecast Ceiling

Obligation of funds for military aircraft and related procurement continued to lag during October, but expenditures are at a higher rate than official predictions.

Here are highlights of the fiscal picture on Navy and Air Force funds (AVIATION WEEK Nov. 9, p. 17) for aircraft and related procurement:

- **The services obligated \$108 million during October, \$86 million by the Navy and \$22 million by the Air Force.**
- **Expenditures totaled \$842 million during October, \$624 million by the Air Force and \$218 million by the Navy.** This is an annual rate of more than \$10 billion, substantially higher than the \$8.3 billion officially anticipated for fiscal 1954.
- **Unobligated balance of \$7.7 billion** was on hand at the beginning of November. This means the services wound up four months of fiscal 1954 with carryover funds from previous years still unobligated, and had not started to use the \$4.9 billion in new procurement money appropriated by Congress.
- **USAF's unobligated balance was \$6.1 billion and Navy's \$1.6 billion.**
- **Expenditures were slightly less than \$3 billion for the first four months of this fiscal year, \$2.2 billion by the Air Force and \$750 million by the Navy.**
- **A balance of \$28.5 billion, sufficient to finance procurement for three years at an annual rate close to \$10 billion a year, was unexpended at the beginning of November.** Air Force had \$20.5 billion unexpended and Navy \$7.9 billion.

BEA's Share of Traffic

	London-Geneva		London-Zurich		London-Copenhagen-Stockholm	
	1952	1953	1952	1953	1952	1953
April	25%	26%	20%	36% ¹	26%	26%
May	30	28	24	35	29	33
June	31	53 ²	23	36	29	33
July	27	52	25	43	34	43*
August	35	52	26	43	34	43
September	32	55	29	40	33	45
Six-month average	30%	47%	25%	40%	31%	38% ⁴

¹ Viscounts introduced London-Zurich, Apr. 18.

² Viscounts introduced London-Geneva, June 1.

³ Viscounts introduced London-Copenhagen-Stockholm, July 1.

⁴ In the first two weeks of October, BEA carried 47% of the London-Stockholm traffic, compared with 28% in the same period in 1952.

Viscounts Lure Opposition Traffic

By Nat McKitterick
(McGraw-Hill World News)

London—Vickers turboprop Viscount has made a strong competitive and financial record during its first six months of operations with British European Airways:

- **The turbine-powered transport won nearly 17% of competitors' traffic** on four main BEA routes in Europe between Apr. 18 and mid-October of this year. British observers point out that the Viscount made these gains competing against relatively new U. S.-produced equipment (DC-6s and DC-6Bs) and older transports.

• **Overall operating profit made by the turboprop totaled more than \$1.1 million after all normal deductions were made.**

• **Operating cost averaged approximately 43 cents per capacity ton-mile, giving a break-even load factor of 51% on total costs.**

► **Threatened Structure**—In Europe, BEA's success with the Viscount already has caused an undercurrent of anxiety. The carefully negotiated structure of "pooled routes," guaranteeing each national operator a minimum percentage of traffic, may be threatened if new equipment, like the Viscount, pulls a disproportionate number of passengers to a single operator.

In one or two cases, rumor has it that a European government is about to ask Britain to renegotiate its bilateral air pacts with an eye to cutting down BEA's landing rights.

Such action would be a severe blow to any manufacturer with new equipment to sell.

But the anxiety is proof of the Viscount's pulling power.

► **Increasing Share**—Operators most affected so far are Swissair and Scandinavian Airlines System. Swissair, using DC-6s to compete with the Viscount,

watched BEA increase its share of traffic on the London-Geneva route from 30% in mid-April to mid-October of 1952 to 47% the first six months of Viscount operation.

On the London-Zurich routes, British European increased its share of passengers from 25% during mid-April through mid-October last year to 40% in the same six months of 1953.

SAS, flying DC-6s and DC-6Bs against BEA's Viscounts, watched the Britons increase their share of the London-Copenhagen-Stockholm route from 31% during April through September to 38% in the same period this year. October 1953 figures promise to boost BEA's share to 47%.

In both cases, British European had a lot of ground to make up. While all BEA flights to Copenhagen and Stockholm are quoted at tourist rates, many of SAS flights are first-class—costing 12% more.

On its fourth developed Viscount route London-Istanbul, BEA's share of the traffic has climbed so high that the airline will not release the figures. Indication is its share is nearly 60% in the past six months, compared with 41% in the comparable period last year.

► **Growing Fleet**—During the six-month period, an average of only seven Viscounts were in service at any given time.

BEA started with three turboprops when the London-Istanbul service opened, now has 13 in service.

The airline has 28 Viscount 701s on order, all of which should be operating by the end of next year. Twelve Super-Viscount 802s are scheduled for delivery starting in 1955.

► **High Load Factor**—A high revenue load factor on Viscounts—70.8% or nearly 10% higher than BEA's overall revenue load factor—helped return the \$1.1-million operating profit. Equally important is the turboprop's low cost.

Its break-even load factor is reported by British European at 21% on direct operating costs and a 51% break-even load factor on total operating costs.

The cost per capacity ton-mile for the first six months is about 43 cents against about 46 cents for BEA's entire fleet, including Viscounts. Cost per aircraft-hour in the first six months was \$247.80. By September, this figure dropped to \$229.66.

A few points should be made on BEA cost computations:

• **The Viscount is being amortized over a 10-year period but not at the rate of 10% a year.**

For the first five years, the rate of amortization is slightly less than 10%; for the last five years, the rate is slightly higher than 10%. U. S. air carriers currently are depreciating their new equipment on a straight five-year amortization.

• **Introductory costs** of the Viscount—crew training, route testing, etc.—are being amortized as they occur. Because the Viscount fleet is being put into service over a two-year period, these costs, in effect, are amortized over two years. This is similar to U. S. practice.

• **Non-operating overheads**—station charges, advertising and publicity, etc.—are pro-rated for the turboprop in various ways. In some cases, the Viscount's share is figured on the basis of gross weight of the transport; in other cases, total number of aircraft determine the percent carried. Still other bases are used in other non-operating overheads.

• **Interest on capital**, figured as a direct operating cost, actually is borrowing authority granted by Parliament. In return, the airline must figure an assumed interest on its capital outlay approximately equal to the yield a similar investment might bring in elsewhere.

In the case of each Viscount, costing \$630,000, the interest rate is fixed at 3%.

► **Improvements Expected**—Under any reasonable operating procedure, BEA expects the Viscount's first annual report will show marked improvements on its first six months.

One obvious example: Current annual utilization hours per aircraft are low at 1,584—a year's projection based on six months' operation. Vickers quotes a figure of 2,500 hr. a year.

With route testing, crew training and the other chores involved in introducing new equipment, BEA's utilization figure is not up to par yet.

Viscounts in service during the first six months of operation were cleared for only 56,000 lb. gross weight. Turboprops now being delivered are stressed for 60,000 lb. gross. British Air Registration Board soon will certify them for 58,500 lb.

► **Increasing Power**—This is due to

Rolls-Royce development of the Dart turboprop engine.

Darts which are now in service are rated at 1,400 hp. plus 375 lb. of static thrust. Darts coming into service have been boosted to 1,550 hp.

When first put into service, the new Darts will result only in 80 to 90 hp. extra for cruising. Takeoff power will be the same. Reason: Vickers cannot develop new reduction gears and air-screws fast enough to allow for the higher takeoff rating at the start. But as these become available, engines will be converted during overhauls to give the Viscount the necessary added take-off power.

Vickers claims that by increasing the Dart power, Rolls-Royce engineers also succeeded in reducing specific fuel consumption 9%.

► **Operating Costs**—Fuel costs are the biggest item on BEA's schedule of direct operating costs. Engine overhaul is the next largest.

When the Viscount went into service last April, engines were scheduled to be removed every 400 hr. In September, the figure went up to 500 hr.

By mid-1954, BEA engineers hope that 750 hr. will be approved. Vickers goal is 1,000 hr. between major overhauls.

BEA believes the Viscount's performance chart will get better in the next six months. By then, the airline will be able to compile figures on new routes: London to Lisbon and Milan, in addition to Vienna and Glasgow services that began in October and London to Frankfurt that opened in November. Considering that only 13 aircraft are being used, scheduled frequencies are minute by normal U. S. standards.

CAA to Investigate Lightplane Accidents

Accidents involving small aircraft weighing less than 12,500 lb. will be investigated officially by Civil Aeronautics Administration beginning Jan. 1.

Civil Aeronautics Board ordered the lightplane probes, formally putting on record work that CAA has been doing as a matter of expediency. This relieves the Board of some of its responsibility and is an easier operation for CAA, which has more field personnel to do the job.

CAA would investigate each air crash, despite the order, to determine if violation of Civil Air Regulations were involved.

► **Copters Excluded**—Excluded under CAB's order are helicopters and small planes operated by air carriers in Alaska.

Alaskan carriers, for the most part, operate small "bush piloted" aircraft on certificates of public convenience and necessity and thus are subject to CAB investigation, as are heavier transports.

The Board currently subsidizes the three experimental helicopter operations at Los Angeles, Chicago and New York. Therefore, it wants to keep its authority over helicopter accidents.

Included in the class of aircraft to be finally investigated by CAA are executive craft, agricultural, business, instructional, chartered and airtaxi planes.

► **No Hearing Authority**—The new order does not give the CAA Administrator authority to hold a public hearing on any accident he investigates. If a public hearing is desired, CAB will take it over.

This move by the Board was the re-



Lockheed Hits Jet Production Peak

Buildup of jet plane production by Lockheed Aircraft Corp., Burbank, Calif., has reached an all-time high and leveled off, the company reports. This line of T-33 trainers

and F-94C interceptors points up volume operations that have resulted in production of more than 5,000 jet aircraft by the aircraft builder at California and Georgia plants.

sult of a study conducted by CAB to determine areas where duplicating and overlapping functions were performed in regulation of civil airways.

CAB member Joseph Adams orally dissented to the order, arguing that because the Board's previous authority cost nothing but maintained proper independence to review cases, there was no point in the transfer.

CAA Denies Plan To Reduce Regions

Plans for a further reduction of one of Civil Aeronautics Administration's present four regions are denied emphatically by Administrator Fred B. Lee. Consolidation of the Kansas City, Mo., and Ft. Worth, Tex., regional offices were discussed during budget talks, Lee indicates. But he says the regions now will remain at four. The number was reduced from seven to four June 30 (AVIATION WEEK May 11, p. 13).

Meanwhile, CAA engineers are computing work loads in the four regional engineering offices with the idea of removing the engineering facilities at one of the regional headquarters.

► **Economical Efficiency**—Some officials argue that administration of three regions would be more efficient both economically and geographically.

Headquarters of Regions 2 and 3 at Ft. Worth and Kansas City, respectively, are situated close together.

• **Region 3** includes North Dakota, South Dakota, Nebraska, Kansas, Missouri, Iowa, Minnesota, Michigan, Wisconsin, Illinois and Indiana.

• **Region 2** controls North Carolina, Tennessee, Arkansas, Oklahoma, Texas, Louisiana, Mississippi, Alabama, Georgia, South Carolina and Florida.

• **Region 4**, headquartered at Los Angeles, covers the greatest land area and the most sparse population: California, Oregon, Washington, Montana, Idaho, Nevada, Arizona, Utah, Wyoming, Colorado and New Mexico.

• **Region 1**, with offices at New York, controls the smallest land area and the largest population: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Delaware, District of Columbia, Ohio, Kentucky, West Virginia and Virginia.

► **Reducing Expenses**—Reports of consolidation of regional offices probably were inspired by reduction-in-force notices still going out to personnel at CAA headquarters in Washington and by attempts at the regional offices to reduce payrolls and expenses some \$9.4 million during the last six months of fiscal 1954.

Under Alfred S. Koch's direction, the Office of Aviation Safety has eliminated

Reds Retreat

The eastern zone of Germany virtually has been abandoned as an operational area by the Red air force, according to exclusive reports reaching AVIATION WEEK.

Reason for the move, openly admitted by Russian airmen and technicians, is to tighten security. Reds claim all Germans are traitors and say it is impossible to bring a new weapon into the zone with any secrecy.

"The Americans know everything 24 hr. later," says one disgruntled Russian.

Specifically, the air bases of Staaken, Wernichen and Brand-Briesen, which until recently supported large units of MiG-15 interceptors and the Il-28 series of attack-bombers, have been shut down. Ground-based electronic gear has been moved, and tank-equipped security units have been withdrawn. Only token forces of guards remain at these fields, the reports reveal.

its divisional chiefs in each region. It is Koch's policy (AVIATION WEEK Dec. 7, p. 17) to delegate more authority to safety agents in the field who deal directly with the airline industry. Re-alignment of OAS is expected to save CAA \$775,000 a year.

Chiefs to be dropped under the new policy are: E. C. Marsh, Region 1; J. M. Leslie, Region 2; R. W. Delaney, Region 3; and B. M. Jacobs, Region 4.

Because of their seniority, technical ability and position, the division chiefs will be reassigned within their respective regions.

Union Outlook Grim In NAA Wage Strike

National Labor Relations Board last week dismissed a charge by United Auto Workers (CIO) that North American Aviation has refused to bargain in good faith for a settlement of the wage walkout at California and Ohio plants.

NLRB's ruling took another round from UAW as the strike entered its seventh week.

► **Shattered Plans**—The union's plans for an industry-wide wage fight were shattered when members of the International Association of Machinists (AFL) at Douglas Aircraft Co.'s El Segundo plant voted to accept a company offer.

Workers at Douglas-Santa Monica also decided against a walkout. Lockheed Aircraft Co. and IAM last week

announced agreement on a new contract.

Elsewhere in the industry, settlements based on the El Segundo pattern were being signed by Hughes Aircraft, Northrop, Rohr and other companies.

► **Thinning Picket Lines**—Strains of the strike were beginning to show within UAW locals as North American reported that 45.1% of NAA's total work force of 33,136 men had left picket lines to return to their jobs as of Dec. 8.

NAA's back-to-work tally: Los Angeles, 8,775; Fresno, Calif., 297; Columbus, Ohio, 6,072.

One union official reluctantly admitted that "a lot of people are back to work." His prediction: The strike might not last too much longer.

CAB Blames VFR Flight in Bay Crash

Cause of the Western Air Lines DC-6B crash in San Francisco Bay Apr. 20, fatal to eight of the 10 persons aboard, probably was an attempt by the pilot to fly beneath the prescribed 500-ft. minimum altitude to maintain visual contact, Civil Aeronautics Board finds.

The plane was crossing from San Francisco Airport to Oakland Airport on a routine trans-bay clearance, providing for a 500-ft. minimum on VFR clearance. Ceiling in the middle of the bay dropped below that, and the plane flew into the water.

When the ceiling drops below 500 ft. on a trans-bay clearance, Civil Air Regulations require the pilot to climb and transfer to instrument clearance, rather than attempt visual flight below the prescribed 500-ft. minimum.

No evidence of aircraft malfunction was found by CAB investigators.

PAA Stratocruiser Drops Engine in Flight

Crew members of the Pan American World Airways Stratocruiser that landed on Johnston Island after dropping an outboard engine Dec. 6 were scheduled to report to Civil Aeronautics Board investigators on the incident last Thursday.

The transport lost one of its Pratt & Whitney R4360 engines 10,000 ft. over the Pacific about 700 mi. southwest of Honolulu, where it had stopped en route from San Francisco to Tokyo.

Severe buffeting was experienced, investigators learned, as the engine wrenched free of the wing. The plane immediately went out of control, but pilots were able to right the aircraft and fly 350 mi. to Johnston Island for a safe landing.

Nacelle of the lost engine is being returned for investigation.

PAA Orders Seven Long-Range DC-7Bs

Pan American World Airways has ordered seven Douglas DC-7Bs, long-range overwater version of the DC-7 designed to carry 52 passengers 4,000 mi. nonstop with nearly 1,000 gal. of fuel reserve. The DC-7B fleet, to be delivered in 1955, will cost approximately \$14 million.

The planes will be powered by Wright Turbo Compound TC18DA4 engines delivering a total of 13,000 hp. The DA4 model of the Turbo Compound differs from the present DA1 and DA2 versions in providing 100 additional Meto (maximum except takeoff) power. The DC-7B's gross takeoff weight will be 125,000 lb. and fuel capacity will be 6,260 gal. Weight and fuel capacity are greater than for the DC-7s placed in domestic nonstop service recently by American Airlines (AVIATION WEEK Nov. 30, p. 15).

PAA's new transports will be capable of flying from New York to London in slightly more than 10 hr, according to Nat Paschall, Douglas vice president-

sales. The DC-7B also will be able to fly San Francisco-Honolulu in 7 hr. 42 min., Honolulu-Tokyo in less than 14 hr. with one stop and New York-Buenos Aires in 18 hr. 47 min. with two stops, says Paschall.

CAA Orders Fatigue Check on DC-6 Part

Operators of Douglas DC-6 aircraft were advised by Civil Aeronautics Administration last week they must inspect upper pivot ends of the aileron-cross bell-crank tube located in the center wing fuselage section at Wing Station 479 at every overhaul period or every 2,000 hr., whichever comes first.

For some months airlines have noted fatigue cracks in that section of the aircraft. CAA's earlier airworthiness directive called for a 1,500-hr. inspection for such cracks. The revision to 2,000 hr. was made at the suggestion of Air Transport Assn. since inspection requires considerable breakdown.

The directive specifies that the inspection is to be made with an eight-power magnifying glass and/or the Dy-Chek

method at the shoulder corner radius of the aileron-cross. If cracks are found, the part must be replaced before the airplane's next flight.

An inspection also must be made after the airplane is exposed to high gusts on the ground which put particular strain on the section concerned.

Lack of Orders Closes French Plane Plants

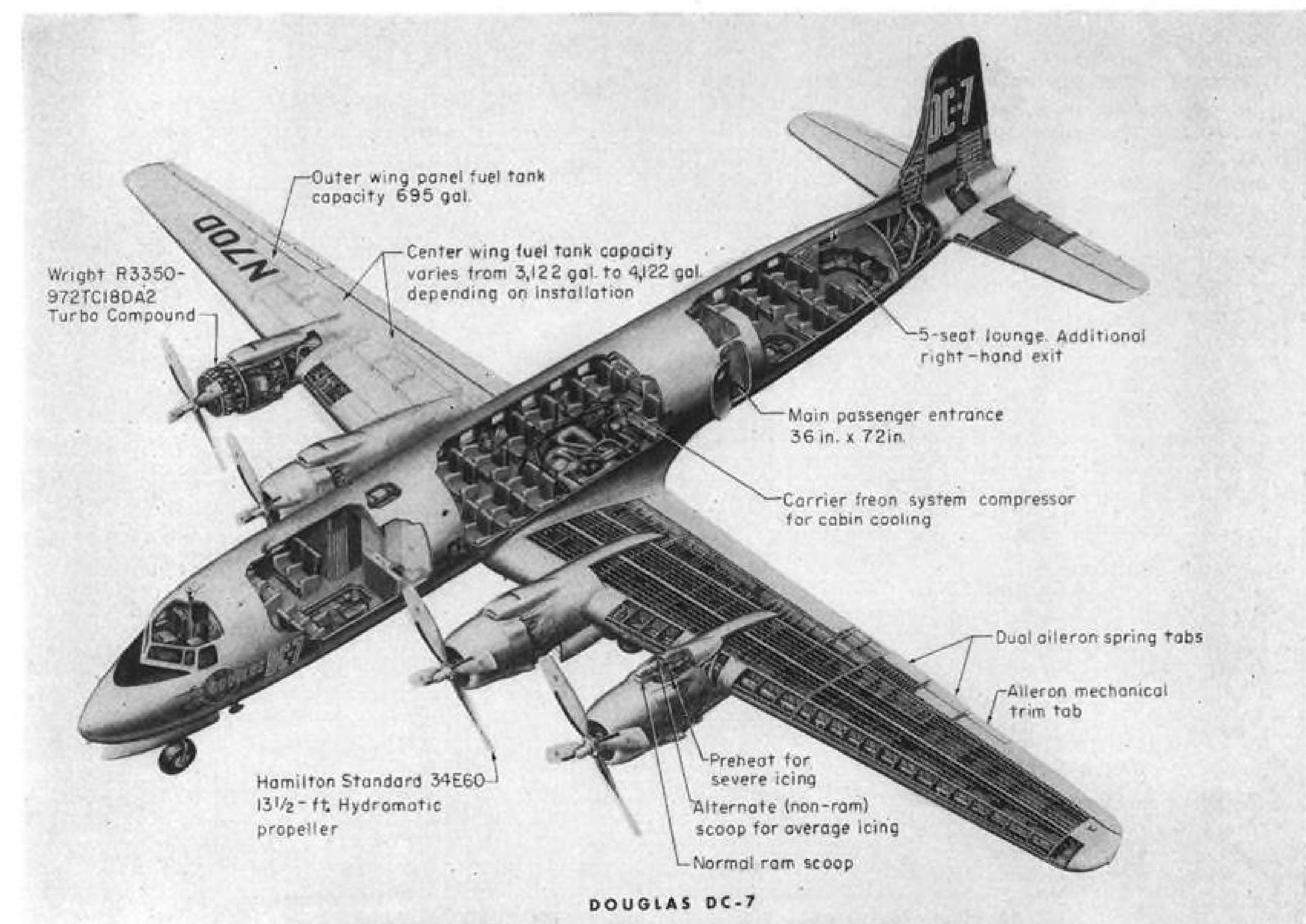
(McGraw-Hill World News)

Paris—Two French aircraft builders will shut down plants permanently this month because of lack of orders.

• Societe Nationale de Constructions Aeronautiques du Nord (Sncan), one of the three big nationalized airframe builders, is turning its Sartrouville factory over to Radio Industrie. Sncan employed 1,200 at the plant.

• Morane-Saulnier is closing its plant at Puteaux, near Paris, where 550 workers are employed. It will continue to operate its factory at Ossin, near the Spanish border.

Sncan closed its big plant at Le Havre



Inside the New Douglas DC-7 Airliner

First detailed cutaway drawing of new 400-mph. Wright Turbo Compound-powered DC-7 transport of the type being used by American Airlines in transcontinental nonstop service. A number of the airliners are being produced by Douglas Aircraft Co., Santa Monica, Calif., for AA (25), Delta-C&S (10), EAL (12), National (4), PAA (see story above), Panagra (5), and UAL (25).

last September, but will continue to operate four other factories.

Closing of the three plants reflects difficulties of the two firms in attracting sizable orders for the Nord 2501 twin-engine transport and the M. S. 733 jet trainer.

Army Calls Copter Top Freight Vehicle

Helicopters promise to develop into the nation's top freight vehicle—both commercial and military, forecasts Army's air transport chief.

But Col. William B. Bunker told the recent fifth annual Air Cargo Day of the American Society of Mechanical Engineers that copter builders must find ways to cut maintenance costs and improve designs from a functional standpoint.

"There is too much airline philosophy and not enough thinking about the trucking technique," he says.

► **Cargo Advantages**—Bunker says more than 85% of all cargo movements in the U. S. are over distances of from 50 to 100 mi., giving helicopter transports advantages over both fixed-wing aircraft and highway freighters.

He predicts that big rotary-wing aircraft, with capacities up to five tons, soon will be moving more than 80% of men and supplies needed by an army in the field.

► **Future Projects**—James M. Glod, cargo superintendent for American Airlines, warns that air carriers must back further development of terminals with greater consideration for airfreight.

Pointing up areas for concentration in the future, he calls for improvements in these cargo operations:

- **Simplification** of traffic practices.
- **Application** of modern material handling techniques.

► **Airfreight Packaging**—Heavy emphasis is placed by the conference on proper packages of freight prepared for shipment by air.

John Mount, marine service manager for the Insurance Company of North America, says recent studies indicate air cargo shipments could be improved by development of containers that would consolidate small packages into one loading unit.

Such a container would have to permit rapid and efficient loading of consolidated random cargo and unit loads, he says. But these advantages would have to be obtained at a low-weight penalty because of critical limitations of excess tare weight on airlifts.

Mount gives this summary of containers that are now available for air cargo:

- **Advantages.** Time would be saved in loading freight on transports and in handling materials at terminals.

Policy Deadline

Civil aviation policy review of Air Coordinating Committee for the President is moving along with each member agency working on "initial papers" for submission to the whole committee Feb. 1.

Written industry comments, due the end of this month, will be followed by brief informal discussions. Final committee recommendations to the President are now slated for Apr. 1.

- **Disadvantages.** Floor loading would be limited, prohibiting use of fork lift; loss of capacity because of high tare weight.

Plane Repairs Return Top Fixed-Base Profit

Facilities for major aircraft repairs are the single most important factor in profitable fixed-base operations, a survey by New York State's Bureau of Aviation indicates.

This branch of service is "practically ignored" by the operators who report unprofitable business, the study says.

Key revenue producers for practically all of the profitable operators surveyed and four-fifths of the unprofitable ones are flight instruction and plane rental.

The bureau makes no claims that following survey conclusions automatically would turn an unprofitable business into a money-maker, but it submits these suggestions "with considerable confidence."

- **Operations** are more likely to be profitable at a large airport than at a small one.
- **At airports** of approximately equal size, the operator with the greater number of planes is more likely to be successful.
- **Addition** of a good major repair department is "most highly recommended."
- **Advertising** by all of the profitable operators, while only half of the unprofitable operators do so, "has an obvious lesson."
- **Flight instruction** and plane rental produces high revenue almost everywhere it is offered and is a "must" for operators not emphasizing it at the present time.

Some other conclusions reached by the pollsters that do not stand out as clear as the preceding and can be accepted only tentatively:

- **Aerial mapping** and photography seem to be profitable sidelines.
- **Gas and oil**, sold by nearly every operator surveyed, is a key revenue producer for only half of them.

• **Airplane sales and service** are leading revenue producers at many of the operations. Addition of a sales agency "should be seriously considered by operators now ignoring this branch of service," the report says.

• **Charter service and hangar storage** are considered important by unsuccessful operators far more often than by profitable ones. It is suggested that the former examine the costs of these items to see whether expenses are cleared—or else put more effort into those other services that rank high at profitable bases.

No Strategy Change In New Year: Radford

The fiscal 1955 military budget will not reflect any radical change in strategy, according to Adm. Arthur W. Radford, chairman of the Joint Chiefs of Staff.

Radford says the Joint Chiefs consider it "absolutely mandatory that we not make any recommendations for radical changes" for the immediate future.

"The forces recommended (for the fiscal 1955 budget) do not represent any material change from those developed in previously approved plans, except for increases we recommended for continental defense," Radford reports. "They represent interim levels pending formulation and completion of a longer-term program which continues under study."

Air Transport Called Key to Africa's Future

Inland Africa's future development depends wholly on aviation, says A. F. Mouragues, former governor of French Sudan.

Several years of study will be required to work out a practicable air cargo system, he predicts, but prospects are excellent because of the ready market along the coast for Sudanese fish and meat, not readily transportable now.

"Strangling bottlenecks of bad roads, long distances and the feeble capacity of the railroad will be broken," he says.

Mouragues envisages the time when remote sections of the "Dark Continent" will be able to ship exports to coastal markets in a matter of hours.

N.Z. Studies Copters

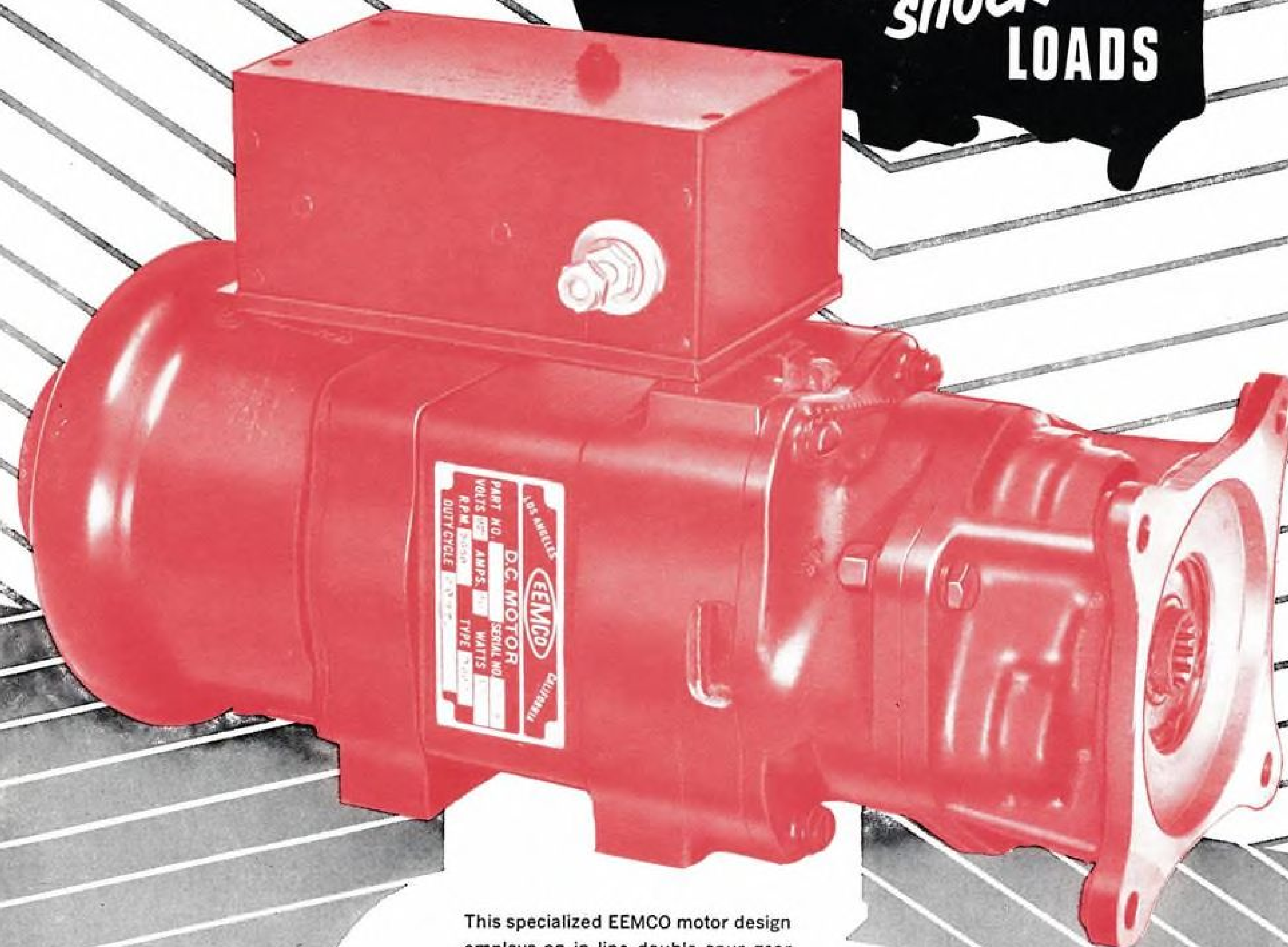
(McGraw-Hill World News)

Melbourne—The New Zealand government has appointed a special committee to study the technical and economic aspects of helicopter operation in that country. Emphasis is on ability to carry fire fighters and equipment to remote bush areas.



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bulletin

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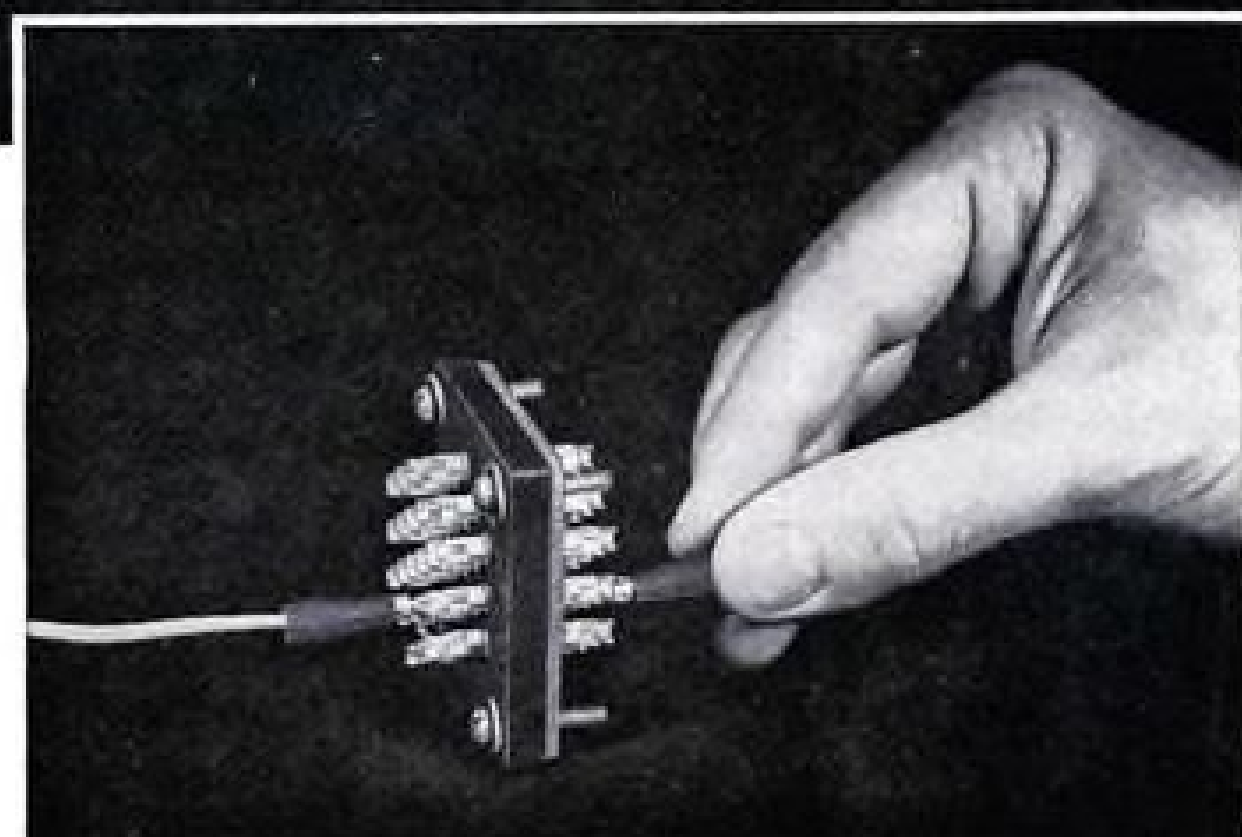
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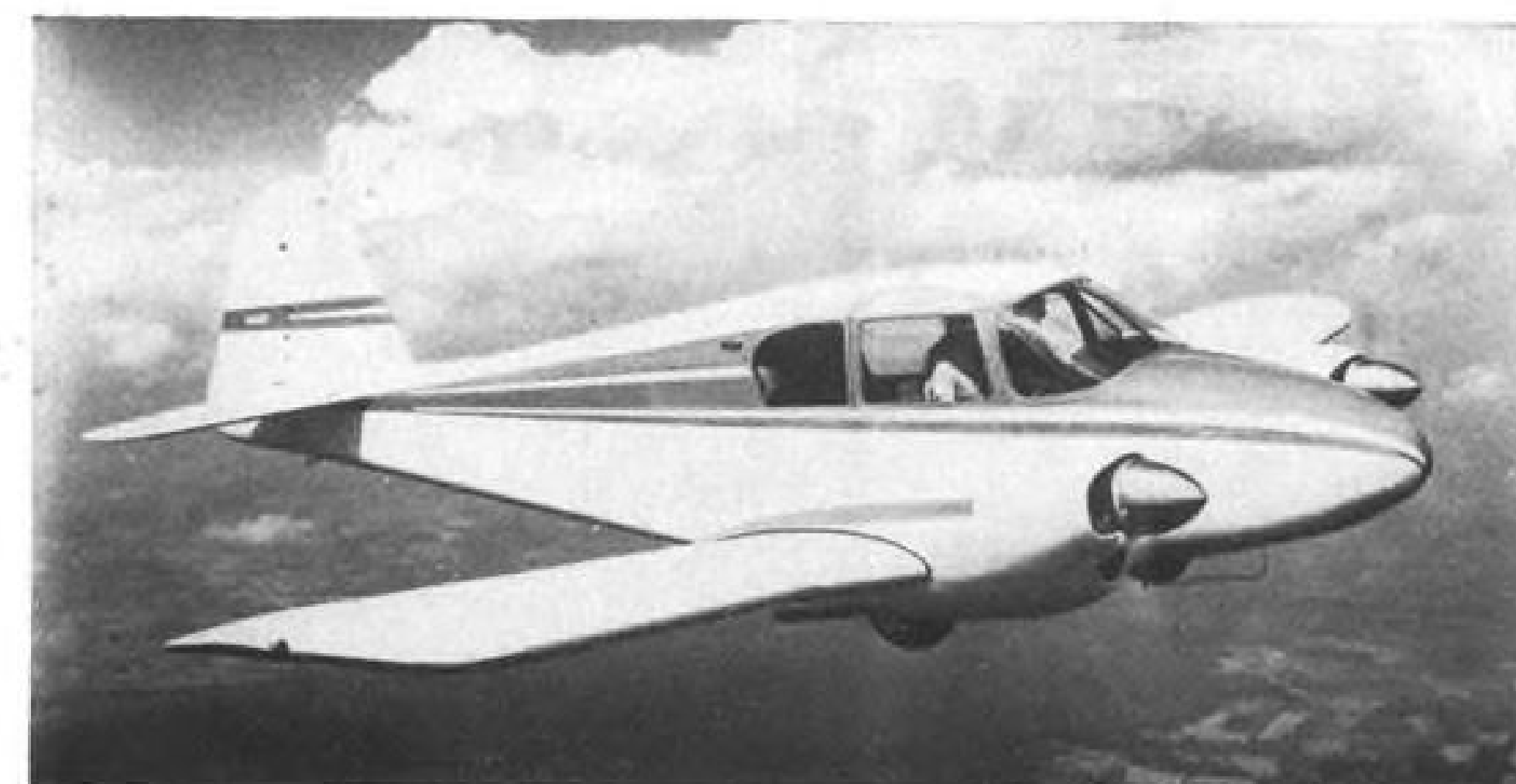
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Lightweight insulating covers are available. Burndy miniaturized panels with 10, 19, 22, 26, 37, 45, 62, 73 and 163 individual sockets, have been selected for use in latest Air Force and Navy aircraft.

Most Burndy miniaturized panels fit in the same bulkhead space as standard AN connector shell sizes. Other socket multiples and sizes may be quickly produced to your design requirements.



Business Flying

Piper Readies Apache Sales Push

Executive pilots soon will get a look at new all-metal four-placer costing about \$35,000 fully equipped.

Early next year Piper Aircraft Corp. will send its all-metal PA-23 Apache four-placer on a nationwide demonstration tour to acquaint business-plane owners and pilots first-hand with the new low-cost twin-engine executive plane. Piper will be ready to start deliveries in January.

The Lock Haven, Pa., manufacturer says it will have invested \$1.25 million in engineering, development, stress tests, CAA certification, tooling and materials on the Apache before it gets back a single dollar in sales.

► **The Market**—Howard Piper, vice president-development, figures that with current twin-engine metal aircraft priced in the upper-five-figure bracket, a good market exists for a new twin selling for \$35,000 and less.

These are the categories to which the Apache is expected to appeal:

• **Single-engine plane owners** and air taxi operators who are normally limited to daylight, VFR flight operations. Piper estimates that twin-engine equipment would double or even triple their current effectiveness.

• **Multi-engine aircraft owners** who restrict the use of their DC-3-class equipment because of its relatively high operating cost. Apaches could supplement these planes, Piper feels, and also extend operations into airports that cannot take the larger transports.

► **Price**—Apache prices will run from \$32,500 for the standard model having no radio, to \$35,075 for the Custom model, which is equipped with Lear ADF, Narco Omnigator and Narco Simplex. This combination provides one low-frequency receiver and ADF, two high-frequency receivers (one with omni and the other with a tuning fre-

quency locator), two VHF transmitters with a total of 20 channels, a marker beacon receiver and an ILS runway localizer feature. Room for additional radio is provided.

The Super Custom will have an autopilot in addition to this equipment. ► **Performance**—Performance as well as low price will be plugged by Piper in its Apache campaign.

The plane recently completed two months of accelerated day-and-night tests and has shown that fully loaded it has a maximum sea-level cruise speed of 160 mph.; at its optimum altitude of 6,000 ft., cruise speed is 165 mph.

"Fully loaded" means with complete instrumentation, three radios, gas tanks full with 72 gal., and four 170-lb. passengers, 198 lb. of baggage and other equipment.

Single-engine ceiling is 5,000 ft. fully loaded, and 8,000 ft. with an average flight load.

The Apache will take off or land anywhere that a Tri-Pacer can operate, says Piper. The new twin-engine business plane requires 900 ft. to reach CAA takeoff speed (just over stall) when fully loaded, but Piper says it has demonstrated its ability to get off after a 700-ft. run and requires only 670-ft. landing roll.

This performance is the result of a combination of Piper's modified US-35B high-lift airfoil section in a wing embodying 204 sq. ft. of area; the 150-hp. four-cylinder, 320-cu. in. Lycomings; constant-speed, controllable, full-feathering Hartzell metal propellers, and a vigorous weight-saving campaign that kept the Apache's empty weight to approximately 2,170 lb. when completely equipped with instruments,

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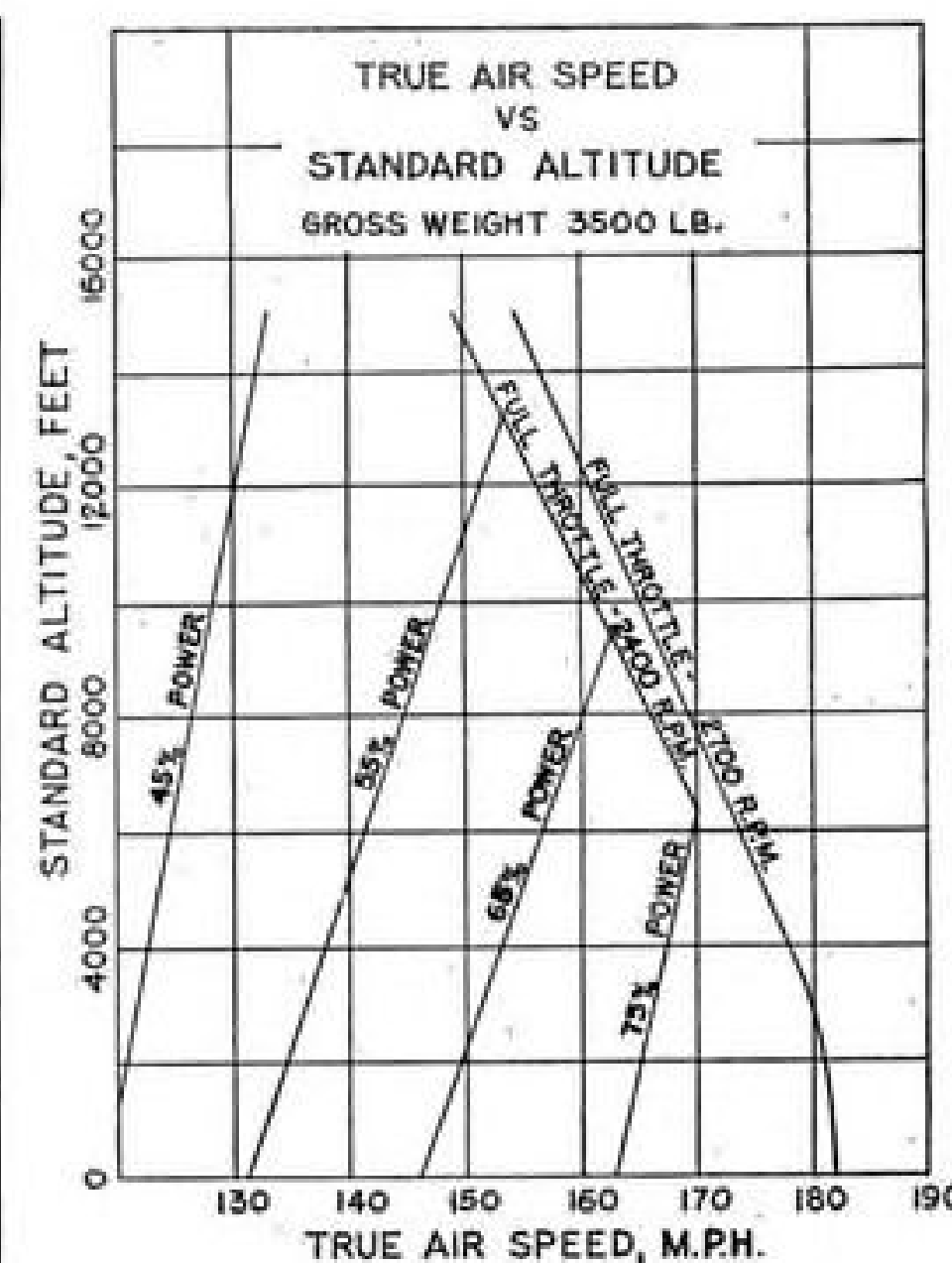
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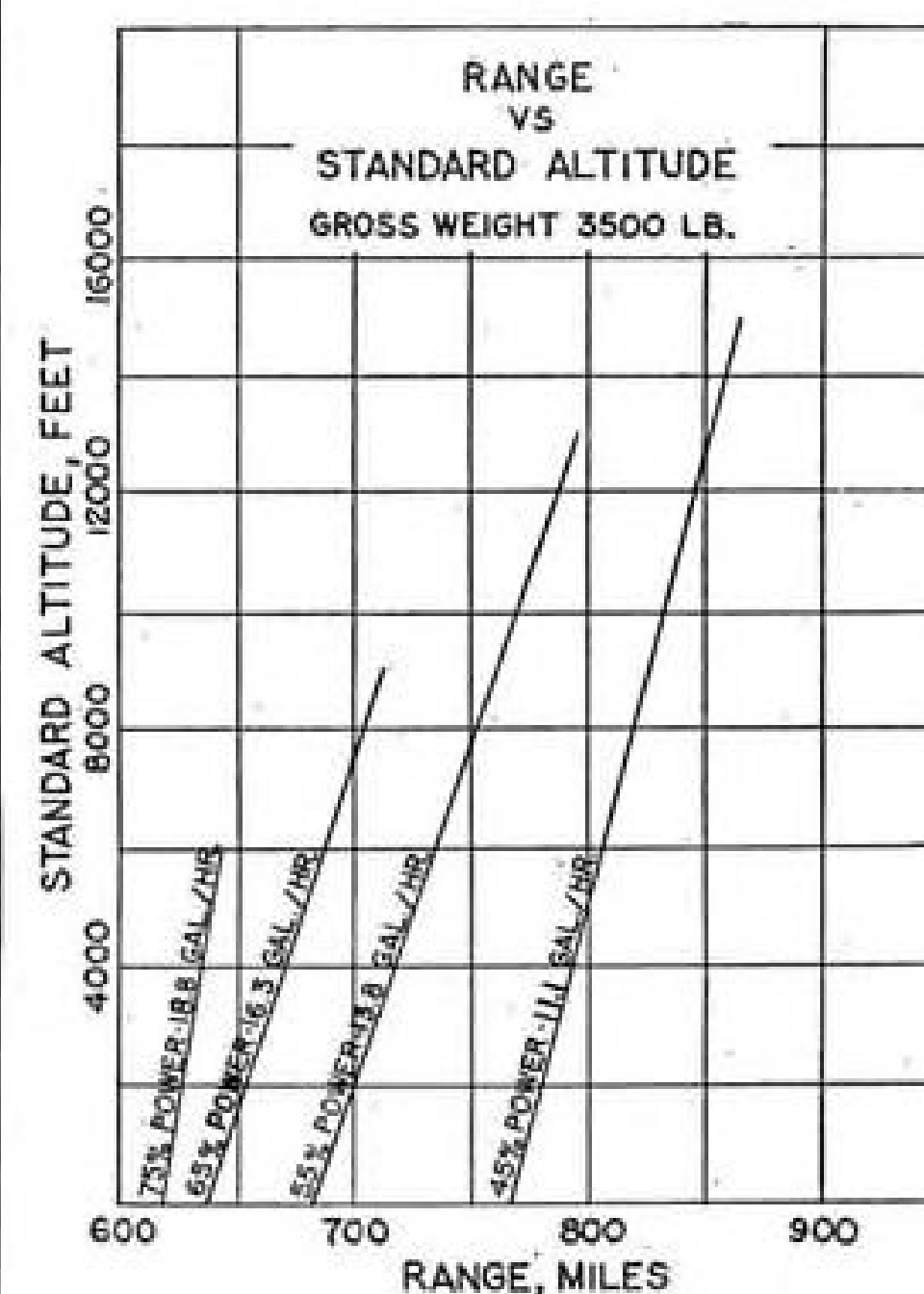
three radios, six antennas and other items.

Controls are conventional dual-wheel type with toe brakes on the left rudder pedals and connections to the steerable nose wheel. Rudder and elevator trims are located overhead between the pilots and are designed to permit hands-off single-engine flight.

A 25-cu. ft. baggage compartment is located behind the cabin, opening on the right side. In addition, if the rear seats are removed, an unobstructed freight capacity from the rear of the front seats to the rear of the baggage compartment of 80 cu. ft. is available. The seats can be taken out in two minutes without using tools.

► **Structural Details**—The PA-23 has been designed to permit quick, economical production in line with the philosophy that has been used in turning out the 37,000 Pipers previously built.

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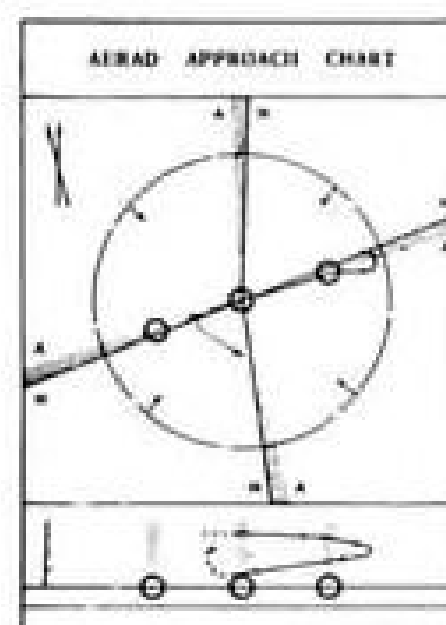
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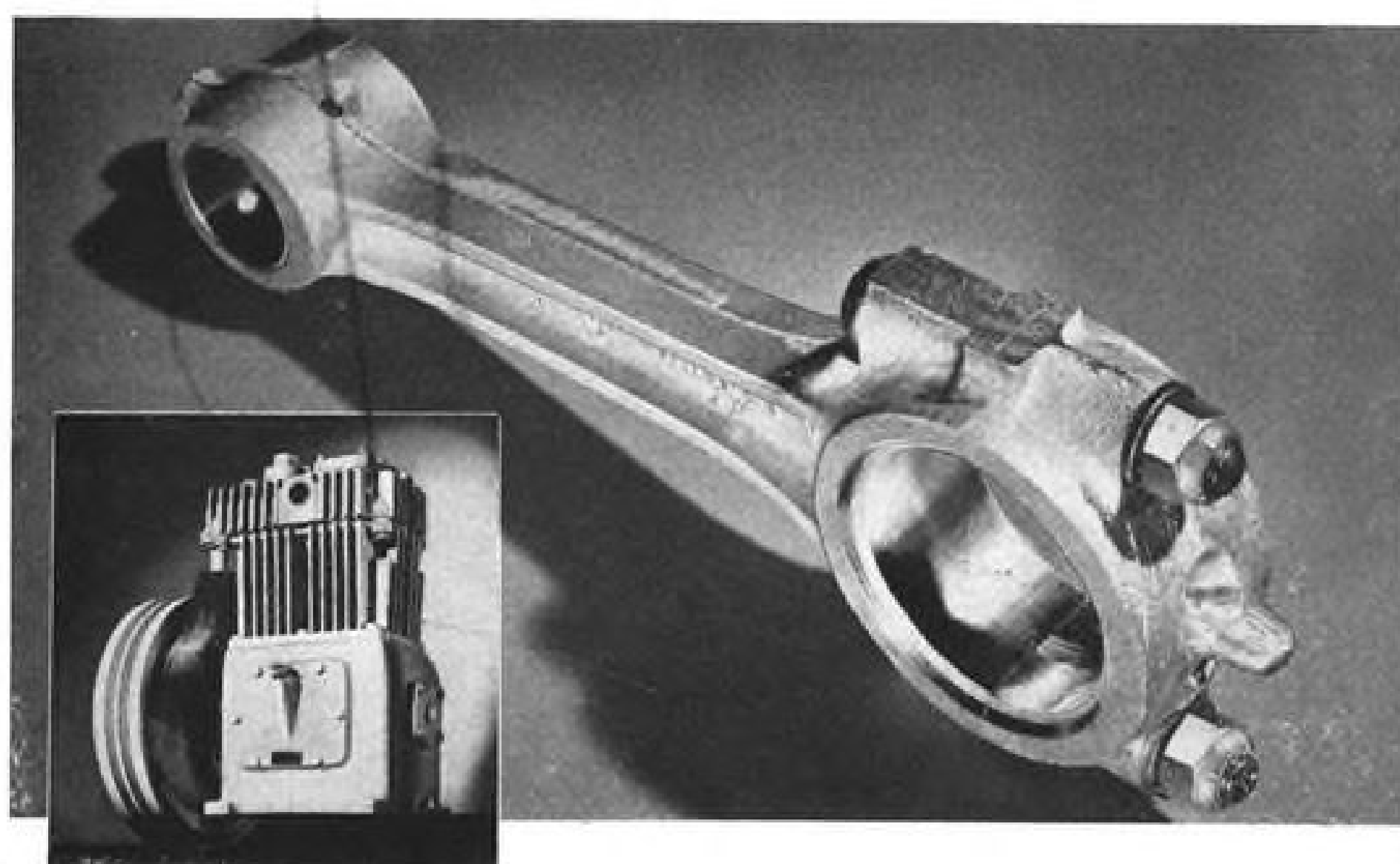
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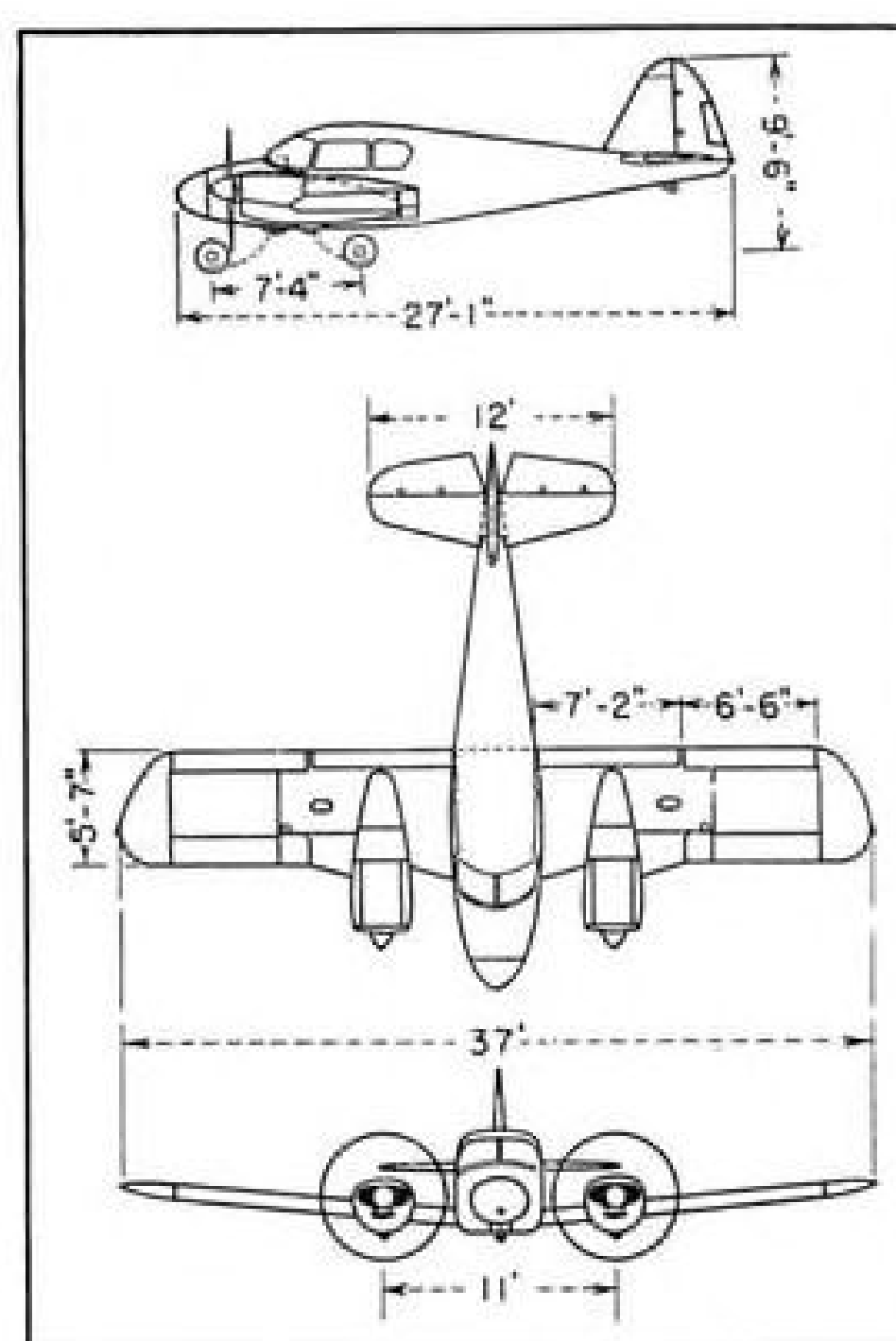
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- Engines
2 Lycoming O-320 @ 150 hp. ea.
- Gross weight 3,500 lb.
- Empty weight (Custom)..... 2,158 lb.
- Useful load..... 1,342 lb.
- Span 37 ft.
- Wing area 204 sq. ft.
- Length 27.1 ft.
- Height 9.5 ft.
- Power loading..... 11.7 lb./hp.
- Wing loading..... 17.2 lb./sq. ft.
- Wheel base 7.3 ft.
- Wheel tread 11 ft.

wing makes it possible to use many interchangeable parts. Basically the structure consists of a massive stepped-down front spar, a rear spar, lateral stringers, stressed skin sections and readily detachable wingtips.

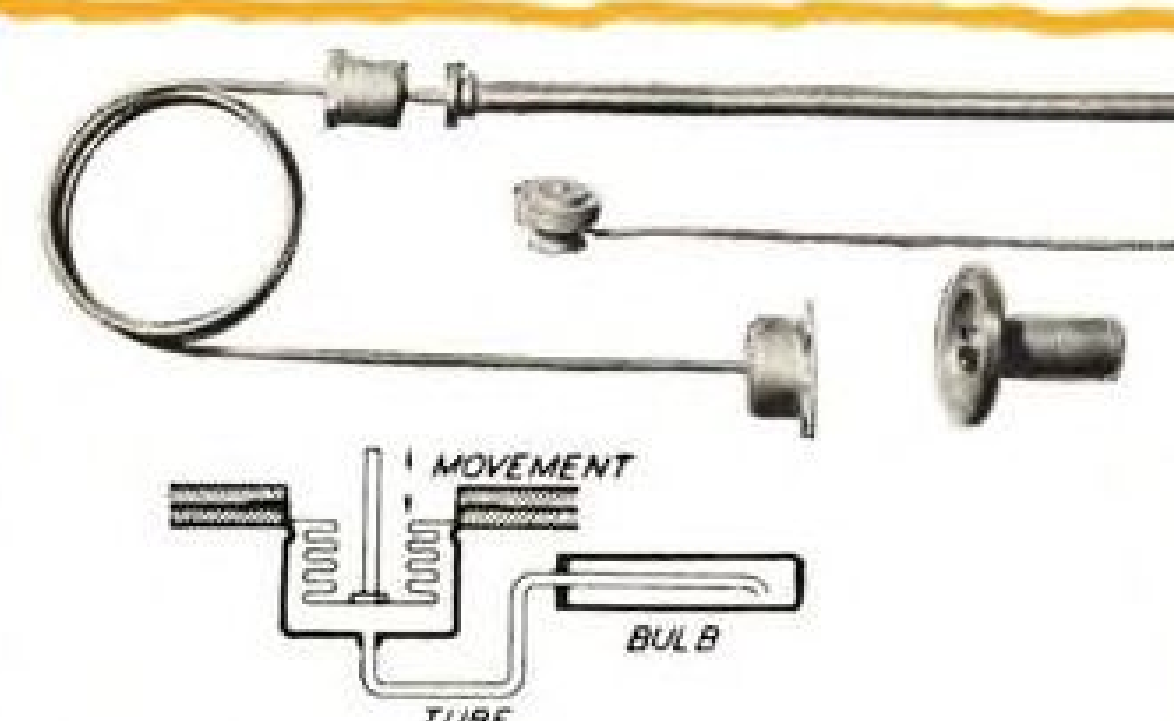
Attachment to the tubular center section structure is by fittings at the side and center of this structure and the main spars are bolted together using high-strength butt fittings in the center of the fuselage. This scheme in effect provides a single continuous front spar, but allows easy removing of the wings when the plane is to be dismantled.

In the forward portions of the wings and fuselage there is flush riveting wherever standard rivet head projection might set up critical drag. Elsewhere universal-head rivets are used, except for places where flush riveting can be done using automatic riveting machines.

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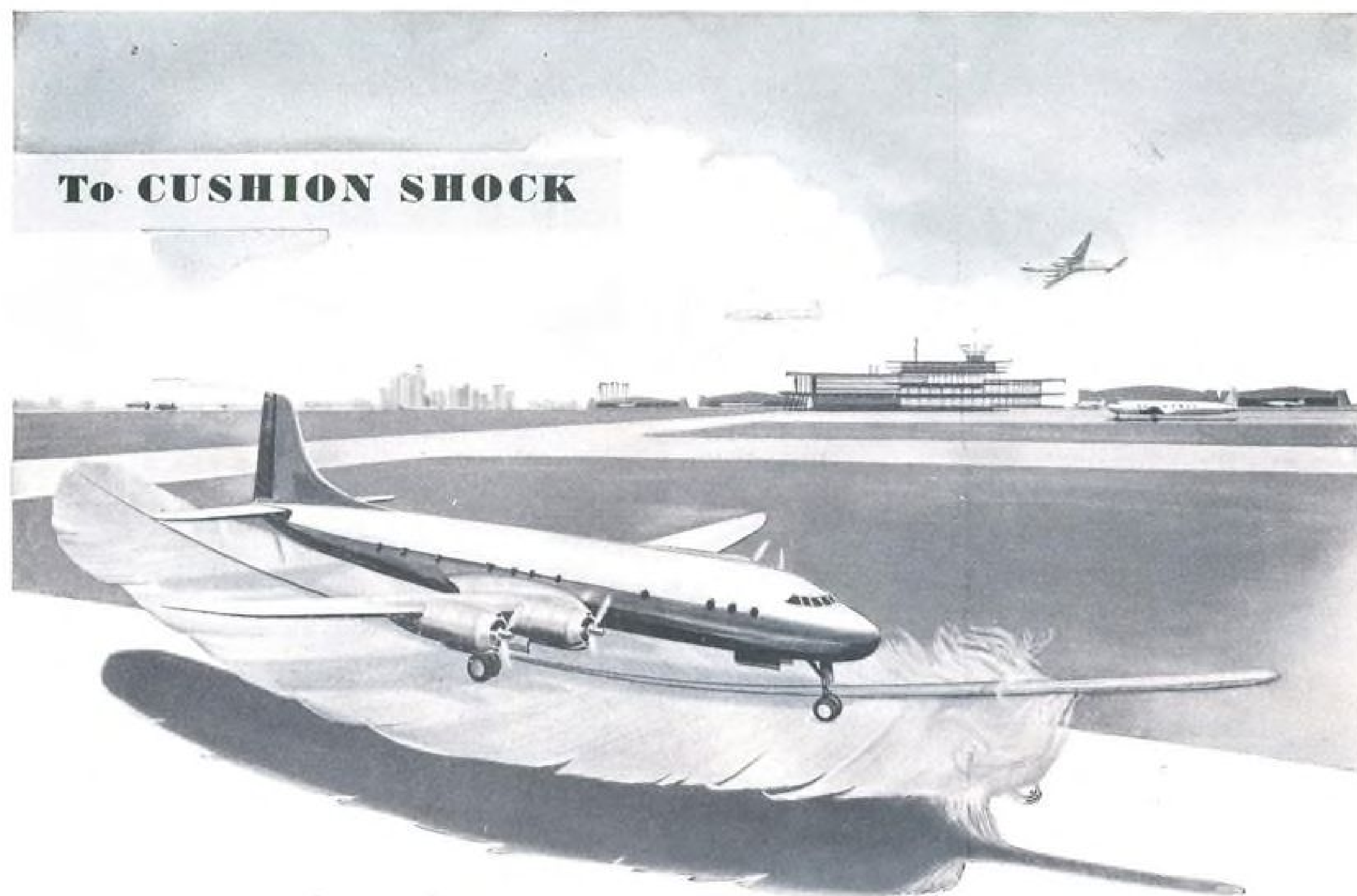


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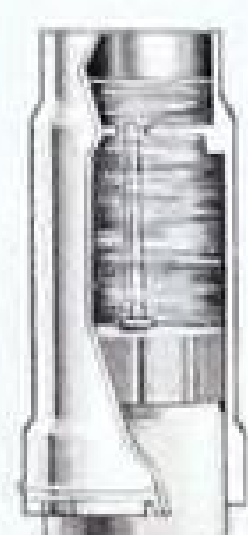
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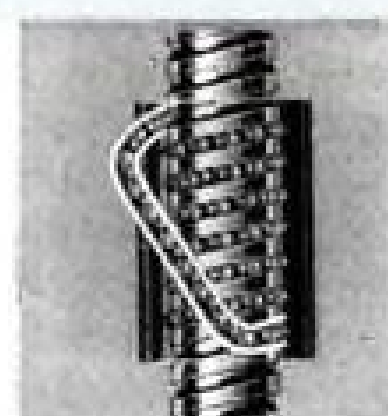
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on the interior. Tubular parts are protected by primer and enamel coatings.

► **Landing Gear**—Long-travel air-oil Electrol landing gear units are used, with many components interchangeable on all three legs. Main wheels are fitted with 600x6 Goodrich wheels and brakes and 700x6 tires; nose wheel carries a 600x6 wheel and tire. Landing gear retraction and extension is done hydraulically, actuated by an engine-driven pump. It takes approximately 11 seconds to get the gear up.

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► **Fuel System**—A 36-gal. flexible fuel tank is located outboard of each engine. An engine driven pump feeds each engine from its adjacent fuel cell. There is also an electrical pump in each line to feed the engines if the other pump fails.

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A Piper-developed cross-over exhaust system combined with an augmentor arrangement is used. Exhaust gases are directed into stainless-steel stacks crossing over in front of the engine and emptying into single six-inch exhaust augmentor tubes located on the outboard side of each Lycoming engine beneath the wings—EJB.

Argentina Designs Flying-Wing Freighter

A four-engine, all-metal flying-wing cargo transport is one of eight civil and military aircraft projects included in Argentina's second five-year plan, an official government news agency reports.

The transport will have a capacity of eight to 10 tons and will be powered by domestically designed and manufactured engines, according to this source.

Other Argentine aviation projects include: supersonic and subsonic wind-tunnels, a high-thrust axial-flow jet engine for new types of planes being planned, and several new piston powerplants.

► **New Planes**—In addition to the new transport, aircraft developments to be handled by the nationalized Industrias Aeronauticas y Mecanicas del Estado (IAME) include:

• A five-jet, 40-passenger transport. Plans to build a four-jet, 40-passenger



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jet airliner in Argentina were disclosed earlier by Dr. Kurt Tank, former Focke-Wulf designer.

- An 18-passenger transport constructed of native wood. The Argentine government is emphasizing development of domestic resources.

- A wood three-place civil plane.

- A two-place glider for training, of wooden makeup.

- A two-place, all-wood advanced trainer, with an Argentine engine.

- Production of the IAME-35 twin-engine, multi-purpose trainer and light tactical aircraft, now undergoing flight tests (AVIATION WEEK Nov. 16, p. 18).

► **Jet Fighter**—Latest flight tests of the tank-designed Pulqui 2 sweptwing jet fighter "have been very satisfactory," reports the Argentine Minister of Air. The plane could go into mass production "very soon," he said. The Pulqui 2 first was flown in June 1950. (AVIATION WEEK Aug. 21, p. 21).

According to the government news agency, there has been considerable interest in Europe in the jet fighter, and one country is slated to send a mission to Argentina soon to investigate possibilities of obtaining manufacturing rights to the plane.

ODM Urges Higher

Civil Plane Output

Expansion of commercial aircraft production and avionics plant capacity is urged by the Office of Defense Mobilization, offering rapid tax writeoff benefits as an incentive.

ODM discloses that commercial plane production still is 5% short of the goal set. Avionics production capacity is 23% short.

Other expansions urged by ODM include: primary aluminum, 12% short; aluminum sheet and plate heat treating facilities, 52%; aluminum sheet and plate producing facilities, 3%; heavy aluminum aircraft forgings, 50%; titanium, 50%.

ODM says no further tax amortization benefits will be authorized for expansion of military aircraft production capacity, pending a review.

In an official order, ODM takes these actions on the 237 expansion goals set up to broaden the industrial base:

- Expansions for 120 goals already reached are banned from further tax amortization benefits.

- Expansions for 49 goals—including military aircraft capacity—are "suspended" and banned from tax amortization benefits but declared "under active consideration."

- Expansions of the 68 goals still not reached are declared "open," and ODM director Arthur Flemming invites industry to participate in meeting them.



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AERONAUTICAL ENGINEERING

Transport Trend Hinges on BOAC Choice

• Carrier will likely pick next transport from these: DH jet, Bristol turboprop, Vickers bypass design.

By David A. Anderton

London—A decision which must be made by British Overseas Airways Corp. within the next few months is expected to have far-reaching effects on the trend of advanced transport design.

► **Five-Card Hand**—The British carrier will choose the next addition to its gas-turbine-powered fleet from among a field of five entries. That choice will shape the pattern of civil aircraft production in England for years to come, and will influence the designers of competing aircraft in the U. S. and other countries.

Each of the five airplanes is designed to roughly the same requirement. They are to cruise at high subsonic speed, and carry about 100 passengers across the Atlantic from London to New York nonstop.

But there the similarity ends. The available designs cover a wide range of aerodynamic, structural and powerplant variations. Perhaps most interesting is the fact that three types of current gas turbines — the turbojet, the bypass (modified turbojet approaching ducted fan) and the turboprop—are all represented in the nacelles of the contenders.

But BOAC has had substantial experience only with the turbojet-powered de Havilland Comet; its turboprop fleet of Bristol Britannias is scheduled for delivery soon, but not soon enough to enable the airline to acquire much experience before making its decision.

So the final selection will have to be based on calculated performance, economics and production dates, influenced somewhat by the limited experience with only two advanced aircraft.

► **The Proposals**—These are the five competing aircraft companies and their proposals:

• **De Havilland**, with the Comet experience under its belt, is developing an advanced version—some say an entirely new design—powered with turbojets.

• **Bristol**, with Britannia production well along and with increasing experience with turboprops, is backing the combination of a turboprop powerplant with an advanced Britannia airframe.

• **Vickers-Armstrongs**, holding a mili-



VICKERS entry in BOAC race is civil version of Vickers 1000 jet (model above).



BRISTOL contender is advanced version of turboprop Britannia shown here.

tary contract for a jet transport prototype, is working on a similar civil version, powered with bypass engines.

• **Avro**, beating the drum for the delta, offers a design for the Atlantic, a four-turbojet transport with the triangular geometry of the Vulcan.

• **Handley Page**, with a winner in the bomber sweepstakes, has adapted the crescent-wing layout of the Victor to a trans-Atlantic transport.

Most technical observers are agreed that the final choice will be made from among the first three. But they emphasize that the choice will be more than just naming an airplane; BOAC will be choosing a powerplant, and perhaps even the type of traffic operations it will undertake.

For background on this important story, AVIATION WEEK visited the de Havilland, Vickers and Bristol factories,

and talked to the technicians who are developing their company's hopes for tomorrow.

De Havilland

The successor to the Comet line—the Comet X—will be a different airplane, but still powered by turbojet engines. The design should be finalized within a year, and the development is aimed at an in-service date of 1960 or 1961. Prototype cost would be underwritten as a private venture by the company, much as were the Comet and the Gyron engine programs.

"It reduces finally to the type of service the airline wants to offer," said Frank Lloyd, DH sales manager. "We see it as competition between fast service and cheap service; there should always be enough demand for speed and

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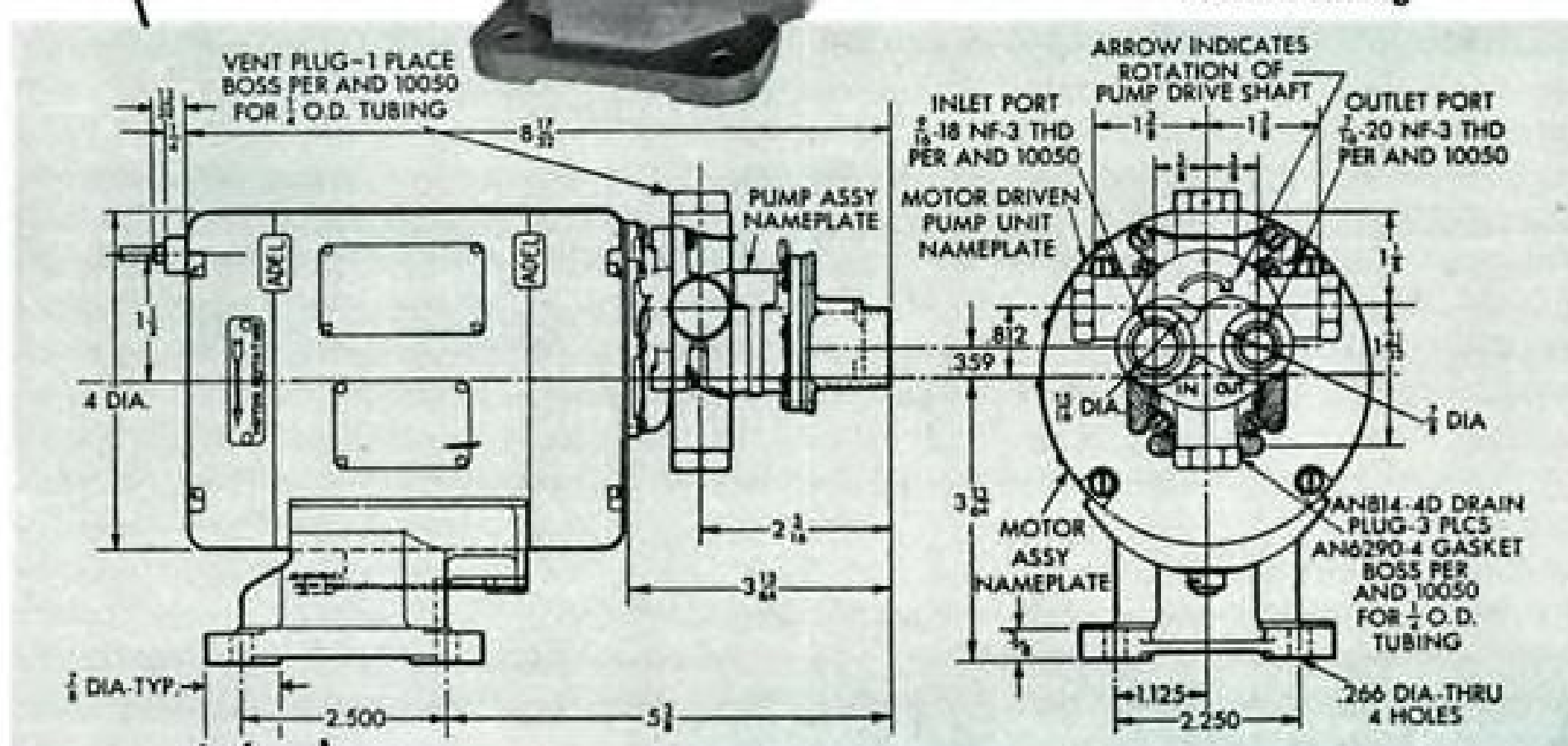
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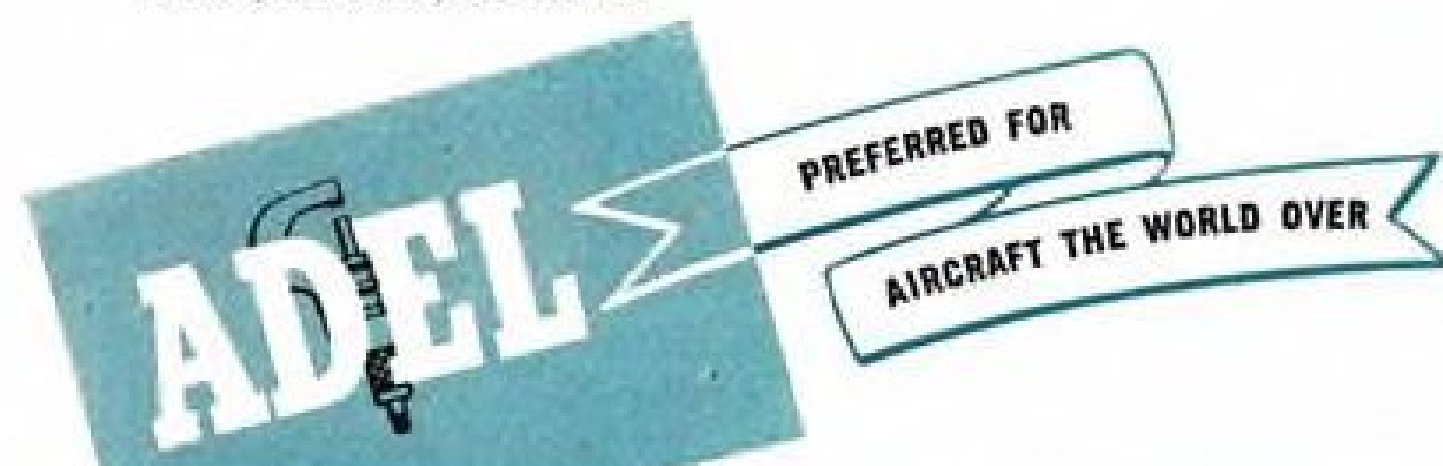
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the extra service to justify an aircraft
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effort to offer cheap service with the
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► **Powerplants**—Simplicity of the turbo-
jet engine was one of the deciding fac-
tors in DH's choice to stick with that
type of engine for its Comet X.

In addition, time between overhauls
is high and going higher; overhaul cost
is low. The company is talking in terms
of 1,000-hr. engine life now, and sees
no reason why this figure shouldn't go
to 2,000 hr. The DH Ghost engine
already has been approved for 750 hr.

With about 90,000 engine hours
racked up on the Ghosts in the Comets,
the company has enough experience to
quote overhaul costs on a fixed-price
basis.

One objection to turboprops was
cited by a company spokesman. He
said that the problem of taking large
amounts of power out through reduc-
tion gearing is difficult, and probably
one of the biggest troublemakers in
that particular powerplant field.

► **Why a Jet Transport?**—"We're aware
of the criticism which has been di-
rected at the Comet and, therefore,
at the jet transport," said Lloyd. "We
have given careful attention to the prob-
lems of landings, takeoffs and controls."

Lloyd emphasized that landing wing
loadings of jet transports will be lower
—and therefore, so will the landing
speeds, all other things being equal—
because of the large percentage of gross
weight which is represented by the
fuel weight.

Maxaret braking of the bogie wheels
—a system which permits the wheel to
rotate as soon as the locked wheel be-
gins to skid—has been proven in prac-
tice, Lloyd said, but reverse thrust is
still some time distant. "A tail para-
chute isn't terrifying," he added.

(Air France pilots interviewed at Le
Bourget commented that they were able
to use the drag of the Comet by hold-
ing the nose off during the landing roll,
and that drag was as effective as braking.
See AVIATION WEEK Nov. 16, p. 38.)

► **Takeoff**—The same aerodynamic drag
that is so effective as a brake also works
against short takeoff if the airplane is
not maintained at its minimum drag
attitude until unstick speed is reached.
Lloyd stated that there are means for
keeping the airplane aerodynamically
clean at takeoff, but declined to explain
further, saying only that they would
be on the Comet 3.

This could refer to the precise atti-
tude indicator now being developed
jointly by de Havilland and Sperry
Gyroscope Co. Ltd., based on a Zero
Reader application.

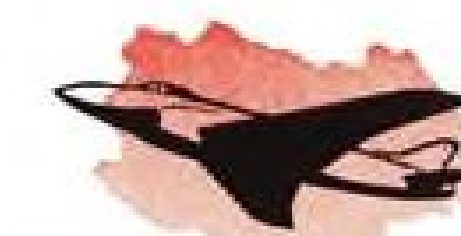
Chief criticism of the Comet con-
trol system has been directed at the
lack of aerodynamic feedback, such as
that obtained in turbulent air with a

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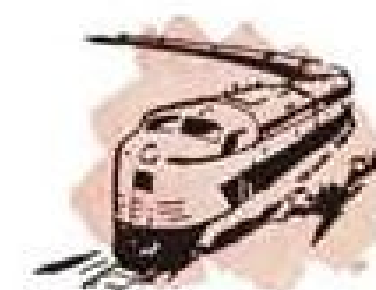


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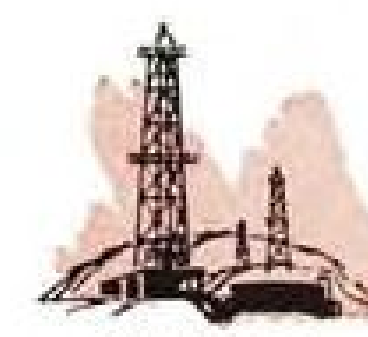
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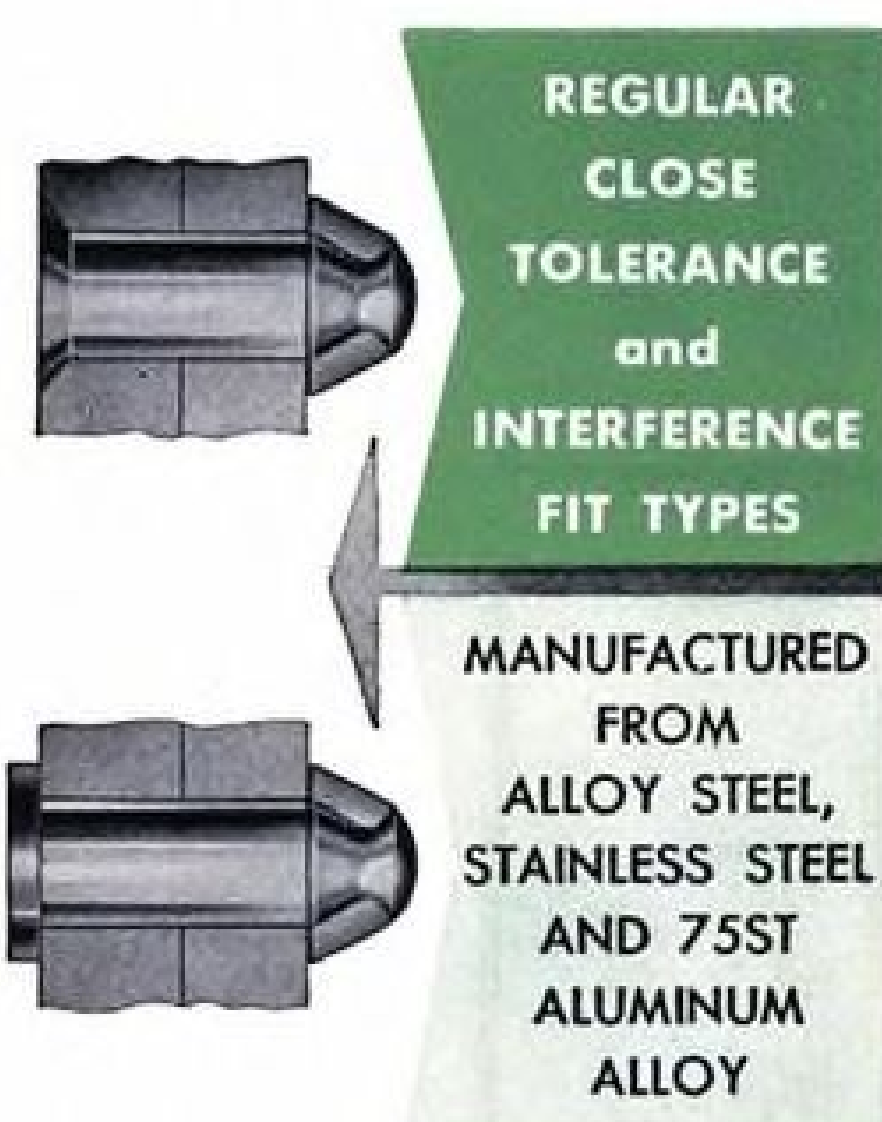
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conventional control system.

The de Havilland position is that there is a stick force in the Comet. It is felt with increasing deflection on the control column. It comes from a spring device used to center the controls.

Also, when the control system was in development, the BOAC pilot fleet was questioned, and their response was that they didn't want feedback from turbulence.

De Havilland says that elimination of feedback eliminates the continual "riding" of the controls by a pilot during turbulence, and that without feedback, the pilot cannot overcontrol.

However, de Havilland is working on a control "feel" unit to supply a stick force gradient as a function of the G load on the airframe.

Time and Money—De Havilland wants to build a "decent series" of the Comet 3, whose basic design is now frozen, before starting work on any successor. Comet 3 production will replace Comet 2 in early 1956, so that the entire timetable looks like 1958 before the prototype Comet X will be available. From then to service should be two more years, which gives a final in-service date of 1960.

Current de Havilland thinking is that the company would finance the prototype itself, just as it did with the original Comet I and the Gyron turbojet engine.

But the firm will not offer credit terms, with a "pay-as-you-operate" basis. De Havilland has never offered credit and sees no reason to break with precedent.

Vickers-Armstrongs

The Vickers VC-7 is the civil version of the Vickers 1000 military jet transport. It will be powered by four Rolls-Royce Conway bypass engines. No prototype will be needed or built, because of its similarity to the military prototype now under construction. Aerodynamic layout will feature "compound-sweep" wings of large area, with buried engines.

George Edwards, Vickers-Armstrongs chief designer (among other jobs), said that the speed of the VC-7 will make it a bigger attraction than a turboprop airplane. "Provided the overall economy breaks even with the turboprop, there is a big appeal in the London-New York run," he said.

"We know that the Conway works," Edwards added, "and it is time saving that will get you the traffic."

The VC-7 should be able to make the trans-Atlantic crossing from east to west with 85% overall regularity, based on BOAC computation methods.

British European Airways has also expressed interest in a high-density

version of the Vickers transport for use on its London-Glasgow route.

Why Bypass Engines?—The Conway is a compromise between the turbojet and the turboprop. Its advantage is one of airplane speed; the disadvantage, one of economy.

Edwards' arguments against the turboprop—with which the firm has had considerable experience in the Viscount—centered around its noise level. He said that Vickers had made some tests in which they varied power, rotational speed and helical tip speed over a range of airplane speeds.

"At high helical Mach numbers, the noise gets tough," said Edwards.

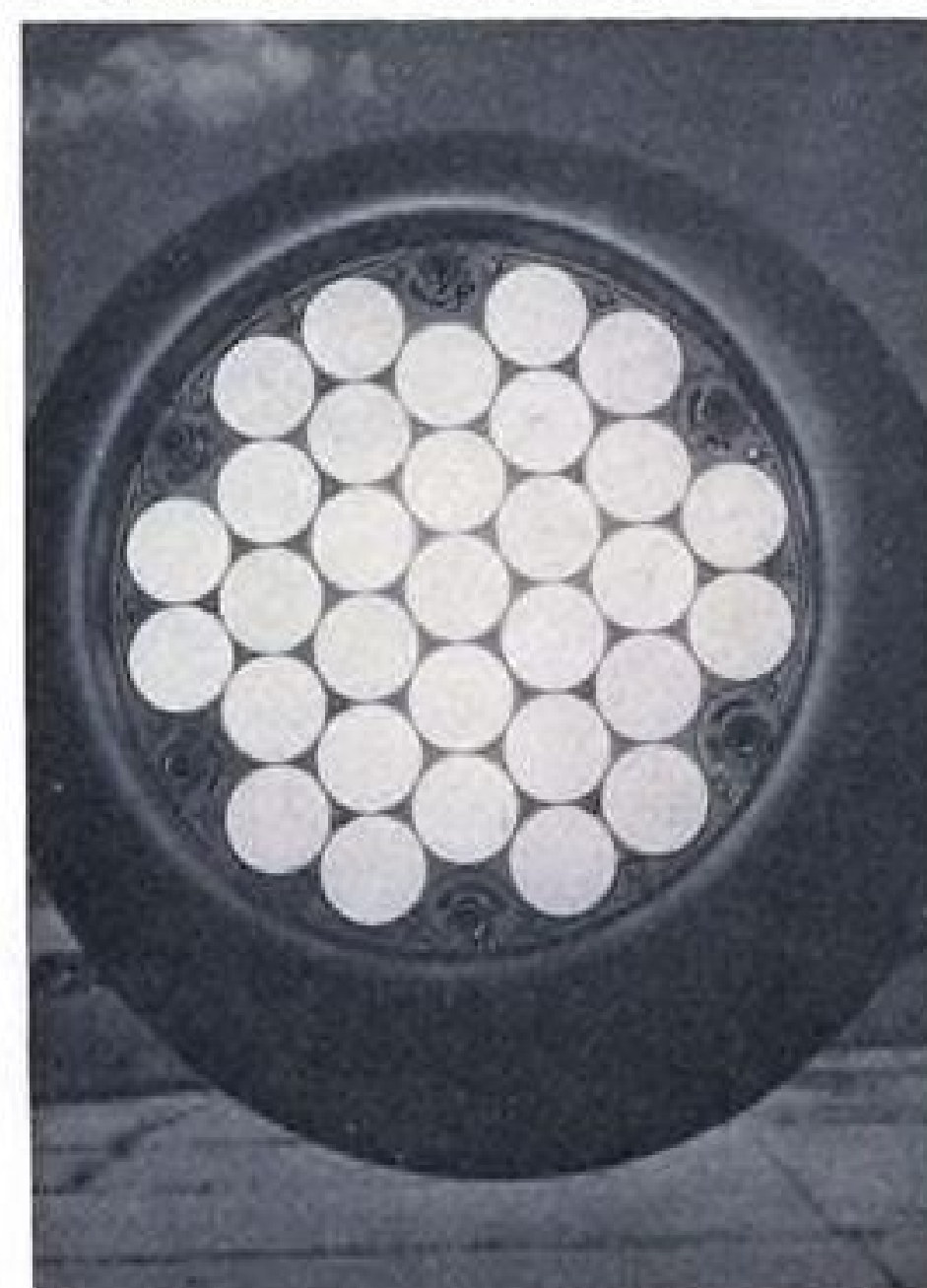
He made the same point about low landing wing loadings that had been voiced by DH technicians. He referred to tests made with the Viscount on icy runways in Canada, using Maxaret brakes, and said that the results were "most encouraging."

"Reverse thrust will come," said Edwards; but he declined to put a date on it.

Military Data—It is a safe assumption that the VC-7, for which few details have been reported, will have essentially the same dimensions as the V-1000 military transport.

That transport is slated to have a 140-ft. wingspan, 146-ft. fuselage length, and a height of 38 ft., 6 in.

So far, only a prototype V-1000 has been ordered; there has been no word of production. Vickers has not stated



Scorpion's Stinger

Head-on view of the starboard rocket missile pod of Northrop's F-89D Scorpion all-weather fighter shows the 31 exit tubes covered by circular plates. The Scorpion's 2.75-in. folding-fin rockets are triggered by electronic control and can be salvoed to provide overlapping fire patterns. Rear portions of the rocket pods serve as auxiliary jet fuel tanks.

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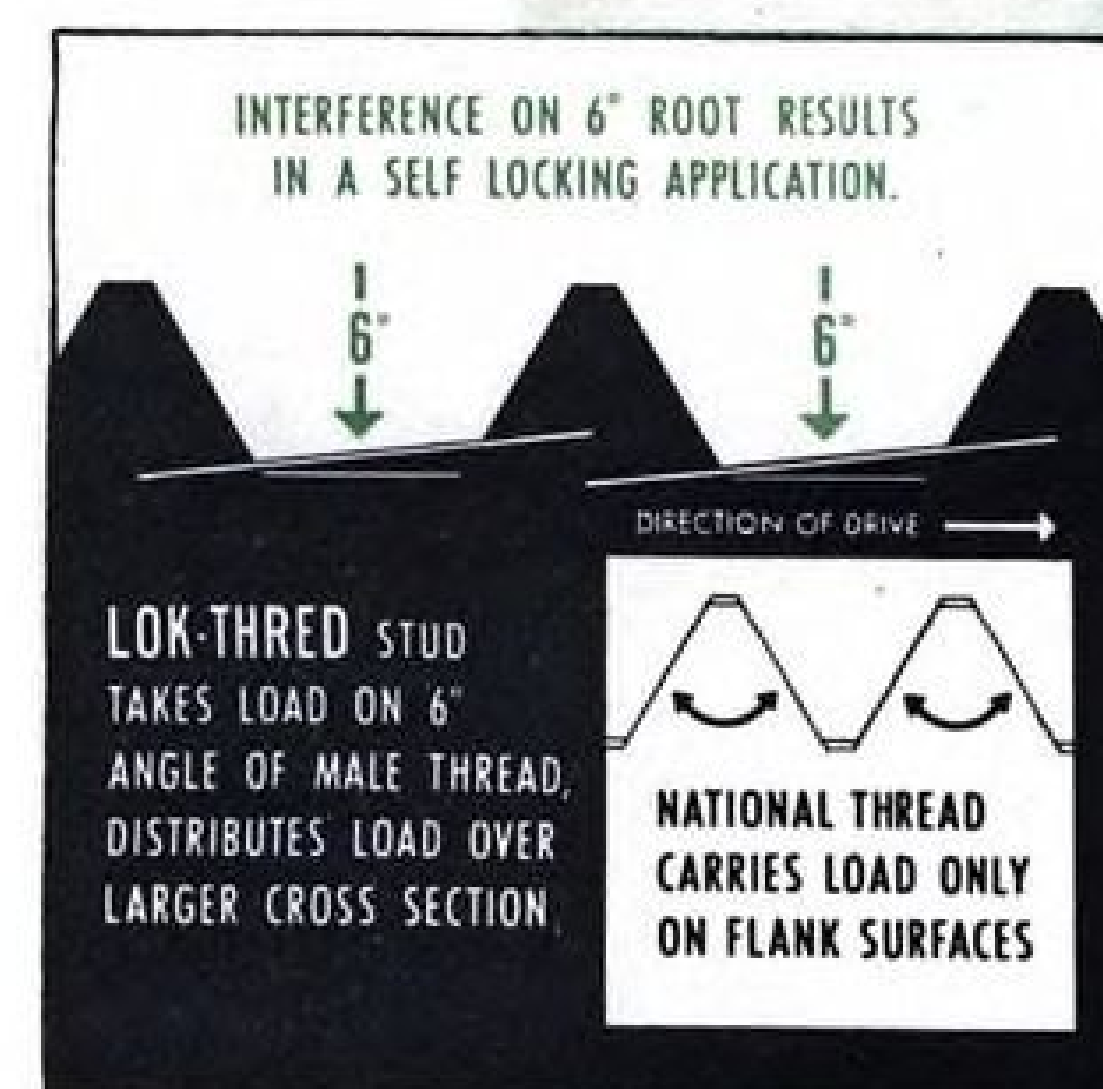
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its position on financing of the VC-7 civil version.

The in-service date for the V-1000 could be 1957, barring the usual unforeseen circumstances. A civil version could be brought along in a short time afterwards, so that possibly first deliveries could be made by 1958. This, too, looks like an in-service date with airlines of 1960.

Bristol

A re-engined, stretched Britannia is the hope of the Bristol company. Powerplants will be based on the Olympus twin-spool design, but will be geometrically about half the size. Although capable of much higher output horsepower, the engine will be rated at about 4,000 hp. for takeoff. The airframe will be the Britannia 300 LR series.

Dr. Stanley Hooker leaves no doubts as to the Bristol position in the civil transport picture. The company is behind the turboprop.

"Give us four or five years, and we'll re-engine the Britannia and then you'll see," said Hooker.

Current turboprop development, from the Proteus 2 and 3 through an upcoming version—Proteus 755—and work with the two-spool Olympus and its turboprop design derivative have added tremendously to the store of Bristol knowledge with that powerplant.

► **Turboprop Arguments**—Hooker cited a company study of transport types designed to make the Atlantic crossing from either London or New York. A jet transport to do the job would cruise in the 500-550 mph. bracket, and would have a gross weight of 250,000 lb. A turboprop transport to do the same thing would cruise at 400-500 mph., but would weigh in at 160,000 lb.

On bearing problems, Hooker was optimistic. "We charge about 4% of piston engine overhaul cost to the gears. They're three-to-one ratio, and you'd only have the equivalent of two sets of them in a big turboprop engine. I can't see that gears are any great problem, either on maintenance or design."

Hooker was at variance with Vickers in his views on noise. He explained that propeller rotational tip speed would still be subsonic, and that the helical tip speed would not be any higher than that of the Britannia. (To this observer, the Britannia is the world's quietest large airplane. It has to be heard to be believed.)

Hooker also pointed out that the tailpipe exit velocity would be around 1,000 fps. on the Britannia, whereas in a jet it would be twice that.

► **Constant Power**—One of Hooker's



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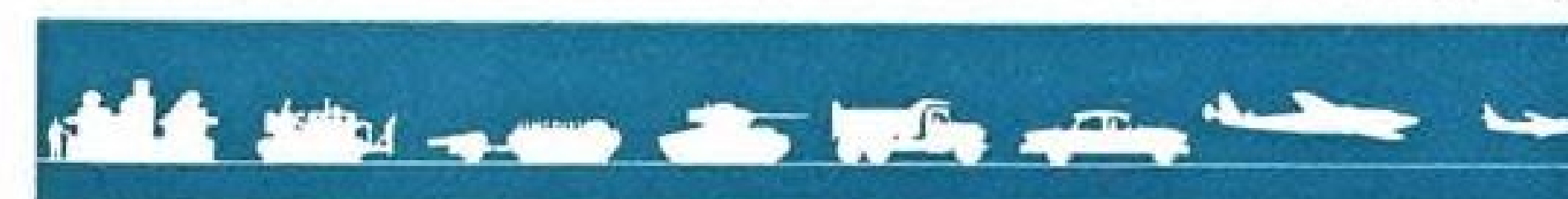
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big talking points is the type of power curve his Olympus-development has. In a graph of brake horsepower against altitude, the conventional turboprop power curve falls off linearly, with the maximum value at sea level.

Hooker proposes to rate the turboprop at considerably under its full-throttle capability for takeoff. This would give a rating of about 4,000 hp. Then as the airplane climbed, the throttle would be opened to keep constant power up to an altitude on the order of 15,000 ft.

At this point, the engine would be on the full-throttle curve, and the power would decrease linearly at con-

stant-throttle setting from there on up. At 36,000 ft., the engine would still be putting out about 2,900 hp.

► **Advantage**—This kind of a power curve has two advantages. It guarantees constant takeoff power, regardless of airport altitude or temperature; the operator will always be able to get 4,000 hp. out of each engine. It gives a much higher altitude cruise power than an engine capable of only 4,000 hp. at sea level.

Hooker plans to keep the present gearing and the present propellers used on Britannia's Proteus turboprops.

There's considerable stretch in the Britannia fuselage yet, said one com-

pany spokesman. Currently pegged at 114 ft. in the Mark 100 series, the length will be increased to 124 ft., 3 in. in later versions. This results in a pressurized body length of 97 ft., 9 in.

The wingspan of the series will stay at the current value of 140 ft., and the height remains at 36 ft., 8 in.

Engineer Demand Off, Starting Pay Up

The employment of engineering graduates continues at a high rate although the demand seems to be slackening. Starting salaries show increases over the initial offerings for last year, according to the Engineering Manpower Commission of the Engineers' Joint Council.

A group of company representatives was asked recently to compare their engineering graduate requirements for 1954 with those for 1953. Of the 143 companies surveyed, 24% said they wanted fewer engineers. A year ago, only 10% of the surveyed group wanted fewer engineers. This year, 52% want the same number, and 30% want more engineering graduates. The figures for last year: 56% wanted the same, 33% wanted more.

► **This Year's Offers**—But salary offerings have gone up; the 1954 offering for men without previous business or industrial experience:

- 8% specified a figure between \$301 and \$325 monthly.
- 36% specified a figure between \$326 and \$350.
- 44% specified a figure between \$351 and \$375.

► **Last Year's Offers**—These were the answers to the question last year:

- 42% specified a figure between \$301 and \$325.
- 43% specified a figure between \$326 and \$350.
- 6% specified a figure between \$351 and \$375.

The same salary for 1954 as in 1953 was offered by 77 companies; 62 companies reported they would offer a higher salary. Not one company intends to offer a lower salary.

The majority of companies reported that they hired between 76% and 100% of the number of men that they tried to hire.

Copter Convert

A veteran of 26 years of fixed-wing agricultural aircraft operation has taken delivery on a new Bell 47G helicopter, which he will use for crop dusting in the rich fruit belt around Lake Chelan, Wash.

The operator, Allen K. Platt, is taking helicopter instruction. The 47G is fitted with dual controls and skid type landing gear.



The REFUELING SYSTEM with a FUTURE for ENGINEERS

Flight refueling goes hand in hand with the jet age—adding unlimited range to the swiftness of jet flight.

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MATERIALS ENGINEER	PATENT ENGINEER
ADMINISTRATIVE ENGINEER	DRAFTSMEN

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The New DIAPHLEX Kilotrol High Pressure Switch

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NO GASKETS
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SOLID SUPPORT will be given steel jig by concrete base, shown going into place.

Concrete Joins Steel in B-52 Jig

The troublesome tooling problem of establishing a sturdy, reliable and relatively inexpensive jig base for B-52 structure has been solved effectively by Boeing Airplane Co.'s engineers. The simple answer is a reinforced-concrete foundation to hold permanently the adjustments of the steel jig it supports.

The combination of concrete base and steel jig has been in use for a number of months on Boeing's B-52 production line in the assembly of

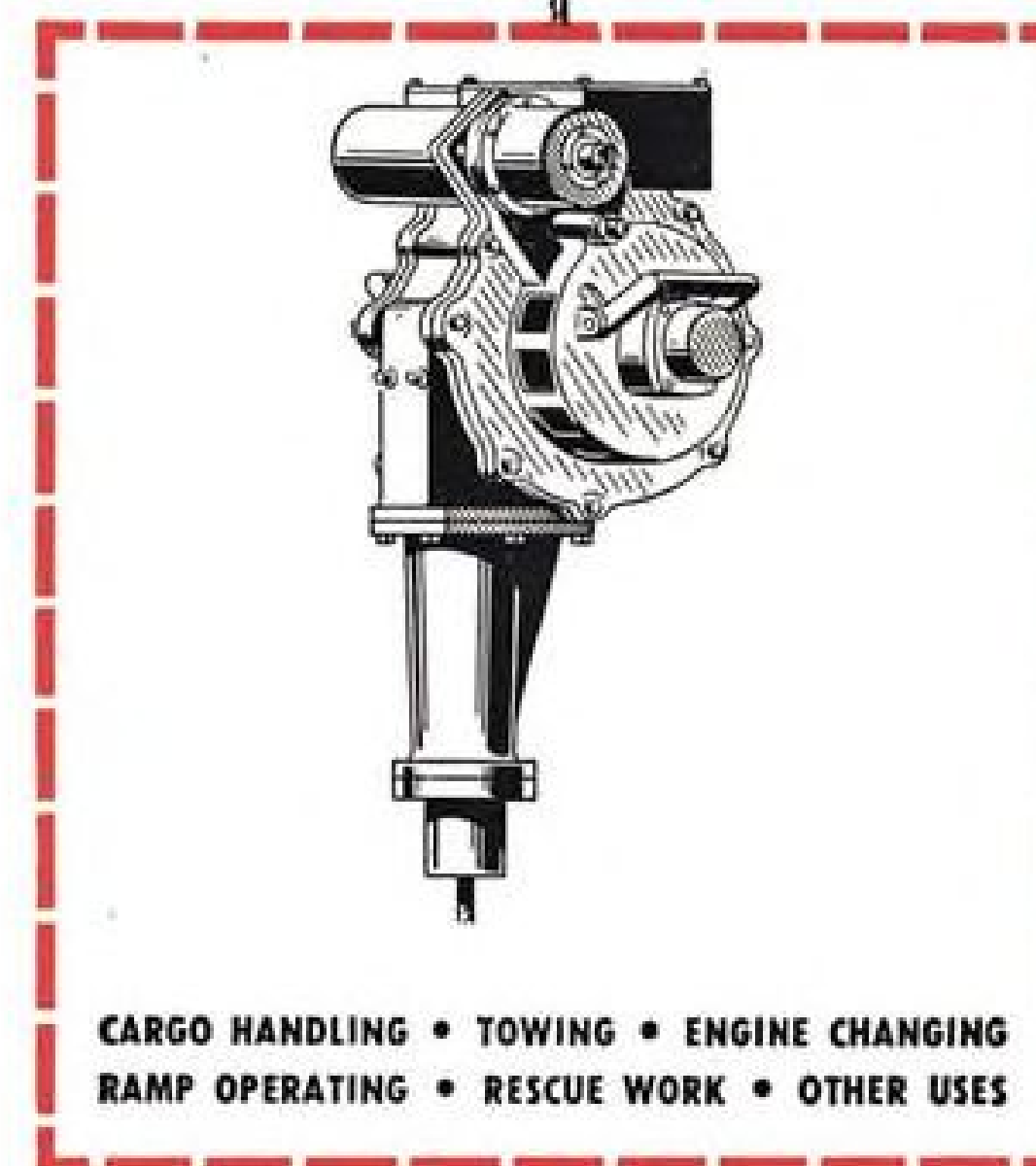
the Stratofort's stabilizer. It replaces the conventional steel base teamed with a steel jig. Observers, watching the new arrangement work out, already see the jig of the future as a combination of concrete and steel.

► **Affords Stability**—Prime job of the concrete base is to give the airframe structure jig the stability it needs for the close-tolerance manufacturing demanded on the B-52 production line. It not only performs this function, but pays off with a number of other im-

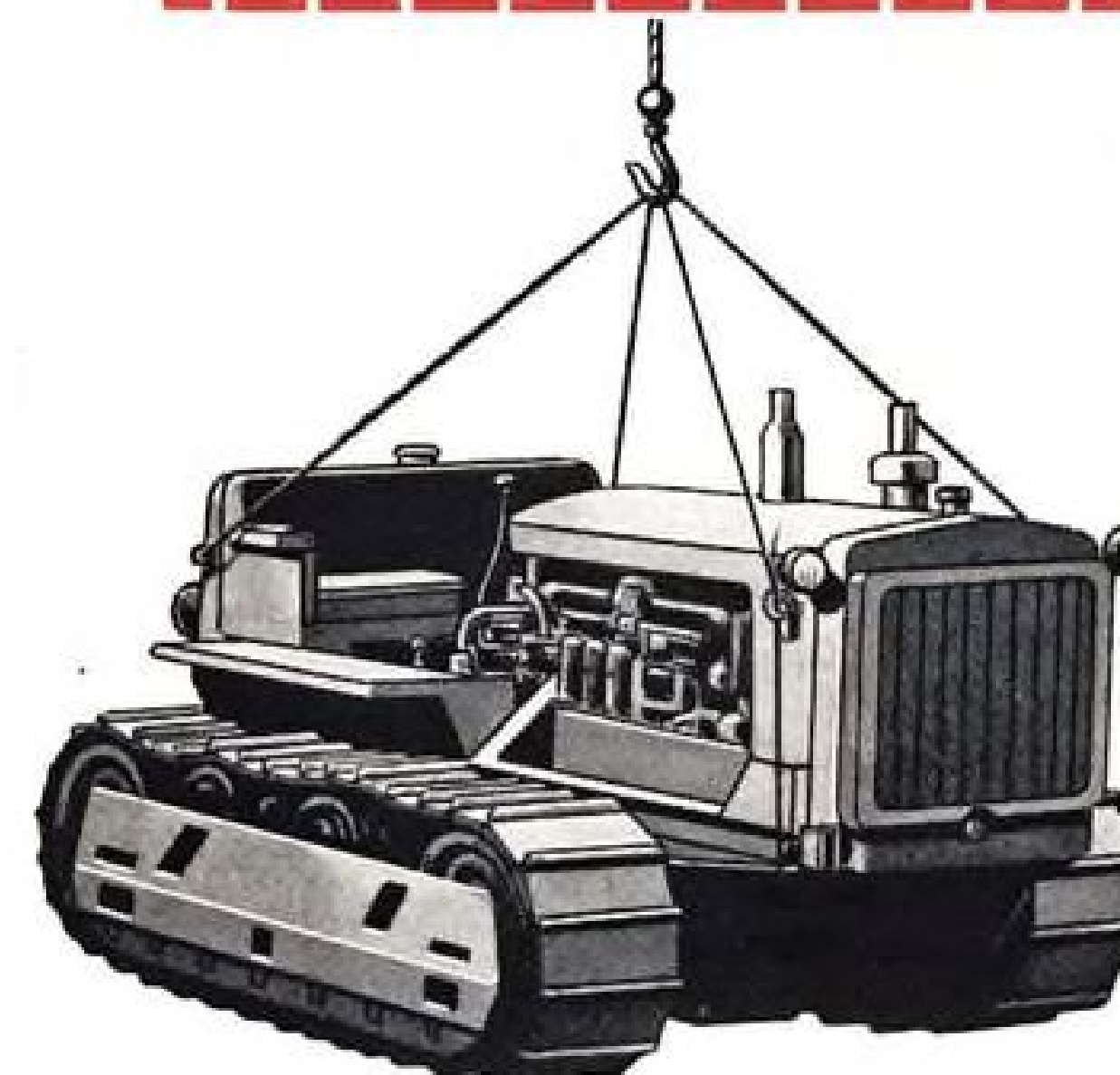


SLANTED BEAM (top) holds B-52 stabilizer during final assembly at Boeing-Seattle.

skyhook ...for a BIG LIFT



CARGO HANDLING • TOWING • ENGINE CHANGING
RAMP OPERATING • RESCUE WORK • OTHER USES



an airborne
hoist by

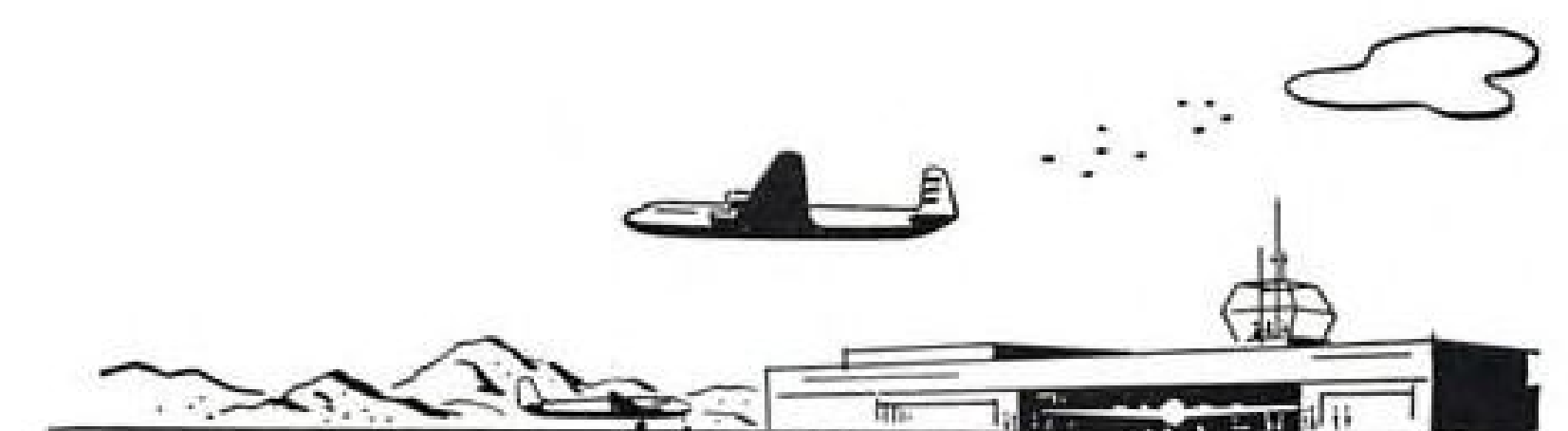


■ Easy does it with a hoist by BREEZE. Here's 10,000 pounds being lifted by a 150-pound airborne winch.

It's one of a new line of cargo-handling devices designed to meet specific needs in aircraft operations, where custom-built features are required.

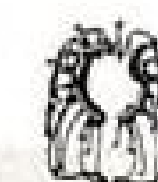
All of them embody extreme compactness and light weight in relation to high rated load. They are precision geared and braked for control refinements, with overload and safety features. They save time, labor and space.

Consult BREEZE engineers for the newest in electrical, mechanical or hydraulic hoists to meet your individual conditions.



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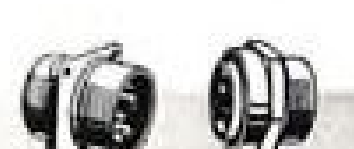
Flexible Metal Tubing



Actuating Systems



Welded Diaphragm Bellows



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PILOT PROTECTION AGAINST "G" FORCES

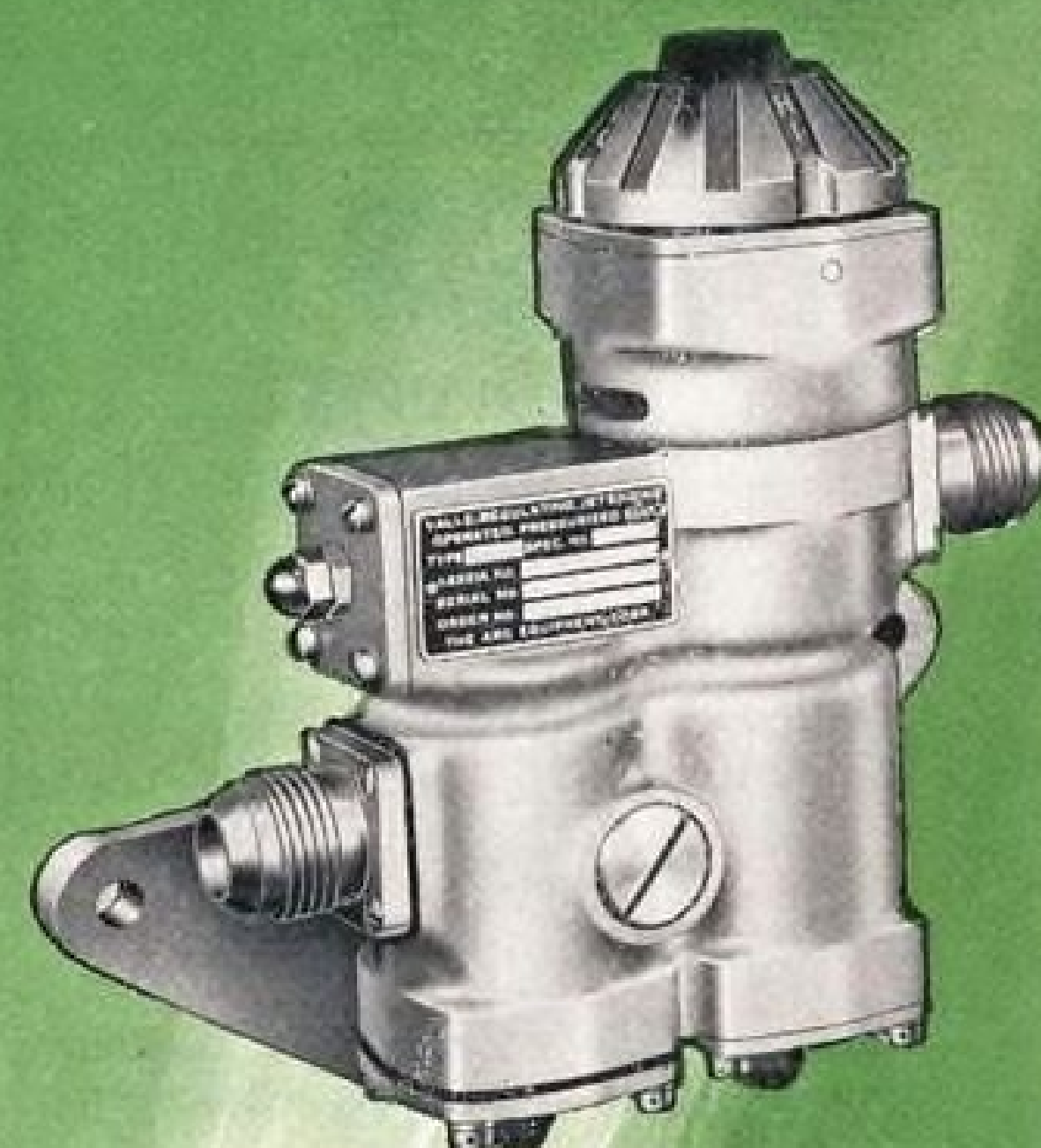
Aro's new "Anti-G" Valve plays a vital role in today's protection of jet pilots.

This valve links the pilot's "Anti-G Suit" to a supply of compressed air. Any sudden change in "G" force (gravity or centrifugal force caused by turns, dives or climbs) opens the valve. Air accurately metered for the existing flight conditions is admitted to the "G" suit bladders, creating pressure on the legs, thighs and front abdomen. This pressure prevents the pilot's blood from rapidly draining from his head down into his body thus preventing "blackout".

For further details on this "Anti-G" valve and other high-precision aircraft products produced by Aro write:

**The Aro Equipment Corporation,
Bryan, Ohio**

Offices in All Principal Cities



**MODEL 10050
"ANTI-G" VALVE
1/2 SCALE**

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"ANTI-G" VALVES . . . OXYGEN REGULATORS . . . AIR AND OXYGEN SYSTEM ACCESSORIES . . . ACTUATING CYLINDERS . . . VACUUM, FUEL AND BOOSTER PUMPS

portant dividends as well, according to Boeing.

The concrete mass has demonstrated its inherent stability with months of careful checking of B-52 subassemblies by optical means. The concrete base is reported to be even more stable than the factory's concrete floor. It provides a damping effect on the vibrations of machines and trucks, thus preventing the jarring of precision-set jig parts supported on the base.

By contrast, vibration affected the conventional base-and-steel jig combination, tending to throw it out of adjustment.

► **Thermal Expansion**—Low expansion characteristics of the concrete also minimize alignment variations which normally result when steel jig supports are subjected to temperature changes which could occur when the factory's hangar-type doors are opened.

The importance of this low-expansion characteristic is emphasized when it is realized that displacement of a major assembly jig of as little as .02 in. will require realignment.

Reduced cost is another category



Ventilated Suit

Designed as an air distribution system for pilot cooling, this British ventilated suit is worn between pressure suit and other safety equipment. Suit plugs into cockpit air supply, distributes cool air evenly to about 100 locations around the pilot's body. Developed by Institute of Aviation Medicine, the suit has been prepared for production by the G. Q. Parachute Co., Ltd., Woking, Surrey.

Another SCHWEIZER PRODUCTION ASSIST*



REPUBLIC Thunderstreak F-84F fighter plane and RF-84F photo-reconnaissance plane are the latest additions to the USAF's jet fighter team.

Engineering and production facilities at **SCHWEIZER'S** Elmira, N. Y. plant, where the internationally famous sailplanes are manufactured, produce numerous parts and components for Republic's Thunderstreaks . . . a real production assist for these high speed jets.

Contact **SCHWEIZER** for an assist with your production problems.

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where the concrete-bolstered production jigs pay off. Boeing reports that the cost is about three-quarters that of the conventional assembly jigs with their bases of steel.

► **Cost Advantages**—The concrete base consists of a central 10-ton structure and 12 smaller piers stepped up in size at the same angle as the B-52 stabilizer trailing edge. Although the contractor had no previous experience with jig building, Boeing says, the concrete jig supports were constructed with more accuracy, at one-third the cost and in one-quarter the time it would have taken to build a comparable steel base.

With the conventional all-steel arrangement, complexity and cost increase directly with size. Foundations are built of large steel-channel beams that are machined, then heat-treated for stress relief; finally setting up is a precision job. Each step is an expensive procedure.

► **Releases Space**—Factory floor space saving is another important dividend with the concrete base. In the new setup, two stabilizer jigs are mounted on one concrete base, reducing by one-third the amount of floor space originally allotted to accommodate two stabilizer jigs.

The doubling-up arrangement such as done on the concrete would not be advisable with a steel base, because the material would transfer expansion and contraction from one jig to the other.

Only drawback seen for the concrete base is the wrecking operation it would require for disposal. Jackhammers probably would have to be used to break the concrete and torches applied to cut the reinforcing bars.

Three New Alloys Offered to Industry

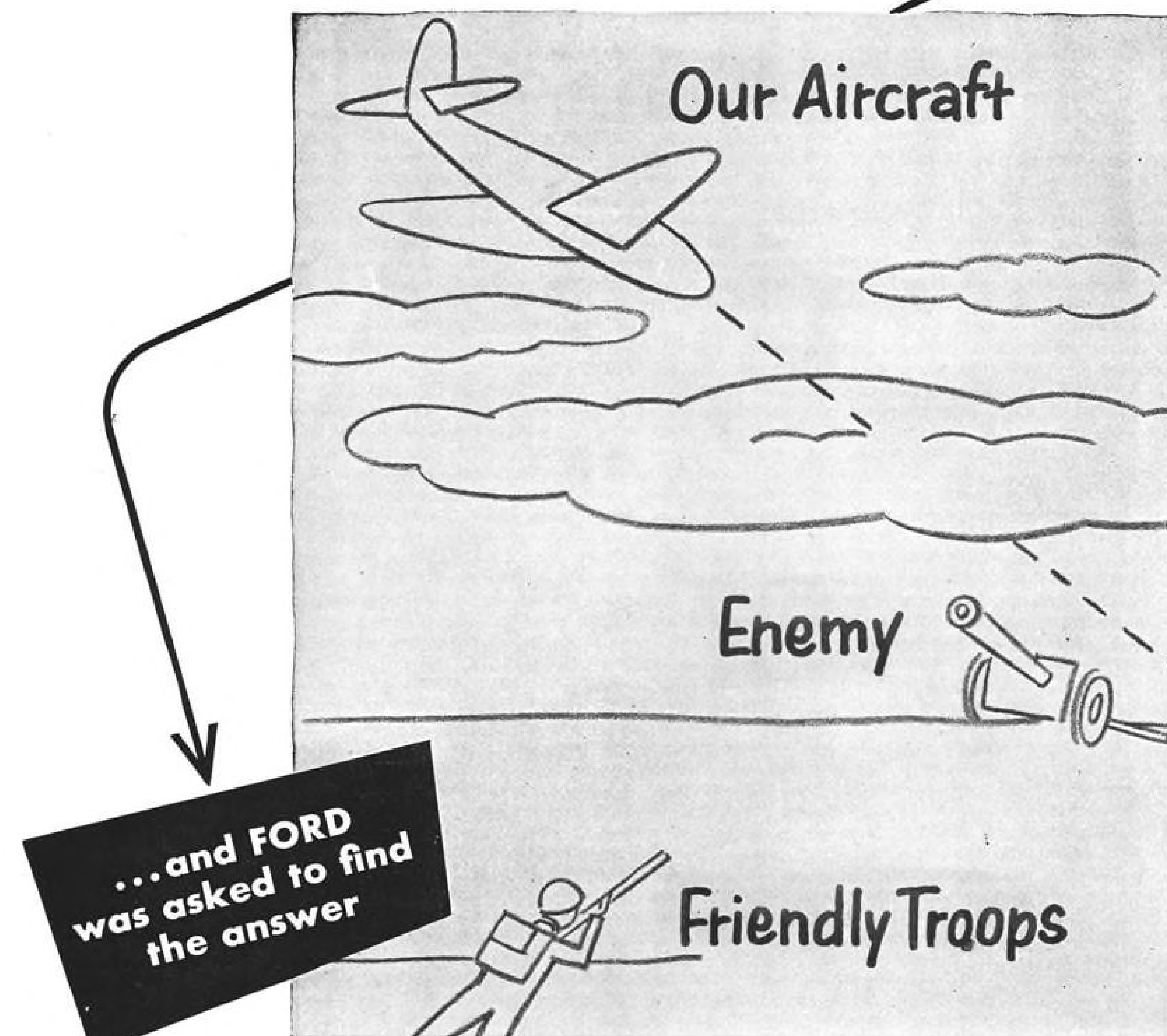
Three new alloys are being offered to industry in a trial marketing test by the Beryllium Corp., Reading, Pa. These are the new metals under scrutiny to see if the demand will warrant production on a commercial scale:

• **Zirconium magnesium**, intended for use in the production of magnesium alloy castings. The material is advanced as a readily alloying oxygen-free hardening agent, with a zirconium content of 30-40%.

• **Manganese aluminum**, offered principally as a manganese additive to titanium alloys, but also seen as having possibilities in the aluminum alloy field. The material has equal parts of manganese and aluminum.

• **Titanium manganese aluminum**, also applicable to the titanium industry, is aimed at introducing combinations for new alloy properties. It consists of 30% manganese, 30% aluminum and 40% titanium.

HOW TO OFFER AIR SUPPORT when target is not seen



Blinding rain! Darkest night! Obscuring clouds! One of these conditions . . . or all three combined . . . deter planes from seeking out and destroying enemy strong points in support of friendly front line troops. That's why the Ford Instrument Company was called in by the Navy to design and build compact, airborne equipment to do this job.

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PRODUCTION

How Automatic Engine Factory Works

• **Machines double output of Wright Turbo Compound powerplant in half the space, improve quality.**

Fresh evidence that Curtiss-Wright believes there's plenty of life yet in the piston engine is the new "automated" production line at the company's Wright Aeronautical Division, Wood-Ridge, N. J.

Described as the first of its kind in aviation engine history, the new assembly scheme, with its extensive use of automatic machinery, is Wright's preparation for present and projected production requirements for the Turbo Compound version of C-W's basic R3350 powerplant.

► **Automatic Savings**—The new line affords these prime benefits:

• **Two engines are being produced** for every one previously turned out on the earlier hand-assembly line. The top potential of the new line will permit even greater output.

• **42% less factory space** is needed in comparison with former production technique.

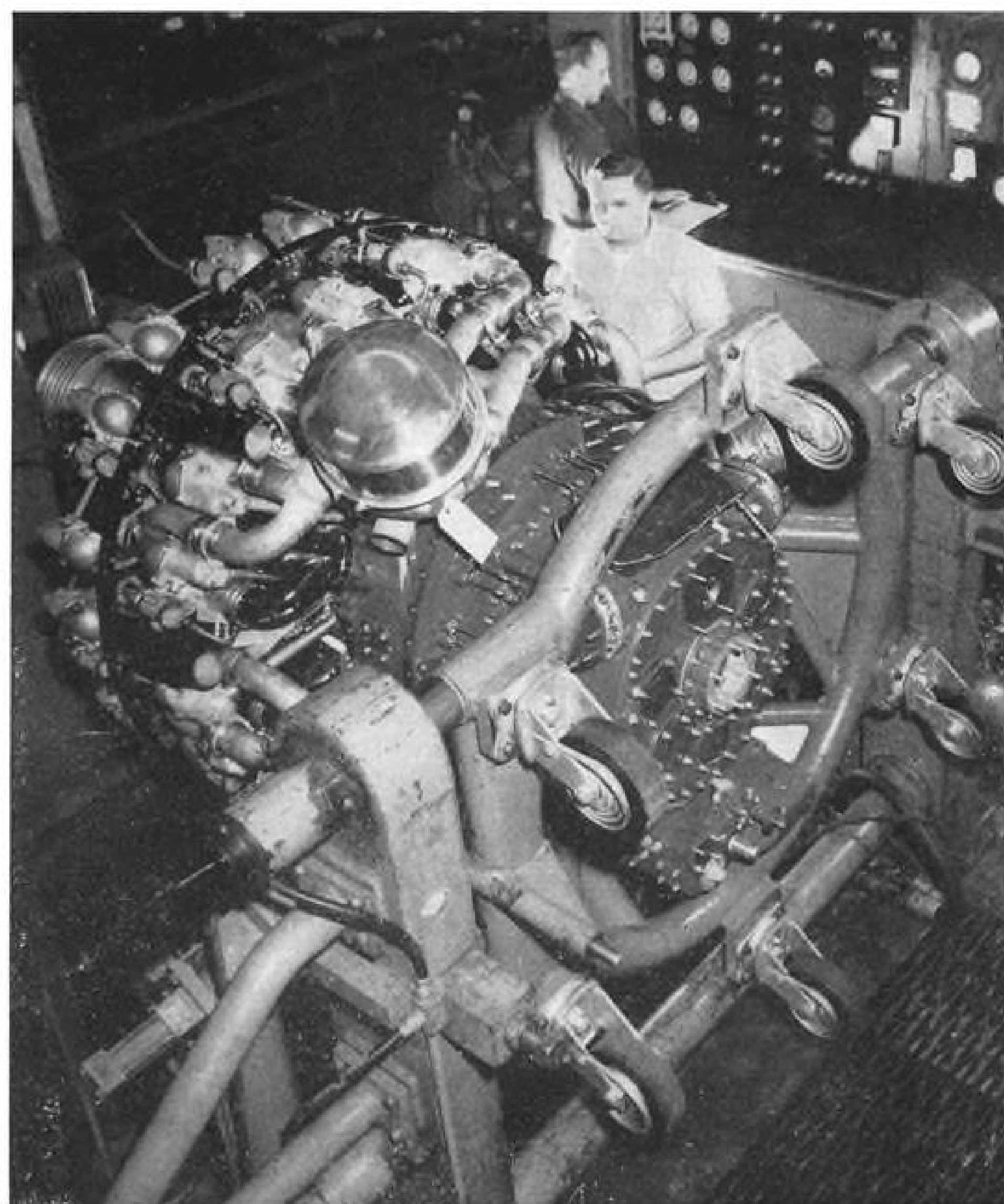
• **Quality achieved** is superior in precision to skilled labor-plus-gages.

► **High Potential**—C-W's chairman and president, Roy T. Hurley, sees the Turbo Compound engine competing with the jet in commercial transports for the next 10 to 15 years (AVIATION WEEK Sept. 28, p. 16). Hurley envisions another round of piston-powered aircraft with cruise speeds around the 450-mph. level.

To meet this potential market and to insure that lack of skilled workers would not prove a bottleneck, Wright engineers created the automated line. It is geared to the production of Turbo Compounds in the range of 3,250 hp. to more than 3,500 hp.—units ordered by 22 airlines and the military.

While the Turbo Compound may be the last basic piston engine Wright Aeronautical builds, the powerplant itself is seen capable of further development. The automated line at Wood-Ridge can be adapted to take care of these higher-power versions.

► **Old vs. New**—On the old assembly line, almost all work was done by hand. The only automatic feature was the floor conveyor installation for moving the work past the 25 assembly stations according to a set time-schedule.



COMPLETED TURBO COMPOUND on dolly is swung into position hydraulically for attachment to pre-oil rig, which checks oil flows and friction.

On the new production line, hand jobs are held to a minimum—merely miscellaneous tasks complementing the overall machine operations. Some idea of the efficiency of the automatic setup is evidenced in the fact that some of the equipment is up to 500% faster than the best handwork on an identical operation. Automatic machines on the line were designed by Wright engineers in cooperation with Hautau Engineering Co., Detroit, which was responsible for their construction.

A key feature in the automatic assembly scheme is the full utilization of conveyor lines and pallets to move parts with a minimum of handling to the subassembly stations. Total number of pallets employed is 1,350, com-

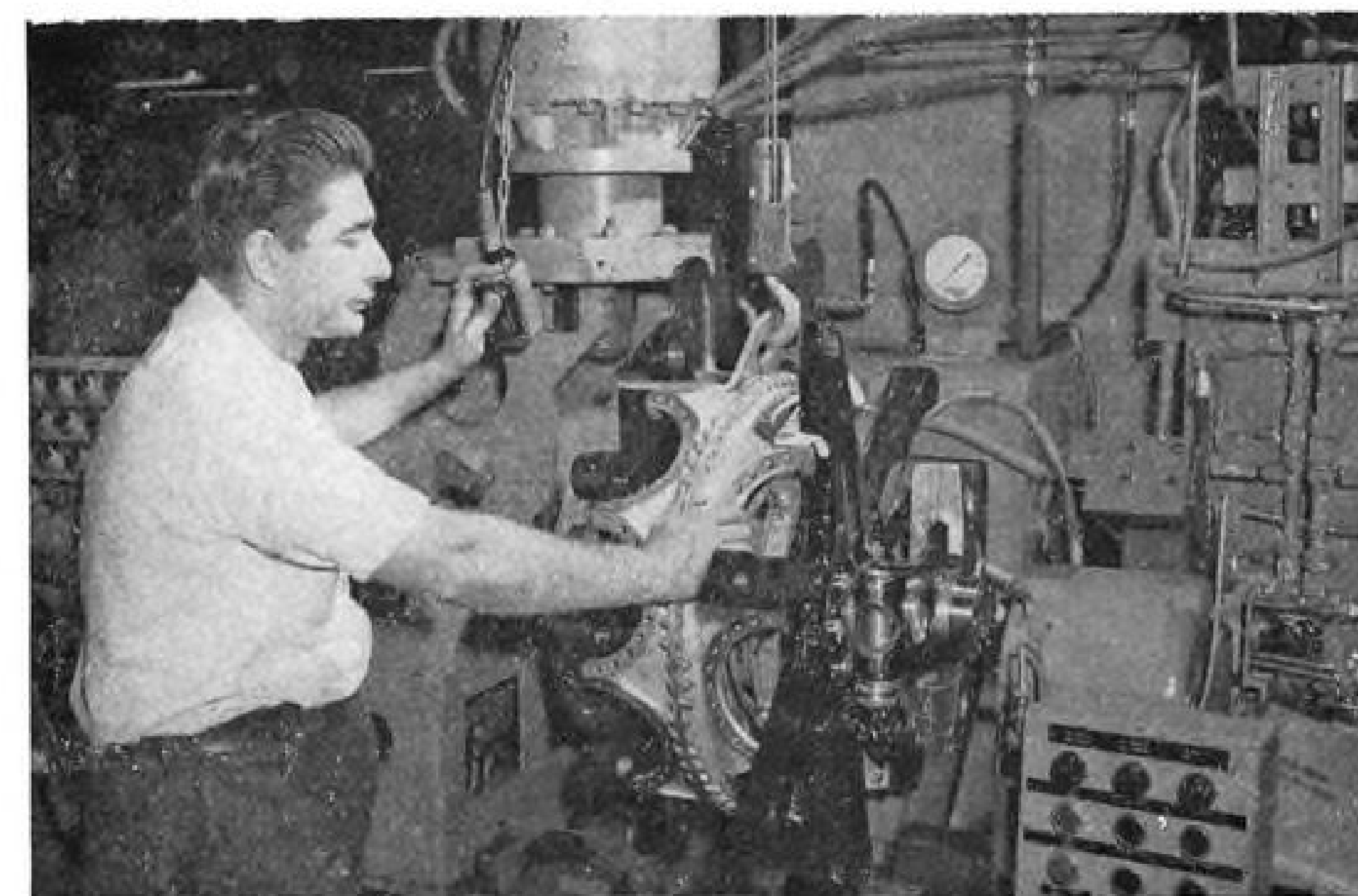
prising about 45 specially tailored, different types. Each is protected with coatings varying in hardness according to the weight of the part it supports.

► **Automatic Operations**—Some of the outstanding automatic operations on Wright's Turbo Compound line involve:

• **Assembly of basic parts** for beginning of engine buildup. Thus, assembly of the engine begins by clamping the three crankshaft sections in a special assembly machine. The master and connecting rods are placed in position and the machine automatically assembles the parts into a unit, and at the same time maintains the required clearances and bolt stretching.

• **Running and torquing** of bolts and

Along Curtiss-Wright's 'Pushbutton' Assembly Line . . .



BASIC ASSEMBLY JOB on automatic machine joins crankcase halves and sections, and master and articulating rods into unit embodying proper clearances.



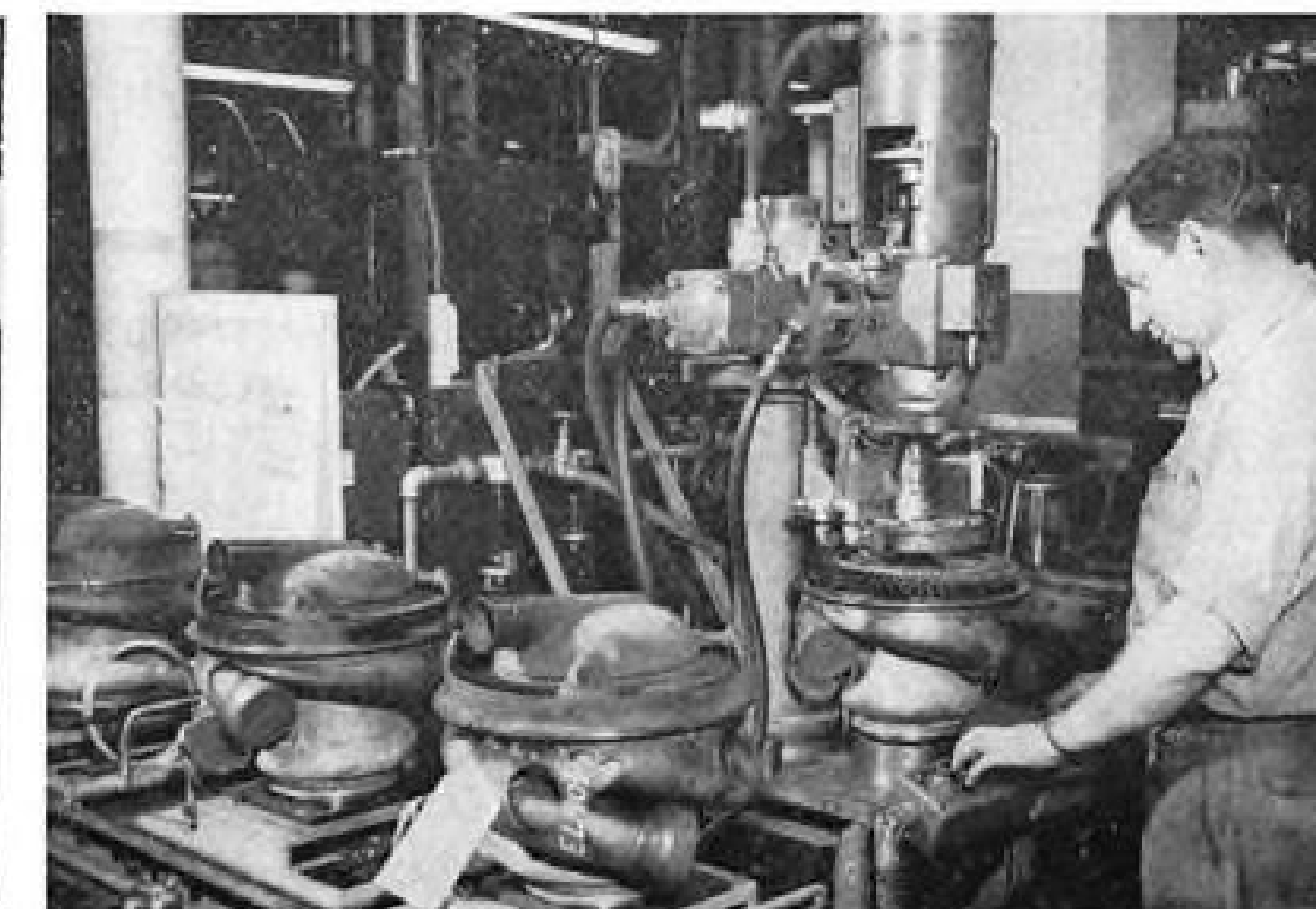
VALVE SPRINGS are locked, depressed, rocker arms set in pushbutton job.



BOLT TIGHTENING, TORQUING is automatic for such operations as these on engine's front cam section (left), securing annular plate around propeller shaft extending from front section (center), locking reduction gear drive on power section (right).



PISTONS and cylinders are installed as connecting rod is extended and cylinder mounting surface is turned to worker.



TURBINE WHEEL has its shaft stretched and nut tightened. Engine embodies three of these wheels.

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Super Constellations vital to U. S. defense

If America should ever be attacked from the air, new Super Constellations will stretch critical "alert time" from minutes into hours. Here's how they'll do it:

LONG RANGE PLUS LONG ENDURANCE—Large fuel capacity and low fuel consumption of turbo-compound Super Constellations provide remarkable range and time aloft as Early Warning Aircraft. This means these "flying sentinels"

can patrol far beyond our borders for long periods of time.

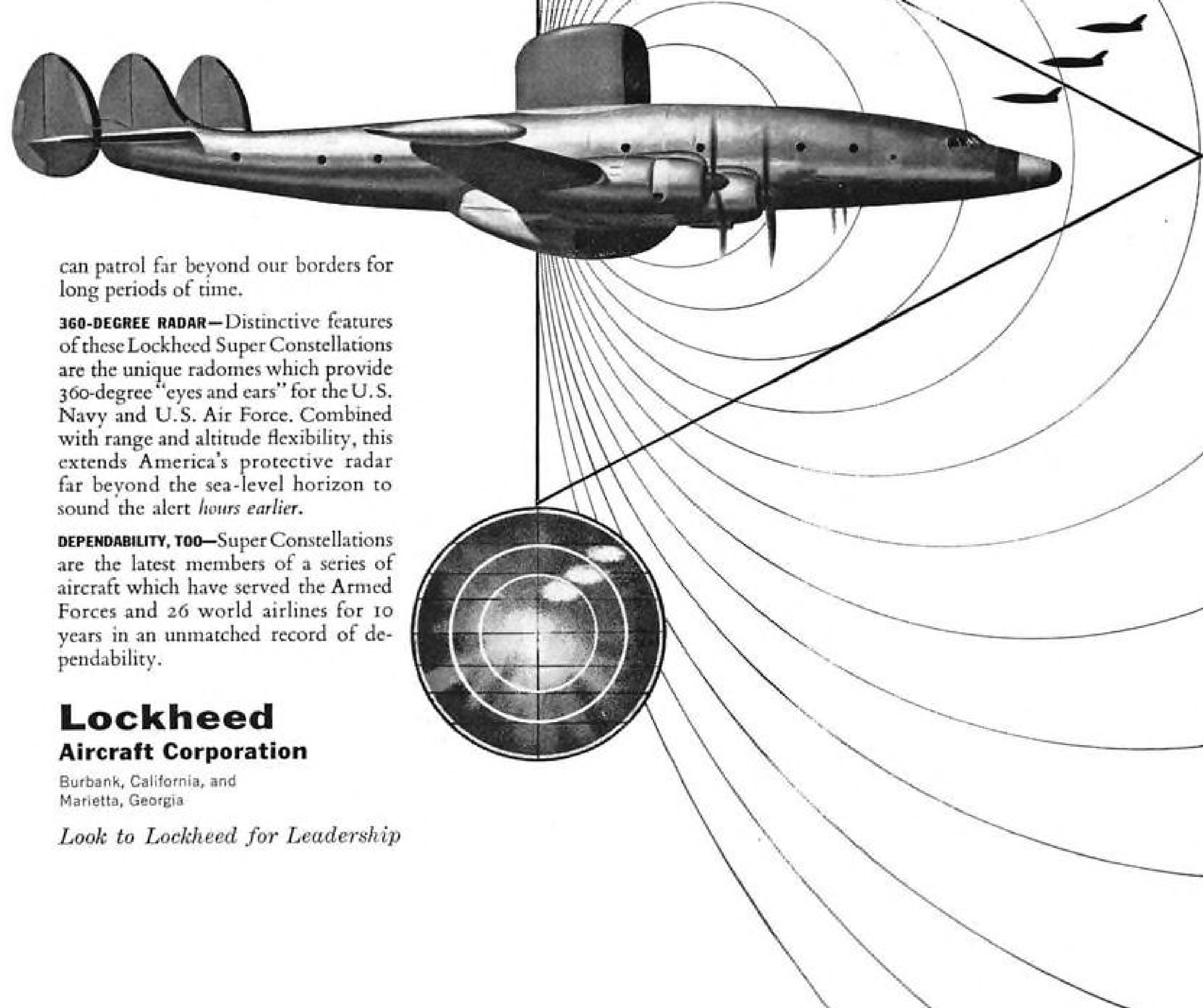
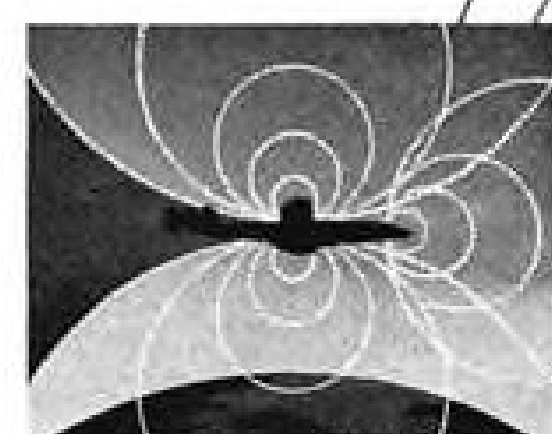
360-DEGREE RADAR—Distinctive features of these Lockheed Super Constellations are the unique radomes which provide 360-degree "eyes and ears" for the U. S. Navy and U. S. Air Force. Combined with range and altitude flexibility, this extends America's protective radar far beyond the sea-level horizon to sound the alert hours earlier.

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Lockheed Continental Defenders Comprise Unique Team

Of all U. S. aircraft manufacturers, the Lockheed Aircraft Corporation today produces the most complete team of airplanes capable of nearly every function of air defense.

With increasing emphasis on continental defense needs, Lockheed is building a record volume of specialized defenders of many types. And production of all Lockheed models is on schedule.

Important members of this Lockheed defense team are these three airplanes:

1. EARLY WARNING—Lockheed Super Constellations, with distinctive radar humps, are "flying radar stations" capable of hovering long hours at high altitude far beyond U. S. borders to warn against attack. (Called WV-2 by Navy, RC-121-D by Air Force.)

2. FLYING SENTRY—For long-range, long-endurance patrols at lower levels, the Navy uses P2V Neptune Bombers, especially designed to protect U. S. coastlines from sneak attack by submarine. Secondary missions: rocket attack, mine laying, torpedo attack, photo reconnaissance.

3. ALL-WEATHER JET INTERCEPTOR—While both the Early Warning Aircraft and the P2V Neptunes are on constant patrol, Lockheed F-94 Starfires are based at strategic continental points, ready to intercept any attacker in daylight or darkness, regardless of weather.

Peace today is as firm as the strength behind it, and other Lockheed models in production contribute toward this peace. These include the T-33 Jet Trainer (Navy, TV-2) in which 9 out of 10 of our jet pilots earn their wings, and the C-130 military transport, only transport designed from the ground up for turbo-prop power.

PLANS FOR TOMORROW'S PLANES—Several new Lockheed models will be tested early next year. One of these will be the XF-104 Day Superiority Fighter. Others are too secret to be talked about. And designs 10 to 15 years from now are now taking shape in research by a special corps of engineer-scientists at Lockheed.

nuts. These important operations are done at various stations with maximum speed and accuracy. Some examples:

An automatic machine tightens the bolts on the annular plate surrounding the splined propeller shaft on the engine's front section.

Bolts are tightened automatically on the engine's front cam section.

Positioning and tightening of bolts is automatic for joining the tappet housing to the rear crankcase section.

An automatic machine runs and torques the nuts for attaching the articulating rods to the master rod.

Reduction gear pinion bolts are set automatically to identical value and the fasteners holding them in place are crimped at the same time.

The large reduction gear drive of the Turbo Compound's power section is tightened and locked in a single automatic tool.

• **Cylinder assembly.** Valve springs for each of the cylinders are locked in place on a special machine. A push-button resets the machine for depressing the spring to allow the rocker arm to be dropped into position.

• **Piston, cylinder hookup.** Assembled engine units mounted on vertical rolling stands are clamped to special machines, one accommodating front-row pistons and cylinders, another for the rear row. Each machine indexes the engine assemblies so that the cylinder-mount surfaces to be worked on will face the assembler. Simultaneously, the crankshaft is rotated to index the master and articulating rods automatically to top dead center for the installation of piston cylinders.

• **Turbine wheel operation.** Turbine wheels of the engine's power recovery section have the wheel nut tightened and the turbine shaft stretched in an automatic operation.

► **Flow Plan**—The finished stores area is the supply point for the entire assembly plan. It can accommodate major sections for about 150 Turbo Compounds and minor sections for about 400 of the engines. This is about 50% more engine parts than were stored in an equivalent area previously.

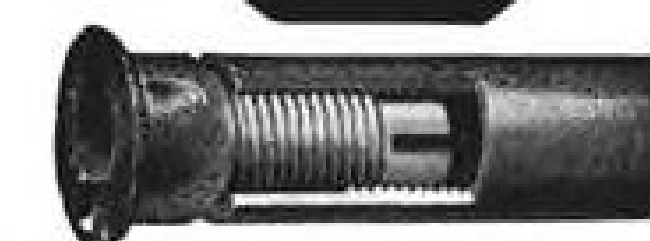
Major components—crankcase front sections, rear housings, connecting rods and similar big pieces—move from finished stores on carriers over a roller conveyor to a loading area. Here, parts are arranged on pallets, routed by conveyor to wash booths, then conveyed to the "green" assembly benches and stations. (The final line, for engines assembled after test and teardown, duplicates the features of the original, green line.)

Nuts, bolts, wire and other minor parts are routed to green assembly stations by rolling bins.

► **Pre-Line Work**—Subassemblies from

DILL LOK-SKRU THE BLIND ANCHOR NUT OR RIVET

ONE MAN INSTALLATION IN SECONDS



THE AVIATION STANDARD for Screw Locking Anchor Nut Uses and Metal to Metal Fastening.

1 Drill one (1) hole.

2 Insert Lok-Skru with either Hand or Power Lok-Skru Tool.

3 With Lok-Skru Tool draw barrel over shoulder of Lok-Skru and flush with metal. This provides a Blind Anchor Nut for Secondary Attachments.

4 TO FASTEN ATTACHMENTS insert standard Machine Screw through hole in attachment and into Lok-Skru. As machine screw is tightened into Lok-Skru it is securely locked by means of the "Specially Crimped" locking-end of the Lok-Skru.

Crimped internal threads of Lok-Skru provide secure locking device for attachment screw.

Write for Folder

Handy information on the many uses and application of Lok-Skrus in airplane construction with complete data on types and sizes.

THE DILL MANUFACTURING CO.

FACTORY 700 East 82nd St. Cleveland 3, Ohio

BRANCH 1011 S. Flower St. Los Angeles 15, Calif.

How Parker tank-mounted valves save weight by allowing 25% smaller fuel line sizes

"When you specify fueling equipment, you've got many problems to consider. We believe the best solution is offered by tank-mounted diaphragm valves like these", reports Everett Badger, shown at the right. He is Chief Engineer of the Fuel Division at Parker Aircraft Co.

"You can save weight", Badger adds, "because the lower pressure drop of tank-mounted valves allows you to use about 25 per cent smaller line sizes. Their pressure drop of about 6 psi at 200 gpm is roughly one-half the loss through a similar valve mounted in the fuel line (including exit losses where fuel enters the tank). These savings let you use smaller, lighter lines without reducing the rate of flow to the tank. In addition, tank-mounted valves weigh about 40 per cent less.

"In the nearly ten years since Parker first started making diaphragm valves, we've never had one rupture in service.

"As for contaminant resistance, there are simply no close fits in this valve or the pilot valve where contaminant might jam.

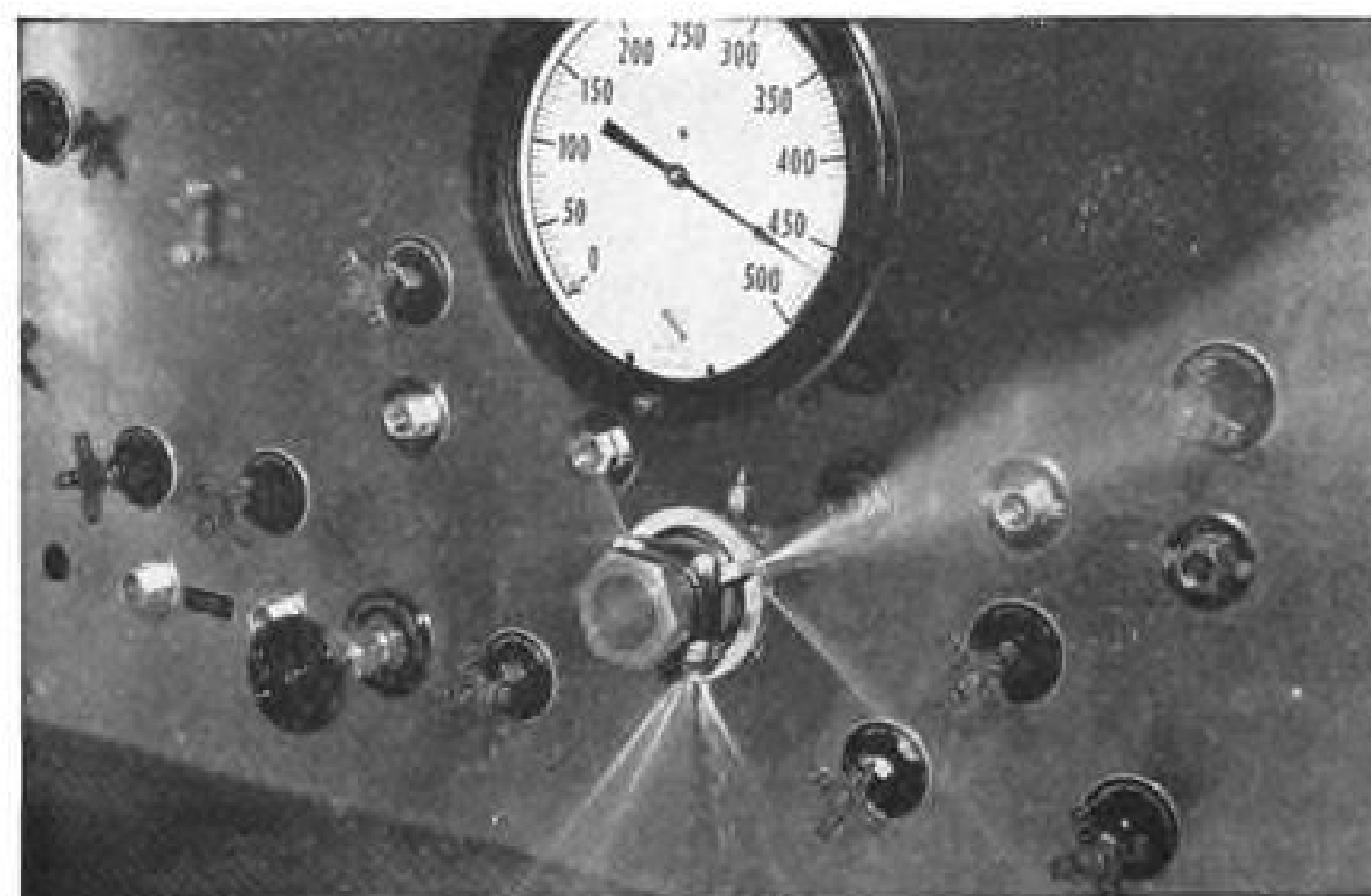
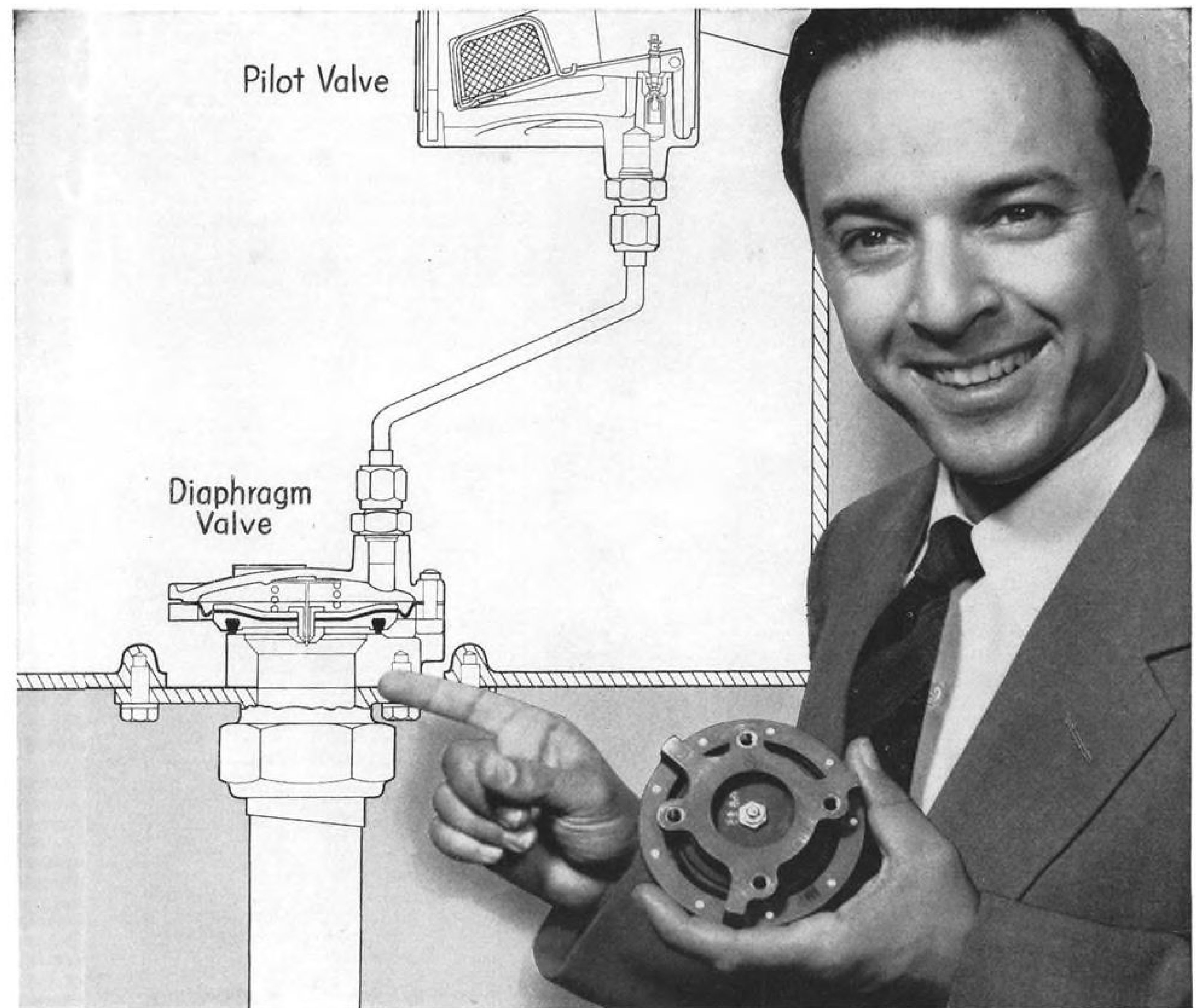
"The same basic diaphragm valve can easily include a second operating diaphragm unit to perform various functions such as flow proportioning or secondary fuel shutoff protection. Pilot line ports can be located on either the tube-inlet side or on top of the valve.

"Parker's pilot valves, like the one shown at the right, are available in single or dual styles with many auxiliaries. Because these valves are essentially pressure closed, there's no chance for 'hang-up' or faulty operation.

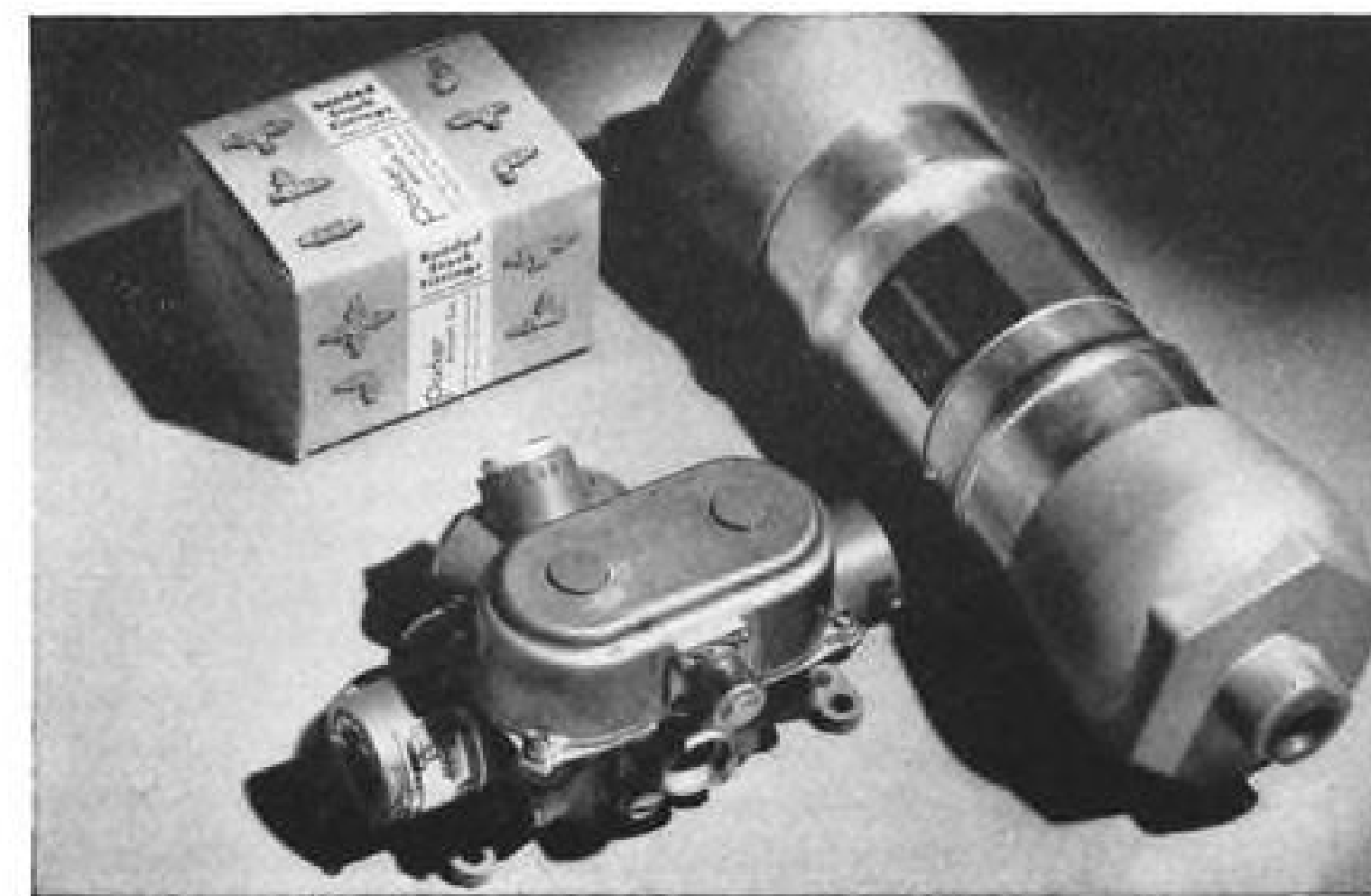
"A brand-new Parker booklet, 'Design Hints for Aircraft Fueling Systems', is just off the press. Send for your copy today."

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Mail this coupon today. Be sure to check the information desired. If you have any other questions, please write to Parker at the address shown above.



don't let *Traffic* tie-up your executives

There's an easy solution...

Today's executives are turning to Bell helicopters to avoid surface traffic jams and save valuable hours in traveling from factory-to-factory, office-to-factory, factory-to-airport and for safe and quick trips to nearby communities.

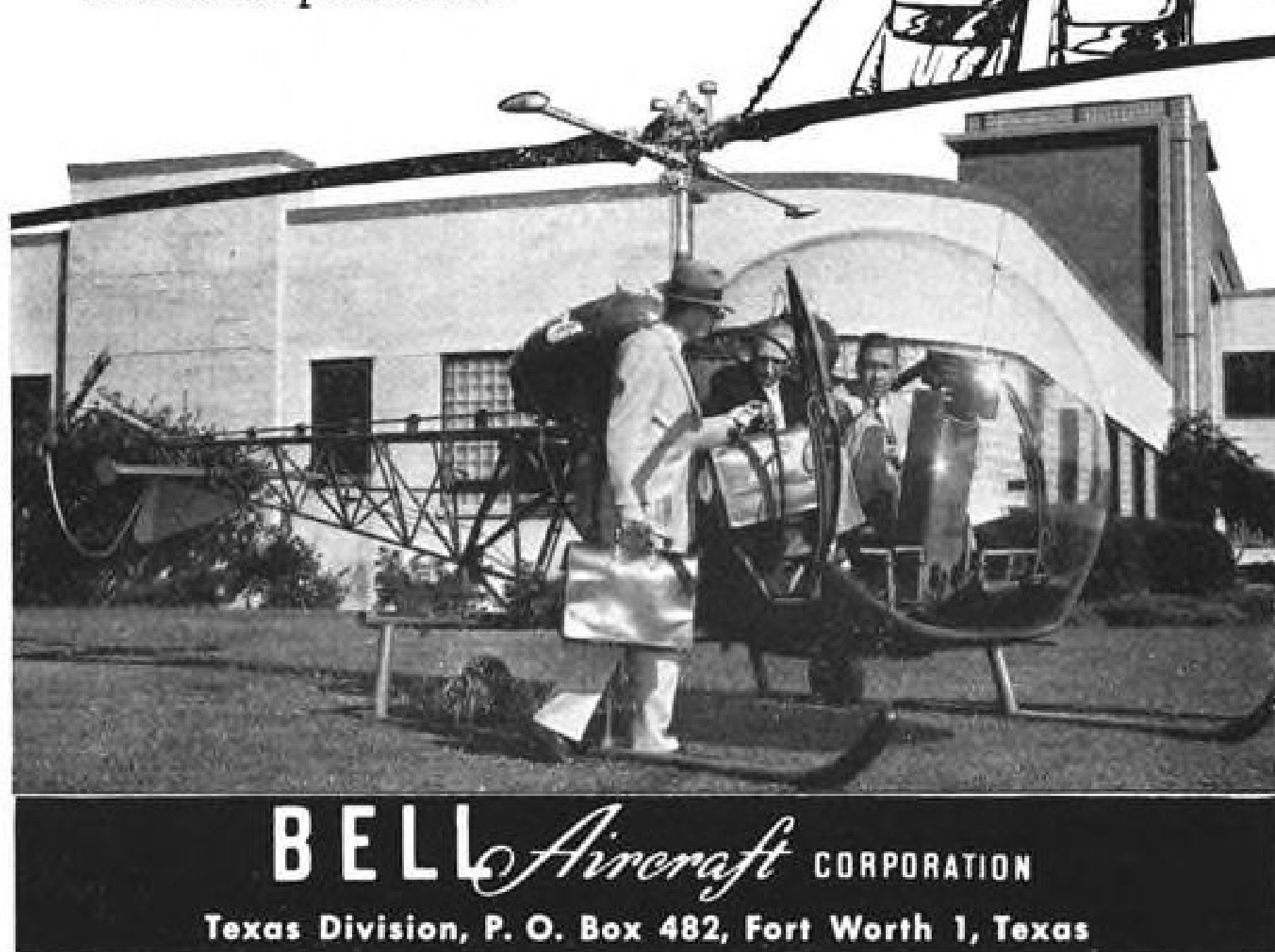
One company estimated that executive time lost in just traveling from factory to airport reached \$1,000 a day. A Bell helicopter not only can save that important time but also doubles as an all-around aerial messenger, hustling high priority mail and material from facility to facility.

Port of New York Authority cut travel time for executive and engineering personnel from two hours on the ground to 20 minutes with a 3-place Bell helicopter; a New Jersey utility company developed a helicopter shuttle run between widely scattered installations; and an East Coast executive uses a helicopter exclusively for business trips in a radius of 100 miles of his headquarters.

Its low initial investment, simplified maintenance and economical operating cost—*plus built-in safety and efficiency*—makes the Bell helicopter a practical form of transportation for the busy executive.

The Bell Model 47 helicopter has been thoroughly proven by more than a million hours of operation in the United States and 30 foreign countries. It is a product of the world's largest manufacturer of commercial helicopters—Bell Aircraft.

Write for complete details:



bench assembly are palletized and roller-conveyed to the end of this area, where they are moved by overhead monorail to pre-line assembly. At this point, the three major components—crankcase front, power, and rear sections—are placed in flush-and-test rigs for cleaning and a performance check under simulated conditions.

Pre-line assembly covers seven stations where subassemblies are built into the basic engine, excluding external parts. Assembly is by fixtures and special machines, with work positioned for easy operation.

► **Line Jobs**—Routing is now to line assembly where each engine, mounted on a vertical stand over a powerized track conveyor, moves according to schedule past a series of stations. All external parts, except for the carburetor, are installed here, valves are set and distributors timed.

After passing through line assembly, each engine is weighed, then advanced to engine pre-oil where it is rigged for simulation of running conditions—actually a check on assembly accuracy.

To put the engine in flight position at this check station, the supporting fixture is swung through 90 deg. hydraulically from the vertical to horizontal position.—Irving Stone

PRODUCTION BRIEFING

► **Sheffield Corp.**, Dayton, Ohio, has concluded an agreement with Cavitron Corp., Long Island City, N. Y., to design, make and distribute the latter's machine tools in the U. S. and Canada, with both firms jointly handling worldwide distribution. Cavitron will continue to make ultrasonic transducers and generators.

► **Brust Tool Mfg. Co.** has opened a new plant in Franklin Park, near Chicago, Ill., to handle increased output of its machine tools and dies.

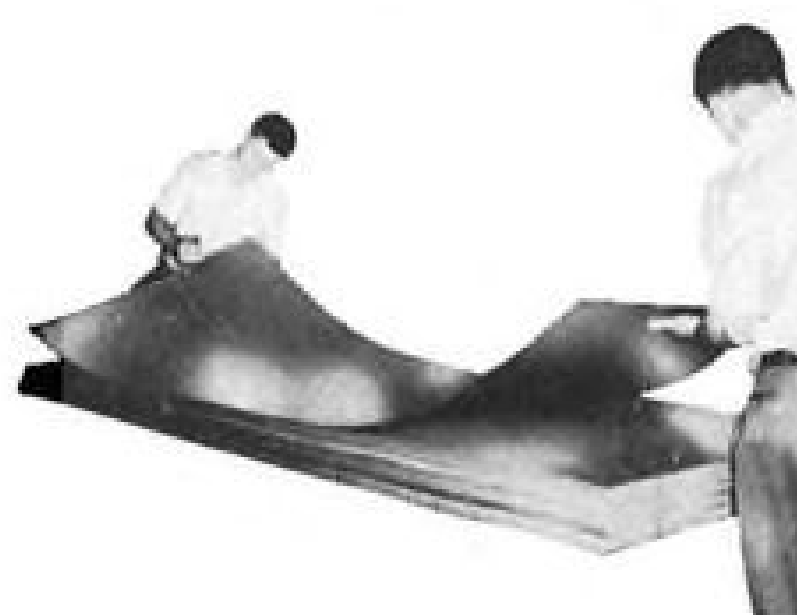
► **A. A. Metal Products, Inc.** has completed a 22,000-sq. ft. plant in Gardena, Calif., which will allow increased production of aircraft parts including pulley guard pins and Flo-Nutt floating barrel nuts.

► **Colonial Broach Co.**, Detroit, Mich., is adding 6,000 sq. ft. of floor space to its present plant.

► **Lockheed Aircraft Service-International**, N. Y. International Airport (Idlewild), totaled 653,877 production man-hours during the first nine months of this year, a 41% increase over the same period in 1952. Deliveries in the current three-quarters period included 781 aircraft, 23% more than last year.



Rem-Cru titanium is used extensively in such advanced production aircraft as the new North American F-100 Super Sabre and the eight-jet Boeing B-52 Stratofortress.



Designing better aircraft with **TITANIUM...**

Titanium's particular advantages become more apparent every day as new applications are developed for its use.

The high strength-to-weight ratio of titanium has become an essential to aircraft designers since this new metal first became available in production quantities. Its corrosion resistance, and complete freedom from stress corrosion cracking are further aids to greater reliability in high-performance aircraft.

Applications—Fire walls, shrouds, cowling, bulkheads and skin sections of supersonic aircraft are fabricated from Rem-Cru RC-55 and RC-70 commercially pure titanium. Parts subjected to high operating stresses, such as structural members and

jet engine compressor wheels and blades, are made from Rem-Cru RC-130A and RC-130B alloyed titanium grades.

Availability—Rem-Cru, a principal producer of titanium, is supplying titanium bars, plates, sheet, strip, wire, tubing, forgings and billets to the aircraft industry. And our production facilities are currently being expanded to several times present capacity, to meet increasing demands for this versatile new metal.

Engineering Service—Rem-Cru engineers have test data available to help you make the most of titanium. When you have an application problem involving the use of titanium, let us help you.

To keep abreast of the latest developments on titanium, write for the Rem-Cru Review—a free periodical devoted to the application and fabrication of titanium and its alloys.

REM-CRU TITANIUM

REM-CRU TITANIUM, INC., MIDLAND, PENNSYLVANIA

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Sperry Gyroscope Co., div. of the Sperry Corp., Great Neck, N. Y., bearing, \$2,000 ea., \$133,660; 16,000 ea., \$40,480; \$38,354.
Aluminum Co. of America, 1200 Ring Bldg., Washington, D. C., aluminum alloy, \$69,533.
American Optical Co., 14 Mechanic St., Southbridge, Mass., flying goggles sets, 24,300 ea., \$41,261.
Bendix Products Div., Bendix Aviation Corp., 401 Bendix Drive, South Bend 20, Ind., maintenance parts for various aircraft, \$28,151.
Bendix Radio Div., Bendix Aviation Corp., Baltimore, Md., antenna loop used in AN/ARN 7 equipment, 10 ea., \$45,684.
Wright Aeronautical Div., of Curtiss-Wright Corp., Woodbridge, N. J., shield assy., 460 each, \$158,268.
R. E. Darling Co., 6825 Reed St., Bethesda 14, Md., disconnect and tube assys. for various aircraft, \$74,720.
Douglas Aircraft Co., Inc., 3000 Ocean Park Blvd., Santa Monica, Calif., maintenance parts for R5D aircraft, \$38,596.
Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., adapters for various aircraft, \$27,310.
Erno Machine Co., Inc., 61 South Lexington Ave., White Plains, N. Y., pneumatic charger for aviation armament, 1,375 ea., \$54,271.
Goodyear Tire & Rubber Co., Inc., 1144 East Market St., Akron 16, Ohio, brake linings for aircraft, \$34,473.
Houdaille-Hershey Corp., 1500 Fisher Bldg., Detroit 2, Mich., shimmy damper for F3D-1-2 aircraft, 51 ea., \$48,816.
Minneapolis-Honeywell Regulator Co., Aeronautical Div., 2600 Ridgway Road, Minne-

apolis 13, Minn., indicators for S2F-1 aircraft, 173 ea., \$40,972.
New York Air Brake Co., Watertown Div., Watertown, N. Y., hydraulic power pump assys. for various engines, \$92,261.
SMS Instrument Sales Service, Inc., New York International Airport, Jamaica 30, N. Y., services and material to overhaul directional gyro indicators, \$51,000.
Scintilla Magneto Div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., distributor and ignition harness assys. for various aircraft, \$132,888; maintenance parts for various engines, \$143,044; \$138,492.
Sprague Engr. & Sales Corp., 1144 W. 135th St., Gardena, Calif., accumulator assys. for various aircraft, \$187,022.
Thompson Products, Inc., 23555 Euclid Ave., Cleveland 17, Ohio, fuel pump assys. for various aircraft, \$362,520.
Vickers, Inc., 1400 Oakman Blvd., Detroit 32, Mich., hydraulic pumps for various aircraft, \$246,564.
Aeroproducts Operations, Allison Div., General Motors Corp., Municipal Airport, Dayton 1, Ohio, services and material to overhaul and replace propellers, \$33,000.
AIResearch Mfg. Co., Div. of the Garrett Corp., 9851-9951 Sepulveda Blvd., Los Angeles 45, Calif., refrigeration unit and supercharger used on WV-1 aircraft, \$65,215.
Electrical Engr. and Mfg. Corp., 4612 W. Jefferson Blvd., Los Angeles 16, Calif., gear box for hydraulic motor for P2V-5-6 aircraft, 53 ea., \$41,511.
Pacific Airmotive Corp., 2040 N. Hollywood Way, Burbank, Calif., valve assy., for various aircraft, 422 ea., \$274,300.
Pacific Div., Bendix Aviation Corp., 11600 Sherman Way, North Hollywood, Calif., maintenance parts for various aircraft, \$1,131,911.
Sikorsky Aircraft Div., United Aircraft Corp., Bridgeport 1, Conn., services and materials to overhaul rotor blades, \$374,200.
Hamilton Standard Div., United Aircraft

Corp., Windsor Locks, Conn., spare parts used on propeller assys., \$131,929; material for HSD propellers, \$43,439; material for HSD propellers, \$150,354; material for J57-P1 engines, \$53,801; spare parts used on propeller assys., \$84,182; propeller assys., used on HSD propellers, \$756,913.
Pratt & Whitney Aircraft Div., United Aircraft Corp., East Hartford 8, Conn., spare parts used on P&W engines, \$306,599; control for use on P&W engines, 25 ea., \$41,998; pump, fuel, for P&W engines, 75 ea., \$101,969; control for use on P&W engines, 82 ea., \$417,124; spare parts for use on J57-P1 engines, \$54,274; material for use on R4360, R2800 engines, \$1,297,691; spare parts for use on J57-P1 engines, \$56,312; material for J48-P5 engines, \$128,613; spare parts used on P&W engines, \$43,437; material for P&W engines, \$432,783.
Westinghouse Electric Corp., Aviation Gas Turbine Div., Lester Branch Post Office, Philadelphia 13, Pa., maintenance parts required to support J34-WE34 engines, 120 ea., \$33,031.
General Laboratory Associates, Inc., 17 E. Railroad St., Norwich, N. Y., coll. 545 ea., \$26,242.
General Textile Mills, Inc., 450 Seventh Ave., New York 1, N. Y., pilot's helmet, 2,000 ea., \$47,060.
Lion Uniform, Inc., 44 Webb St., Dayton 3, Ohio, flying suit, 7,010 ea., \$84,120.
Lite Mfg. Co., Inc., 101 W. 21st St., New York 11, N. Y., target: Aero 26B, radar reflective banner, 3,270 ea., \$135,182.
Parker Aircraft Co., 5827 W. Century Blvd., Los Angeles 45, Calif., maintenance parts used for various aircraft, 10,377 ea., \$39,951.
Rhodes Lewis Co., 6151 W. 98th St., Los Angeles 45, Calif., cylinder release for P2V-4-5 aircraft, 549 ea., \$203,304.
Rubbercraft Corp. of America, Inc., 151 Orange Ave., West Haven, Conn., PK-2 paraft kit, 426 ea., \$31,713.

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Combination Wheel Skis and Wheel Replacement Type Skis for Most Sizes and Types of Aircraft—The most complete line in the industry. Skis to fit all popular aircraft from light planes to multi-engined passenger, cargo and military planes.

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Depend on FEDERAL for the finest and greatest advancements in airplane skis! ALL FEDERAL skis sold will meet C.A.A. and new D.O.T. requirements.

When buying FEDERAL Skis you deal with a fully responsible distributor and dealer backed by a pioneer manufacturer of top quality ski equipment with assured good service and parts availability.

AIRCRAFT MANUFACTURERS

Under new procurement policies aircraft manufacturers are faced with military requirements for ski-wheel equipment. Federal Aircraft has over 25 years of experience in this specialized field. Contact Federal for experienced engineering service in connection with correct ski design and proto-type or production requirements.



Need a "double"?

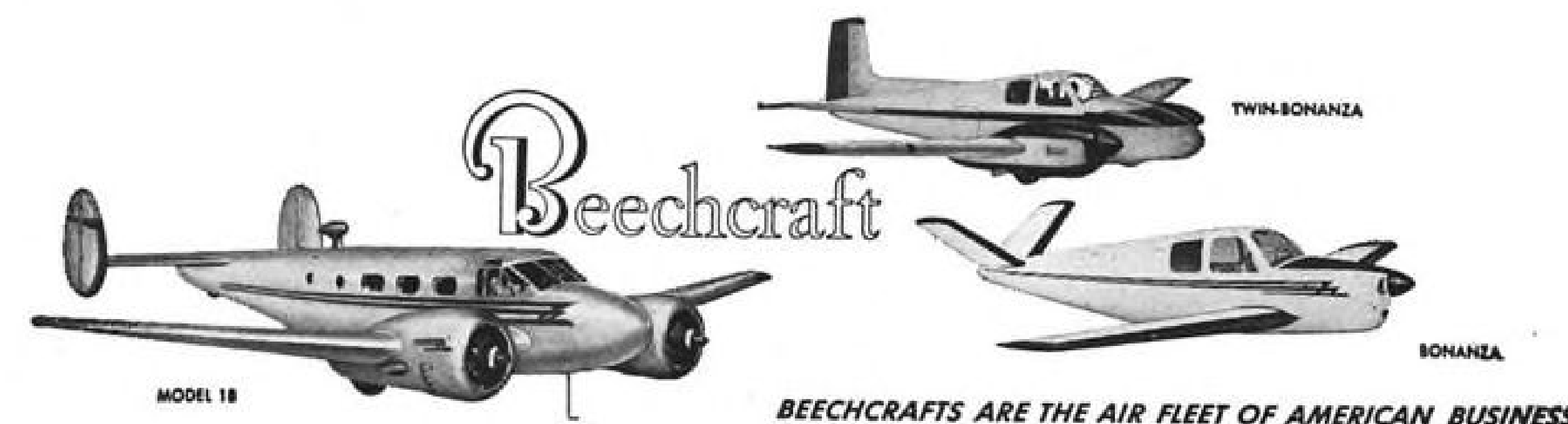
In so many organizations the top men, the key men, need "doubles" — that's one of the big reasons for so many company-owned Beechcrafts. These swift carriers whisk needed men to *where* they're needed in hour-saving, day-saving time. The faraway problem is

reached and solved, and you're back before you're missed.

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typical costs and operating data may change your whole conception of the cost of Beechcraft travel.

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BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Fast Writeoffs

Accelerated tax amortization for manufacturers expanding their defense facilities is granted by the government in the form of certificates of necessity.

In the following list of recent certificates, company name is given, followed by product or service, cost of construction deemed necessary for defense expansion, and the percentage of the expansion cost allowed for fast write-off. Fast writeoff permits property to be depreciated in five years.

- International Business Machines Corp., Poughkeepsie, N. Y., research and development for military aircraft, \$366,741, 40%.
- Cornelius Co., Minneapolis, Minn., aircraft parts, \$10,580, 70%.
- Lear, Inc., Learcal Div., Los Angeles,

Calif., scientific and technical equipment for defense, \$60,112, 65%.

- AlResearch Mfg. Co. of Arizona, Div. of Garrett Corp., Phoenix, Ariz., aircraft components, \$514,608, 55%.

- Kearfott Mfg. Co., Newark, N. J., aircraft components, \$47,151, 65%.

- Air-draulics Co., Pasadena, Calif., aircraft parts, \$5,000, 70%.

- Daven Co., Essex County, N. J., scientific and technical equipment for defense, \$443,316, 50%.

- Eastern Air Lines, Inc., Miami, Fla., air transportation, \$11,382,000, 80%.

- Lockheed Aircraft Corp., Burbank, Calif., aircraft and aircraft parts, \$61,152, 65%.

- aircraft, \$73,133, 60%.

- Brunswick-Balke-Collender Co., Muskegon, Mich., aircraft parts, \$35,845, 65%.

- Rogerson Aircraft Supply Co., Los Angeles, Calif., aircraft engine parts, \$47,741, 45%.

- Aircraft Engineering Products, Inc., Clifton, N. J., aircraft parts, \$14,926, 70%.

- Marquette Metal Products Co., Cleveland, Ohio, aircraft parts, \$11,661, 60%.

- Delta Air Lines, Inc., Atlanta, Ga., air

transportation, \$12,200,000, 80%.

- B. H. Aircraft Co., Inc., Farmingdale, N. Y., aircraft parts, \$89,275, 45%.

- Helwig Tool Mfg. Co., Inc., St. Paul, Minn., aircraft parts, \$8,338, 70%.

- Crown Controls Co., Inc., New Bremen, Ohio, aircraft instruments, \$58,000, 45%.

- Kenyon Instrument Co., Inc., Huntington Sta., L. I., N. Y., aircraft parts, \$3,441, 70%.

- Western Electric Co., Inc., Greensboro, N. C., aircraft equipment, \$27,399, 65%.

- American Standard Corp., Treviso, Pa., aircraft parts, \$24,000, 45%.

USAF Contracts

Following is a list of recent USAF contracts announced by Air Materiel Command.

- Allison Div., General Motors Corp., Indianapolis 6, Ind., spare parts J35 and J71 engines, \$1,832,479.

- Continental Motors Corp., Muskegon, Mich., engines, 177 ea., \$745,081.

- Friden Calculating Machine Co., Inc., 2350 Washington Ave., San Leandro, Calif., driftmeters, 249 ea., \$1,009,107.

- Geotechnical Corp., 3712 Haggard Drive, Dallas 9, Tex., data recorders, seismometers, spare parts, \$181,022.

- Goodyear Tire & Rubber Co., Inc., 1144 East Market St., Akron, Ohio, wheel assemblies, 232 ea., 12 ea., 52 ea., \$71,861.

- Hughes Aircraft Co., Hughes Tool Co., Culver City, Calif., modification of E-series fire control components; ECP HUG-0409-197, 1,032 ea., \$7,567,623.

- North American Aviation, Inc., Los Angeles International Airport, Los Angeles 45, Calif., additional funds, GFAE rework, \$100,000.

- PSP Engineering Co., 8420 Otis Street, South Gate, Calif., release assy., 1,000 ea., \$30,500.

- Red Bank Div., Bendix Aviation Corp., Eatontown, N. J., generators, 947 ea., spare parts, \$746,520.

- Western Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark, N. J., indicator, 1,285 ea., \$133,048.

- Delta Air Lines, Inc., Atlanta, Ga., air

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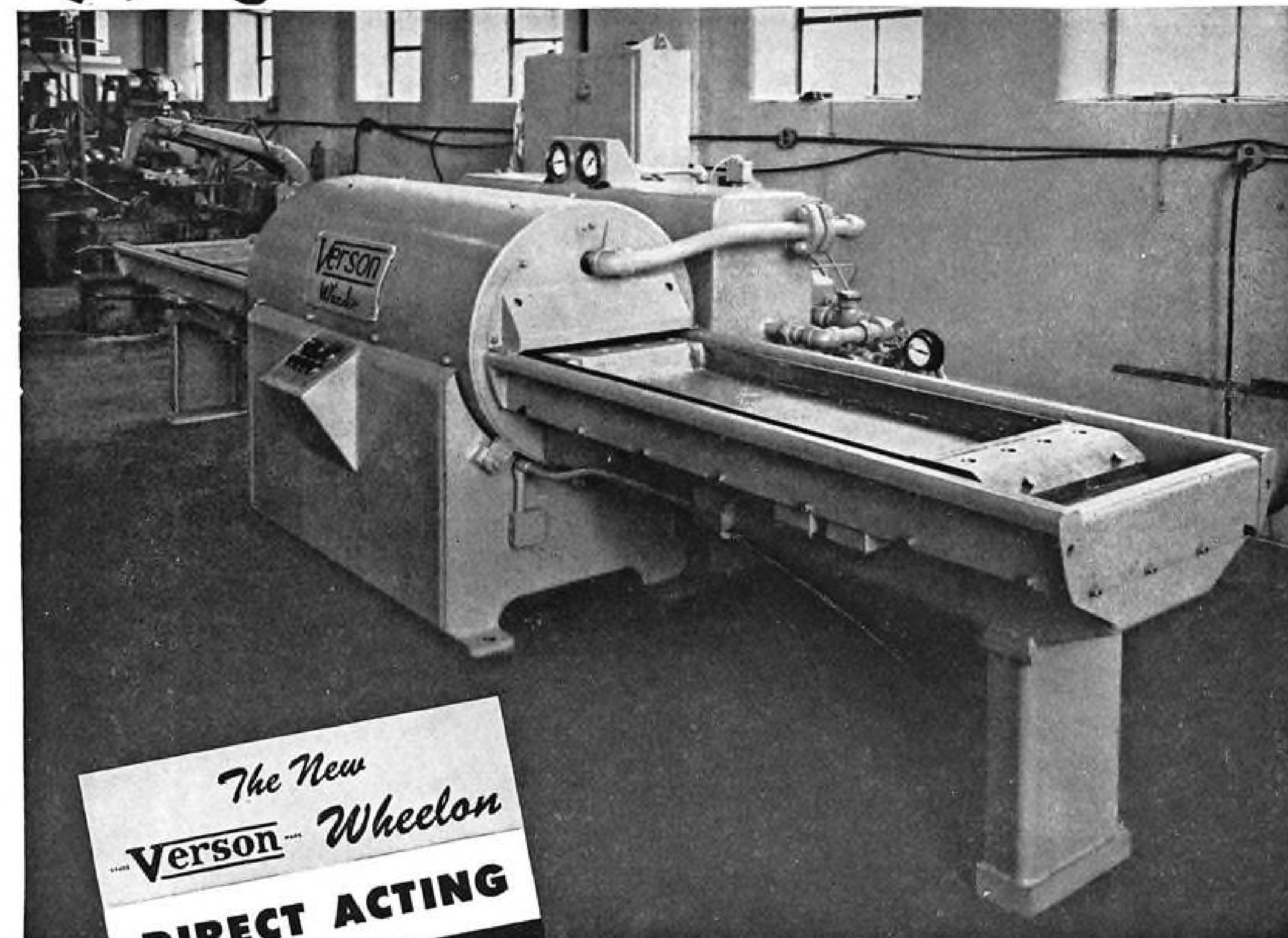
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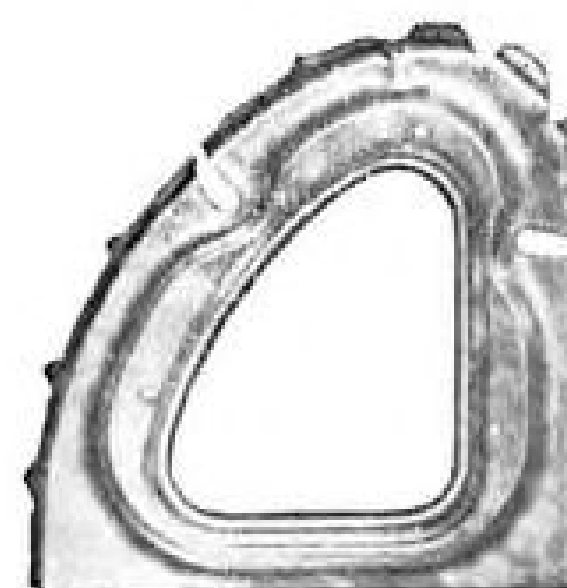
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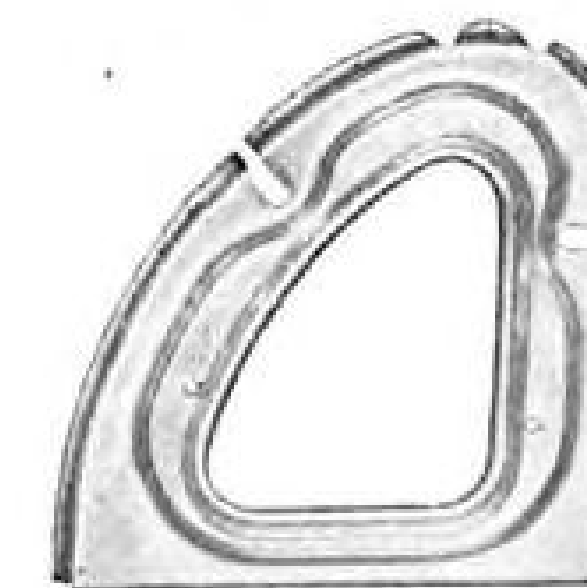
YES—this is a 2500 ton press...



The New
Verson-Wheelon
DIRECT ACTING
Hydraulic Press



Formed in a conventional rubber pad press.



Formed in a Verson-Wheelon press.

To meet the demand for a more efficient, more economical method of rubber pad forming of metal, Verson now offers the Verson-Wheelon Direct Acting Hydraulic Press. With this revolutionary new method, it is possible to exert forming pressures many times as great as the practical maximum with a conventional rubber pad press. The small press above, for example, operates at 5000 psi, equivalent to a rated tonnage of 2500. The photos at the left show the superior forming detail.

The advantages of the Verson-Wheelon method are—complete forming of flanges, eliminating hand finishing... lower first cost... elimination of expensive machine foundations... minimum plant space requirements.

Write for bulletin VW-52 which gives further details.

A Verson Press for every job from 60 tons up.



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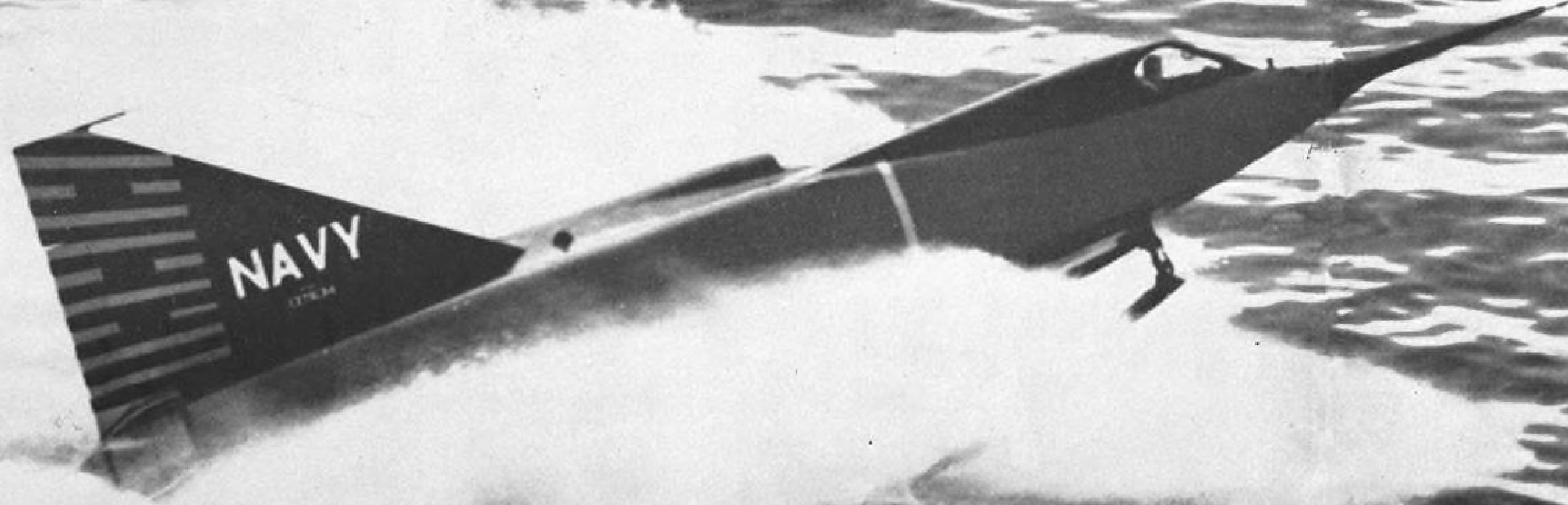
Drill Press Saw

This modified drill press having a two-inch saw attached to an adapter is saving Convair's San Diego, Calif., division \$8,000 annually, the company says. The device, used for trimming airplane bulkheads, frames, angles and extruded parts, saves man-hours and turns out superior work compared to table saw, hand saw or hand snips formerly used. Drill press table can be adjusted to vary the amount of trim required.

AVIATION WEEK, December 14, 1953

HIGHLIGHTS IN *Jet Engineering*

**Increased
thrust-to-weight ratios
applied to radical
fighter design**



New aircraft designs and fighter concepts are demanding jet engines having greatly increased thrust with less weight—typified by the Westinghouse powered Convair XF2Y-1 "Sea Dart". This jet seaplane—as all other Westinghouse powered aircraft—takes advantage of the lightest weight engine in its power class to attain high speed, high altitude performance.

Westinghouse first met this challenge over ten years ago with the original axial-flow jet engine. Since then, continual engine thrust increases, coupled with a weight reduction program, have resulted in ever-increasing thrust-to-weight ratios. Research has also led to improved durability, reliability and performance with such engineering developments as . . . first application of titanium and its alloys, fabrication of components to replace solid castings and development of the step wall liner.

This pioneering by Westinghouse is paying off in more advanced, high-performance aircraft by making it possible for engines to meet designers' demands for maximum thrust-to-weight ratios. Thus, Westinghouse Aviation Gas Turbine Division contributes to continued pace setting by American aircraft. Westinghouse Electric Corporation, Lester Branch P. O., Philadelphia 13, Penna.

J-54029

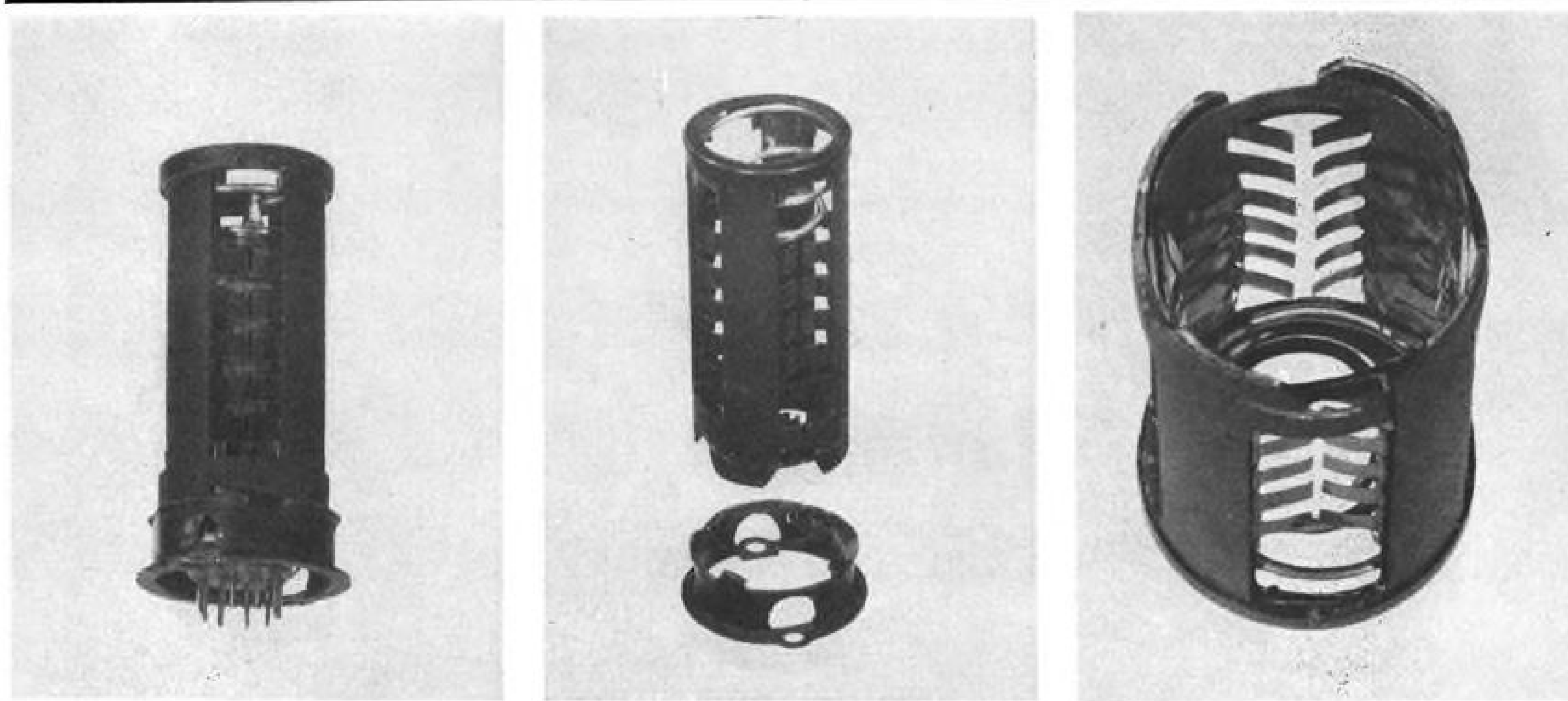


The Convair XF2Y-1 "Sea Dart", experimental U. S. Navy jet seaplane, is one of the latest in a long line of Westinghouse powered, high-performance fighters. It is the world's first delta wing seaplane and the first known combat craft to use hydro skis.

YOU CAN BE **SURE**...IF IT'S
Westinghouse



AVIONICS



HEAT-BEATING shield keeps subminiature tubes cooler. Spring fingers (right photo) provide support and conductive path for heat.

New Shield Gets Rid of Tube Heat Fast

Device may lengthen subminiature tube life, improve reliability; Wright Field tests show cooling effect.

By Philip Klass

A new type of shield for miniature tubes, designed to dissipate tube-generated heat instead of trapping it, is slated to become standard for future Air Force equipment. The new shield, developed by International Electronic Research Corp. should ease a major cause of tube failures—excessive temperatures—thereby improving equipment reliability.

► **Will Improve Reliability**—Wright Air Development Center's Electronic Components lab, after testing the new shield, reported that it "will provide better cooling and greater reliability for electron tubes than any other shields or mounting procedures for miniature tubes presently being used in military electronic equipments." The report concludes: "Its use should result in greater reliability for military airborne electronic equipments."

WADC tests showed that a tube enclosed by one of the new IERC shields had a maximum bulb temperature rise only one-third as great as a tube equipped with a standard JAN shield, and only half as great as a tube operating without any shield. The IERC shield is also designed to restrain cantilever-type vibration of the tube relative to its socket.

North American Aviation's avionics division has reportedly adopted the new shield for all future equipments and several major equipment manufacturers are currently evaluating the shield or have placed pilot orders.

► **An Avionic Problem**—The use of tube shields, to provide electrostatic shielding and thus to prevent stray coupling between circuits, is almost as old as electron tubes themselves. Until recently, there had been little change in basic tube shield design.

As long as the shield performed its electrical function, nobody worried over the fact that it restricted conduction, convection, and radiation cooling of tubes. The ambient temperatures in which home and industrial electronic equipment usually operate are comparatively low and the equipments can be spread out to avoid high power dissipation densities.

Since the end of World War II, heat dissipation in avionic equipment has become a major problem. Avionic equipments must be compact, giving high power densities. They must operate in high ambient temperatures and at high altitudes, where cooling air's density, and thus its effectiveness, is greatly reduced.

Various solutions have been attempted by avionic equipment manu-

facturers, but mostly on a makeshift, piecemeal basis:

- Tube shields have been painted black, to make them better radiators.
- Some have cut small windows in tube shields to improve convection cooling.
- Combination tube shields and clamps for subminiature tubes have been designed to conduct tube heat to the chassis.

► **New Design**—IERC has come up with a totally new miniature tube shield design which occupies no more space than a JAN shield and cools by:

- **Convection**, through the use of slots along the side and an open top which creates a chimney effect.
- **Conduction**, through metal fingers which contact the tube envelope and provide a heat path through the shield base to the chassis.
- **Radiation**, by means of a dull black finish.

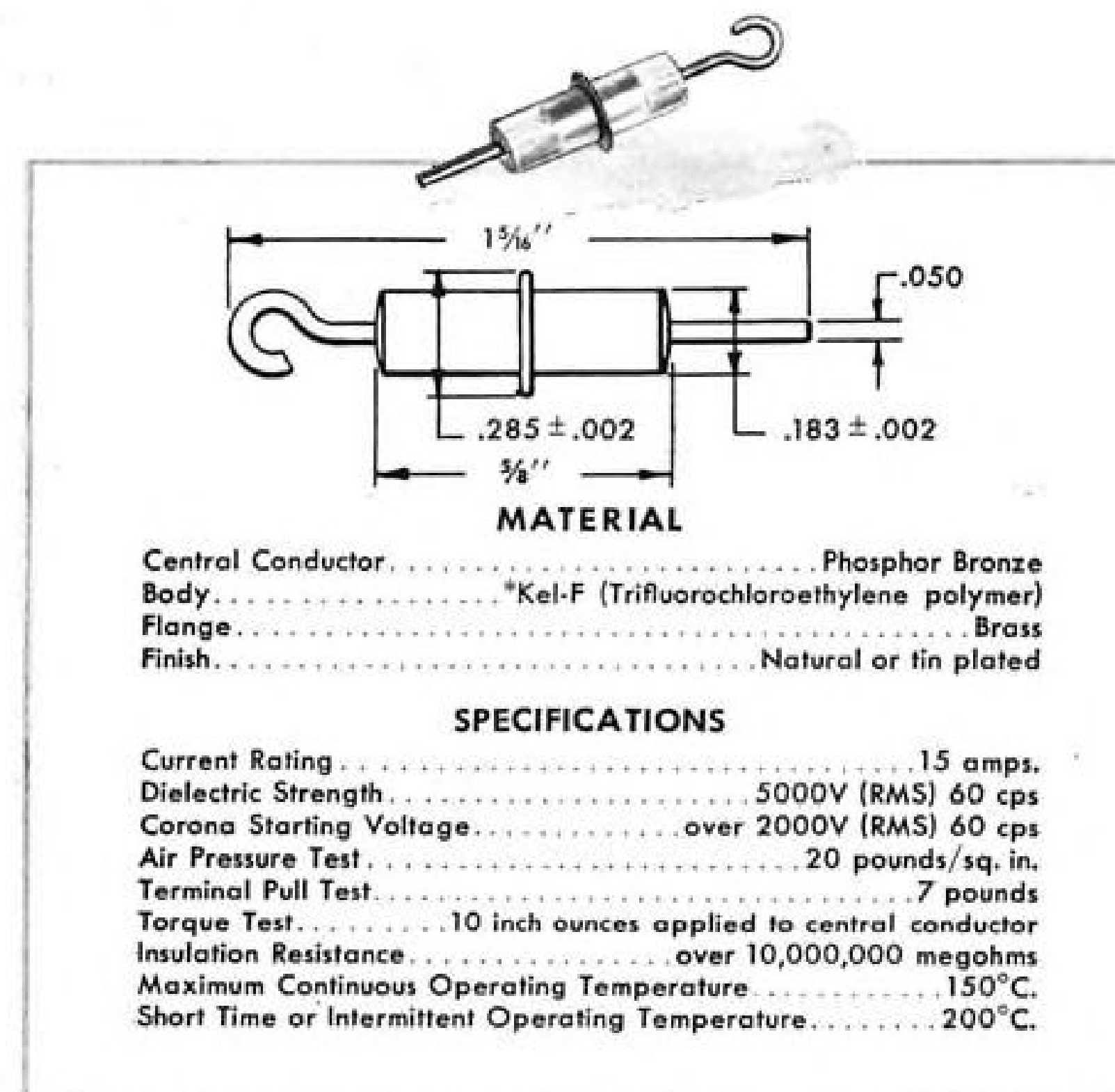
► **Proof by Test**—In its tests on the new shield, WADC's Electronic Components lab ran a comparison with other types of miniature tube shields, including standard and modified JAN shields. Five 5763 beam power tubes were placed side-by-side on a chassis and operated at rated filament voltage, 240 v. on the plate, drawing a plate current of 47.5 ma. Three thermocouples were attached to each tube glass envelope, one each opposite the top, middle, and bottom of the tube's plate, to measure bulb temperature.

Each of the five tubes was outfitted with a different type of shielding ar-

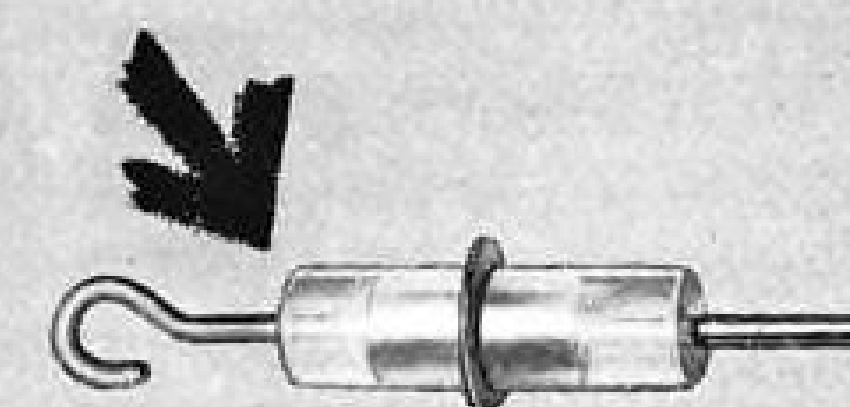
NOW

Kel-F* hermetic sealing terminals

IRC's new FEED-THRU TERMINALS provide assured hermetic sealing for electrical and electronic components. Exclusive IRC molding technique bonds Kel-F* to metal in a superior and consistent hermetic seal. Type HS-1 terminals are designed to the sealing requirements of MIL-T-27. Send coupon for data bulletin.



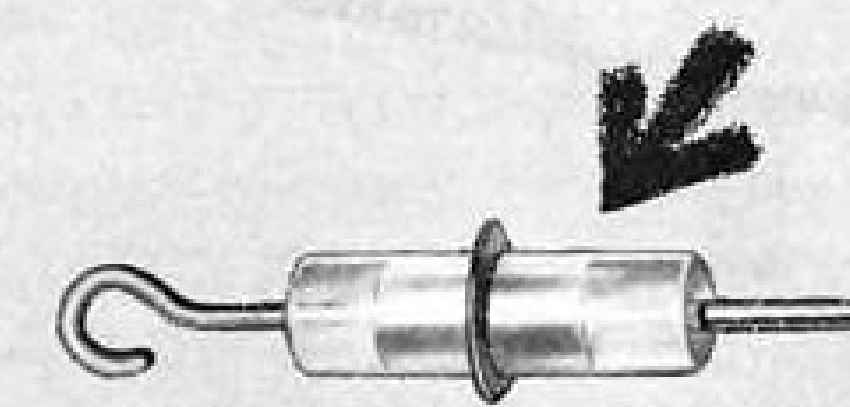
*Trademark—M. W. KELLOGG CO.



ELECTRICAL CHARACTERISTICS—limitations of other types of hermetic sealing terminals are all fully overcome.



MOLDED KEL-F* BODY—chemically inert to organic solvents, acids, oils, fumes.



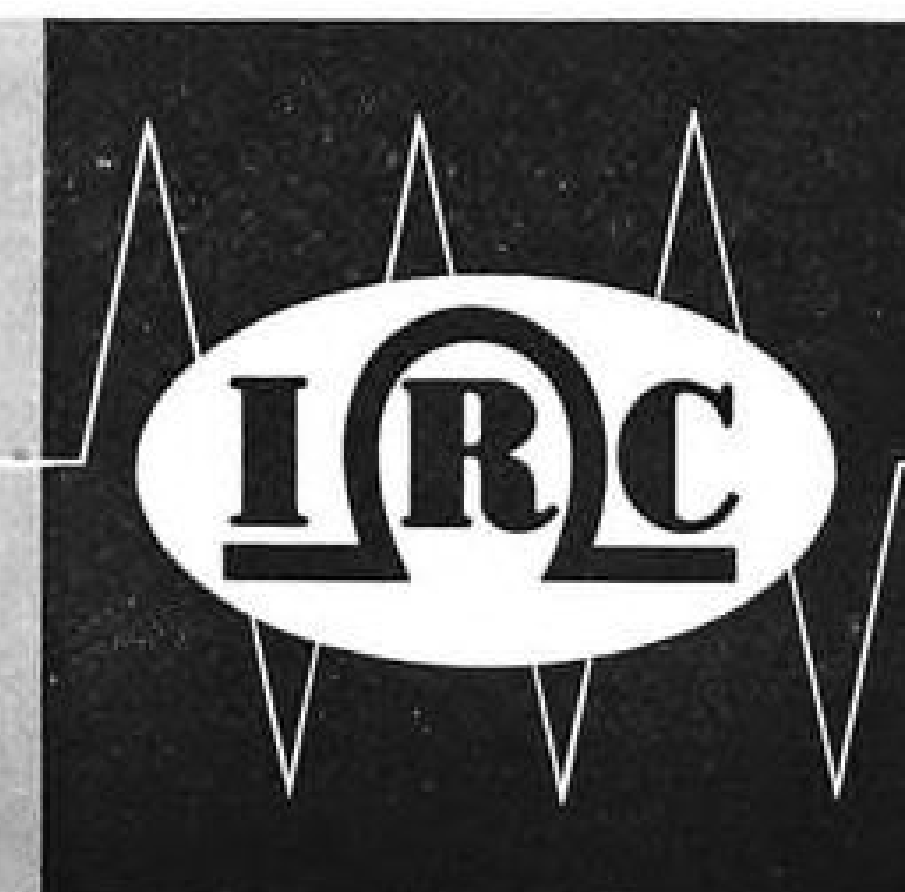
RUGGED CONSTRUCTION—tough and resilient; withstands constant vibration.

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Please send Technical Bulletin HS-1, describing hermetic sealing terminals:

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Title.....
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**NOW!...from the world's
largest producer of gyros...**



RATE GYRO

Type No. 15814-1-A

MOTOR: 26 volts, 400 cps, 3 phase with rated speed of 22,000 rpm and a rotor moment of inertia of 175 gram-cm².

PICKOFF: 26 volts, 400 cps, single phase with "E" type variable coupling. With resistive load of 10,000 ohms, tuned output is 6 to 7 volts at maximum rate. Null is 30 millivolts with an armature travel of 2 1/2" to 3" either side of null.

DAMPING: Accomplished by fluid flotation of gimbal. Damping factor is 0.5 to 0.7 of critical, but values up to and including 1.0 of critical can be provided.

NATURAL FREQUENCY: 50-55 cps (undamped).

WARM-UP TIME: One minute.

RANGE: Maximum rate is 450 ± 20°/second. Minimum detectable rate is less than 1.5°/second. Other maximums and minimums are available.

ENVIRONMENTAL CHARACTERISTICS: -20°F. to 140°F. temperature operating range. Maximum shock is 60 g. Vibration operating range of 5 g. from 20 to 300 cps. Positive hermetic seal.

WEIGHT: 13.5 ounces complete with mounting bracket and electrical connector.

FREE GYRO

Type No. 14108-1-A

MOTOR: 26 volts, 400 cps, 3 phase with rated speed of 22,000 rpm and a rotor moment of inertia of 1260 gram-cm².

DRIFT RATE: Will not exceed 1" per minute when subjected to Scorsby test at amplitude of ± 15° and rate of approximately 6 cpm (corrected for earth's rotation).

PICKOFF: Autosyn® type with peak value of 20 volts. Initial slope of output voltage curve about null position is 0.35 volts per degree ± ten per cent. Phase shift is less than 20 degrees. Residual voltage is less than 50 mv.

WARM-UP TIME: Within two minutes.

OPERATING LIFE: Rated at 500 hours.

ENVIRONMENTAL CHARACTERISTICS: Maximum operating temperature of 195°F. and a minimum of -20°F. Maximum allowable shock is 60 g. with maximum operating vibration of 7 g. (from 10 to 500 cps). Maximum excursion not to exceed 0.5 inches. Positive hermetic seal.

WEIGHT: Approximately 4.2 lbs.

CAGING AND UNCAGING: Can be caged remotely by applying 26 volts, 400 cps, single phase and 28 volts DC power. Will cage from any position of gimbals within 30 seconds with gyro rotor at full speed. Application of 28 volts DC will uncage within 0.1 seconds.

*REGISTERED TRADE-MARK BENDIX AVIATION CORPORATION.

Out of Eclipse-Pioneer's vast engineering and production experience come these two new, better gyros for specialized missile and aircraft needs. We will welcome your inquiry for further details.

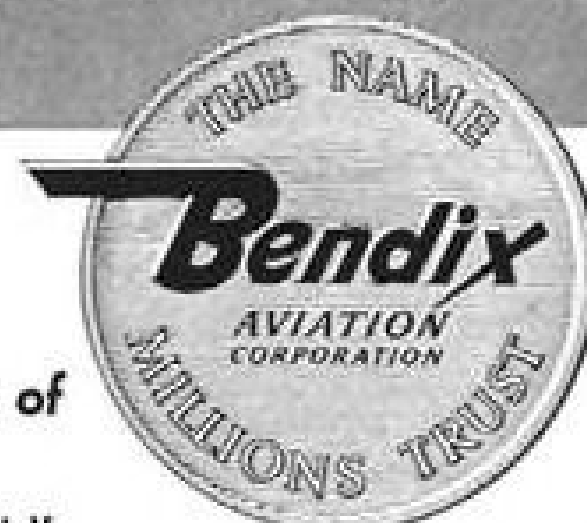
WRITE DEPARTMENT H

ECLIPSE-PIONEER

Teterboro, New Jersey

Division of

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



rangement. These were as follows:

- Bright finish JAN-S-28A shield.
- Black finish JAN-S-28A shield.
- Black finish JAN-S-28A shield with window cutouts.
- No shield.
- IERC shield.

► **Sea-Level Test**—Following is a comparison of the maximum bulb temperatures obtained when the test chassis was operated at normal room conditions (27.5C), at sea level:

Shield	Temp. (C)
None	125
Bright JAN	168
Black JAN	145
Cut-out JAN	106
IERC	78

► **50,000-Ft. Test**—The tests were repeated at a simulated altitude of 50,000 ft. at 27.5C with the following results:

Shield	Temp. (C)
None	160
Bright JAN	190
Black JAN	160
Cut-out JAN	127
IERC	95

► **Conduction Important**—To determine how much of the IERC shield cooling was taking place by conduction, WADC ran tests in which the IERC shield had full (normal) contact with the chassis and in which it had only 50% chassis contact. The following results show that conduction plays an important role in the shield's cooling ability:

	Maximum Temperature (C)	
	50% Contact	100% Contact
Sea level	105	78
50,000 Ft.	127	95

Capacitance between the tube elements and the IERC shield, measured at 1 mc., is 13.6 mmf., compared to 11.1 mmf. for a conventional JAN shield, and 10.2 mmf. for a JAN shield with window cut-outs, the WADC report says.

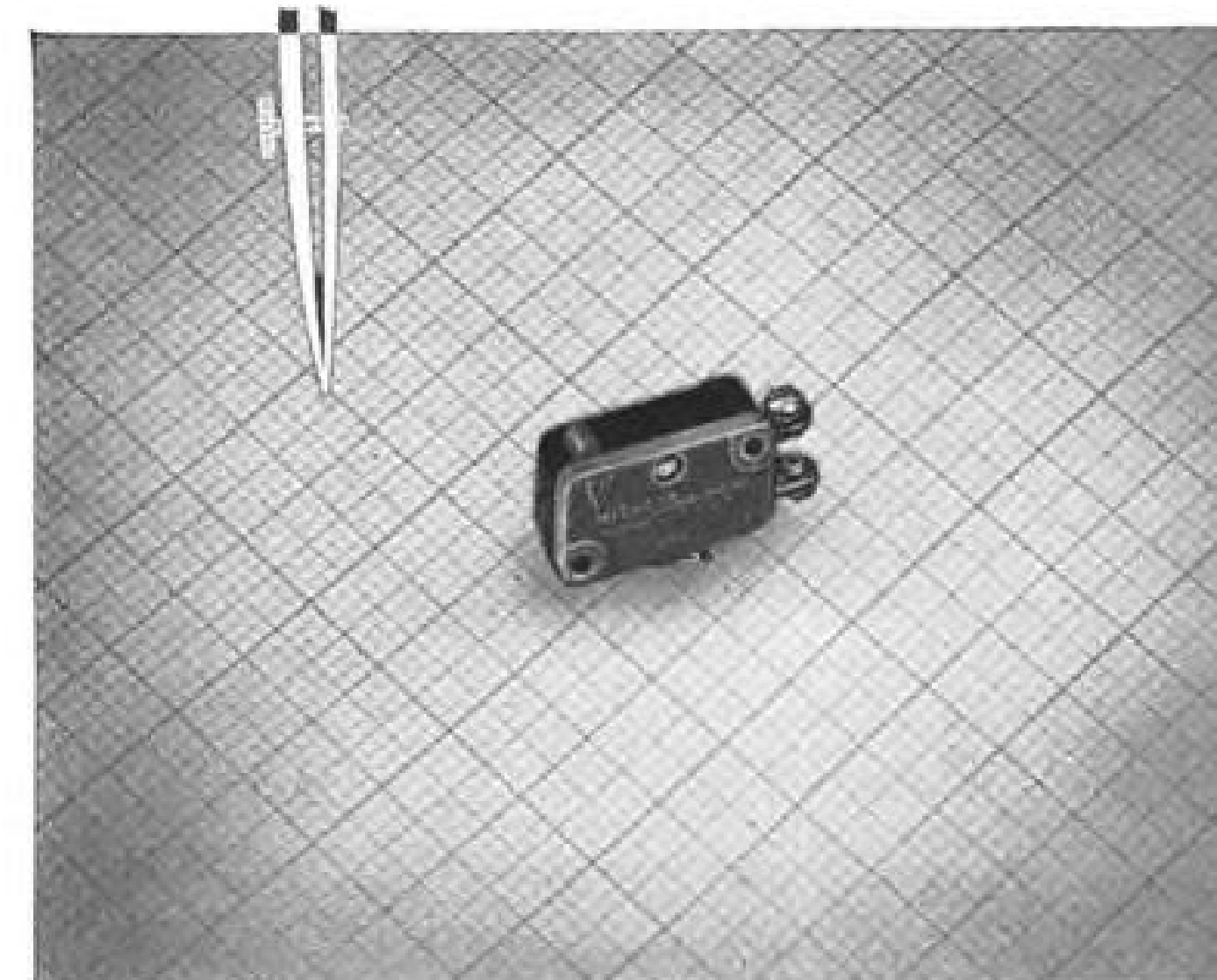
► **Why It Cools Better**—The WADC report explains why the new IERC type shield offers such improved cooling. In the standard JAN-type shield, "the dead air space between the shield and tube is a heat trap," report says.

"When . . . ventilating windows are provided . . . there is no direct contact from tube to shield to chassis to carry off the heat . . ." the report goes on to say. "The (JAN-type) bayonet contact between shield and shield mount makes poor point contacts and thus provides a poor heat conducting path from shield to chassis."

The new IERC shield simultaneously provides windows for convection cooling, and metal spring fingers which rest on the tube bulb and serve to conduct heat away from the tube. The IERC tube shield, and the mount

Better Products Thru Better Design

how MICRO switches
and MICRO field engineering service
can help you meet competition...



RARELY in recent years has the demand upon designers for better products been more pressing. Indications multiply that the long-expected "buyer's market" is now with us.

For the first time in many years it is not enough to have a product to sell. "How soon can I get delivery?" has been replaced with such inquiries as "Just what will it do?," "How long will it last?" and the all-important "How much does it cost?"

As manufacturers and their design and sales staffs prepare for this new competitive market, the pressure is on design and development engineers to re-evaluate every part, every component and every product to improve its performance, increase its life and, perhaps, to reduce its cost.

If your organization is seeking ways to improve its position in the competitive field, MICRO has a message for you. This is particularly true if a more efficiently designed product is indicated. Or, perhaps, you wish it to do things that other similar products won't do.

Nothing so stamps a product as being of high quality as absolute reliability. To the manufacturer it means the enhance-

ment of his good name. To the dealer it means freedom from maintenance and costly warranty replacements. To the customer it means long and satisfactory performance.

To this search for increased reliability MICRO brings a small, precision switch for those designs where less accurate switches won't do. This is because MICRO switches are so well and precisely built and have such uniform quality of operation that, once installed, their accurate performance is so routine that their presence is almost forgotten.

A switch to control the thermostat in a refrigerator or an air conditioning unit, for instance, must always operate within exceedingly close differential control. Even a slight drift cannot be tolerated.

A switch in a household appliance, which turns on the water to operate a motor, must turn on the water at exactly the same water pressure each time. Too little water pressure and the motor starts too soon . . . too much and water splashes over.

A switch in a business machine is required to stop the machine if even the thickness of an extra sheet of tissue paper passes beneath the switch actuator.

These are some of the contributions MICRO switches have made to absolute reliability in the design of better products. MICRO field engineering is available to assist you in the selection of the switch that will enable your product to do things other products won't do.

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AVIATION WEEK, December 14, 1953



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And the sky is no longer the limit on OPPORTUNITY at Martin. Young men are now in top positions at Martin. We need more young men for exciting jobs—creative engineers. We need:

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- ELECTRO-MECHANICAL ENGINEER
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to which it is attached to the chassis, provided a better heat conduction path. Despite the improved conduction, the new shields are as easily removed as their JAN counterparts, for access to the tube.

The spring fingers serve another function—to provide support for the tube and prevent mechanical resonance of the tube under vibration conditions. IERC says that no definite mechanical resonance conditions are experienced in the audio-frequency spectrum for the tube and shield combination.

► **Availability**—Production quantities of the new tube shields, for various sizes of seven- and nine-pin miniature tubes

are now available, according to Harvey Riggs, IERC president. Because the new shield base will fit chassis designed for JAN shields, Riggs reports that several companies are considering changing over existing equipments to use the new IERC shield.

International Electronic Research Corp., which was formed a year ago, also makes a line of subminiature tube shields designed for cooling. The company is an affiliate of Grimley Engineering Co. of Glendale, Calif. IERC's chief engineer, Leroy Woods, was responsible for the new development.

Company address is 175 West Magnolia Blvd., Burbank, Calif.



In 1920, as it is today, SERVICE STEEL has kept pace with the progress of the aircraft industry as a dependable supplier of

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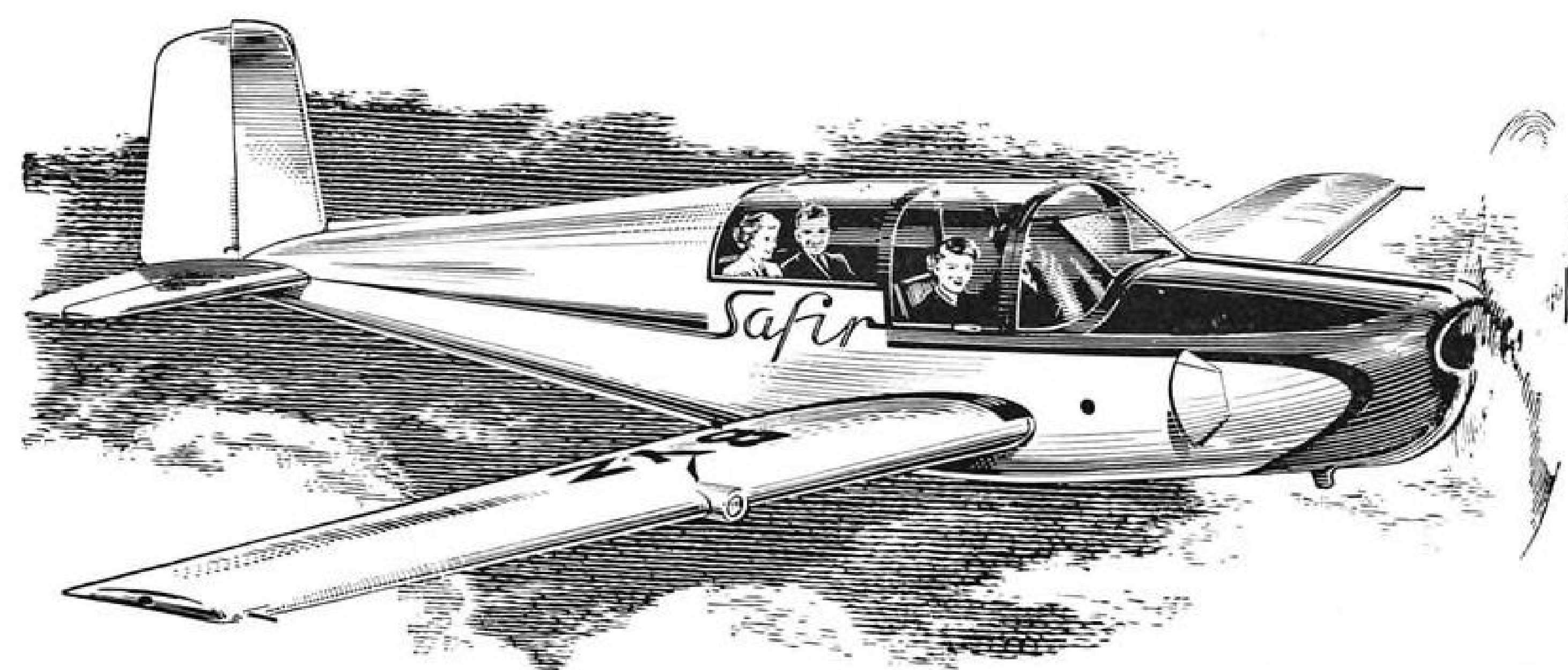
1437 Franklin Street, Detroit 7, Mich.
2444 Hunter Street, Los Angeles, Calif.
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4942 N. Western Ave., Chicago 25, Ill.
3412 Comfort St., Cincinnati 23, O.



Saab-91 Safir now a four-seater

The well-known *Saab-91 Safir* 3-seat all-metal training and touring aircraft is now available in a new and comfortable 4-seat model—the *Saab-91C*. Especially designed for executive and pleasure travel as well as for taxi and feeder use, the new *Safir* is also equally suitable as

a light "utility" or ambulance transport. By removing the rear seats, a quarter-ton cargo can be easily carried. Like its predecessors, the 91A and the improved 91B *Safir* versions now in use with several air forces and government flying training schools, the 91C *Safir* can also be used as a primary trainer up to the more advanced stage of jet training. All this makes the new *Safir* one of the world's most versatile light aircraft.



SAAB-91C SAFIR

Four-seat light aircraft



Power	one 190 h.p. Lycoming O-435-A "flat six" aircooled engine driving a v.p. propeller
Span	10,6 m (34 ft. 9 in.)
Length	7,95 m (26 ft.)
Wing area	13,6 m ² (146 sq. ft.)
Weight Empty	745 kg (1,650 lb.)
Gross Weight	1,215 kg (2,686 lb.)
Max speed	270 km/h (168 mph)
Cruising Speed (Sea Level)	240 km/h (150 mph)
Service ceiling	5,100 m (16,800 ft.)
Normal range	900 km (560 miles)
(All figures relate to 1,215 kg (2,686 lb.) weight)	

A stretcher case can be easily loaded into the *Safir*. The new model 91C can also accommodate a medical attendant.



SVENSKA AEROPLAN AKTIEBOLAGET (SAAB AIRCRAFT COMPANY) · LINKÖPING · SWEDEN

Speed Production.. Automatically with

RIVITORS



T-J RIVITOR used for automotive clutch plate assembly. Saves time and labor doing a four-fold job—assembly, setting, inspecting and ejecting.

DOUBLE RIVITOR sets two rivets at a time! Equipped with 10" hoppers, and tooled to automatically feed and set two 1/4" diam. x 3/8" long wagon box head rivets at a time in elevator chain and rattle or elevator flight assemblies for farm implements. Controlled by one foot pedal.

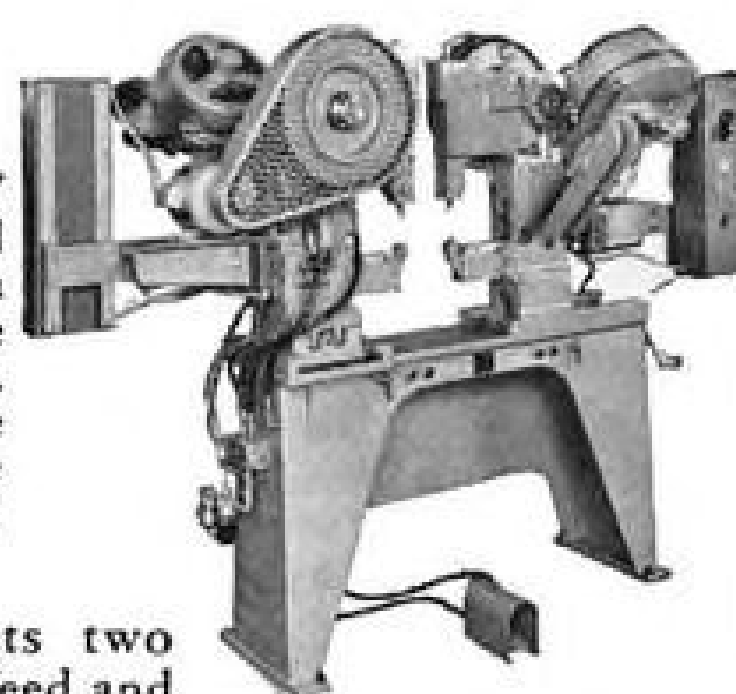


CLINCHORS



T-J CLINCHOR... one of six special 8" throat Underfeed Clinchors used by a large automotive body manufacturer. Feeds and sets 11/16" square cased nuts in outside quarter panels, left and right hand.

DOUBLE CLINCHOR sets two nuts at once! Tooled to feed and set 3/8" x 1/2" x 1/16" thick Fabri-Steel nuts at each operation. Both Clinchors tripped by same foot-operated valve. Adaptable to wide range of clinch nut setting problems.



Boost production... save labor with T-J Rivitors and Clinchors for many assembly jobs today... in aircraft, automotive, farm machinery, stampings of all kinds.

T-J CLINCHORS set clinch nuts 3 to 5 times faster! Fully automatic... controlled by a single foot pedal! Available in Underfeed and Gravity feed models, throat depths 8" to 36".

T-J RIVITORS automatically feed and set solid rivets... with high production! Electrically-powered Rivitor sets 1/16" to 1/4" diam. solid steel rivets up to 7/8" long. Air-powered Rivitor sets aluminum alloy rivets up to 1/4" diam. or steel rivets up to 1/8" diam. and up to 3/4" long. Throat depths 8" to 36".

Write for Clinchor bulletin 847; Rivitor bulletins 646 and 847. The Tomkins-Johnson Co., Jackson, Mich.

37 YEARS EXPERIENCE

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TOMKINS-JOHNSON

RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

No Special Training For New Test Units

Production-line testing of capacitors and resistors by non-technical persons can be speeded by devices recently announced by two manufacturers.

• Capacitance limit bridge employs a Schering bridge for checking capacitors between 0.0001 mfd. and one mfd., to an accuracy of nearly 0.3%. Device gives a "go, no-go" type indication with red, green, and amber lights to show operator whether capacitor value



is too low, acceptable, or too high. Rejection limits can be set at any arbitrary value: 0-50% below and 0-100% nominal value. Model OS-2 capacitance limit bridge is manufactured by Gulton Manuf. Co., Metuchen, N. J.

• Impedance bridge can be used to measure resistors of 0-10 megohms with a probable error of less than 0.1% and capacitors as large as one microfarad with a probable error of under 0.2%. The M1 impedance bridge, manufactured by Goodyear Aircraft Corp., con-

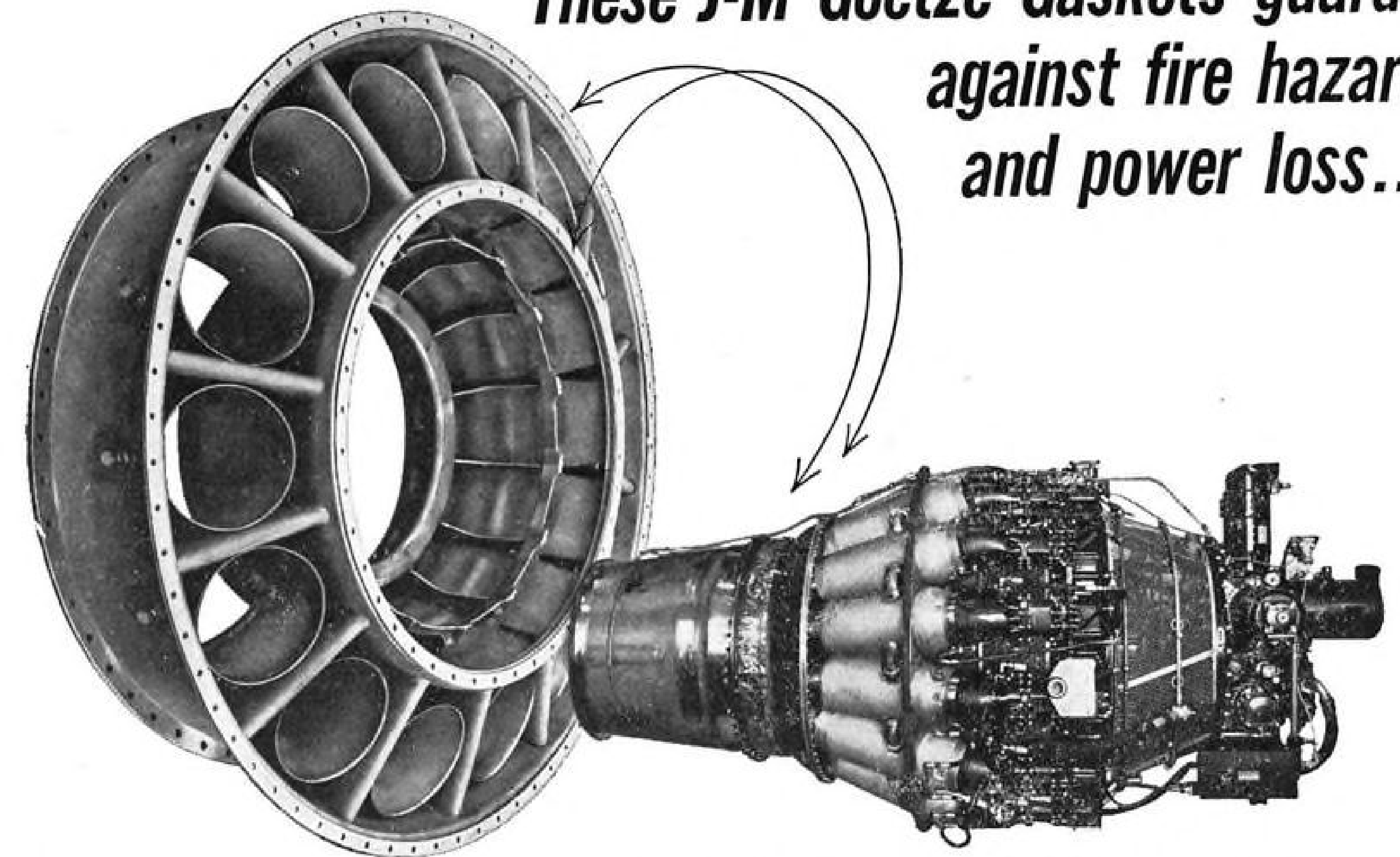


sists basically of Wheatstone and Schering bridges. To measure an unknown resistor or capacitor, operator rotates controls until tuning-eye indicator is centered, then reads control knob indications. The device operates from 110 v. a.c. Goodyear's address: Akron, Ohio.

Radar Designers Get New Components

New components for use in microwave/radar work announced recently include a K-band klystron tube, a miniature attenuator pad, pulse-forming

These J-M Goetze Gaskets guard against fire hazard and power loss...



Arrows point to J-M Goetze metallic gaskets on the inner and outer annulus, and their approximate location on the J33 turbojet engine turbine frame.

...on powerful turbojet engines like the J33

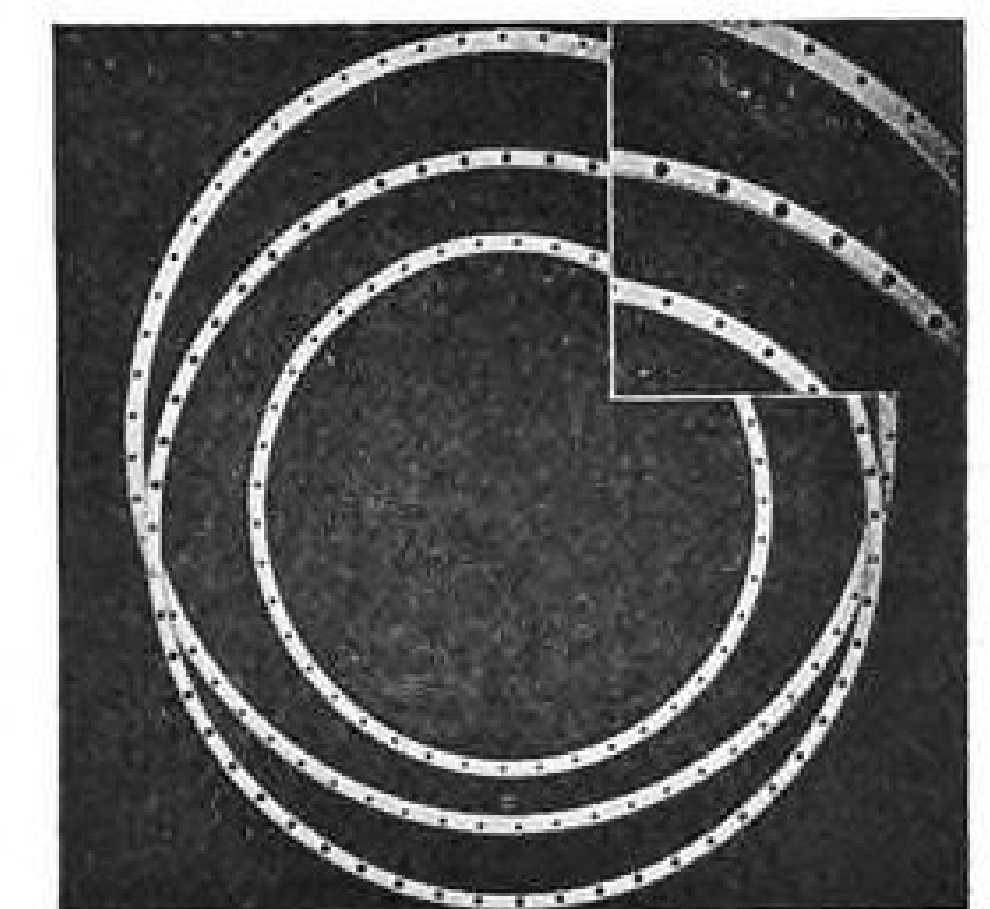
Sealing the inner and outer annulus on the J33 to prevent leakage of fuel and flame into the airframe is another example of the many tough, critical sealing jobs entrusted to Goetze custom-crafted metallic gaskets.

For this particular service condition, the Goetze gasket specified is made from a flat gasket design... with the metal on both edges rolled around an asbestos filler. This construction provides the resilience needed to overcome the warpage encountered in these applications. Like all Goetze gaskets, this style is precision-made to fit tight and stay tight in service.

There is a Johns-Manville Goetze gasket for practically every jet air-

craft requirement. Goetze craftsmen can fabricate them in almost any shape or size for sealing igniters, compressor bleed-offs, cross ignition tubes, combustion chambers, fuel nozzles, turbine drain lines, etc. Backed by more than 60 years of Goetze "know-how," these durable gaskets are solving many of industry's most complex sealing problems.

Why not write for further information about Johns-Manville Goetze gaskets...and other J-M flight-proved products for the aviation industry. Ask for your copy of Brochure AV-1A. Address Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay Street, Toronto 1, Ontario.



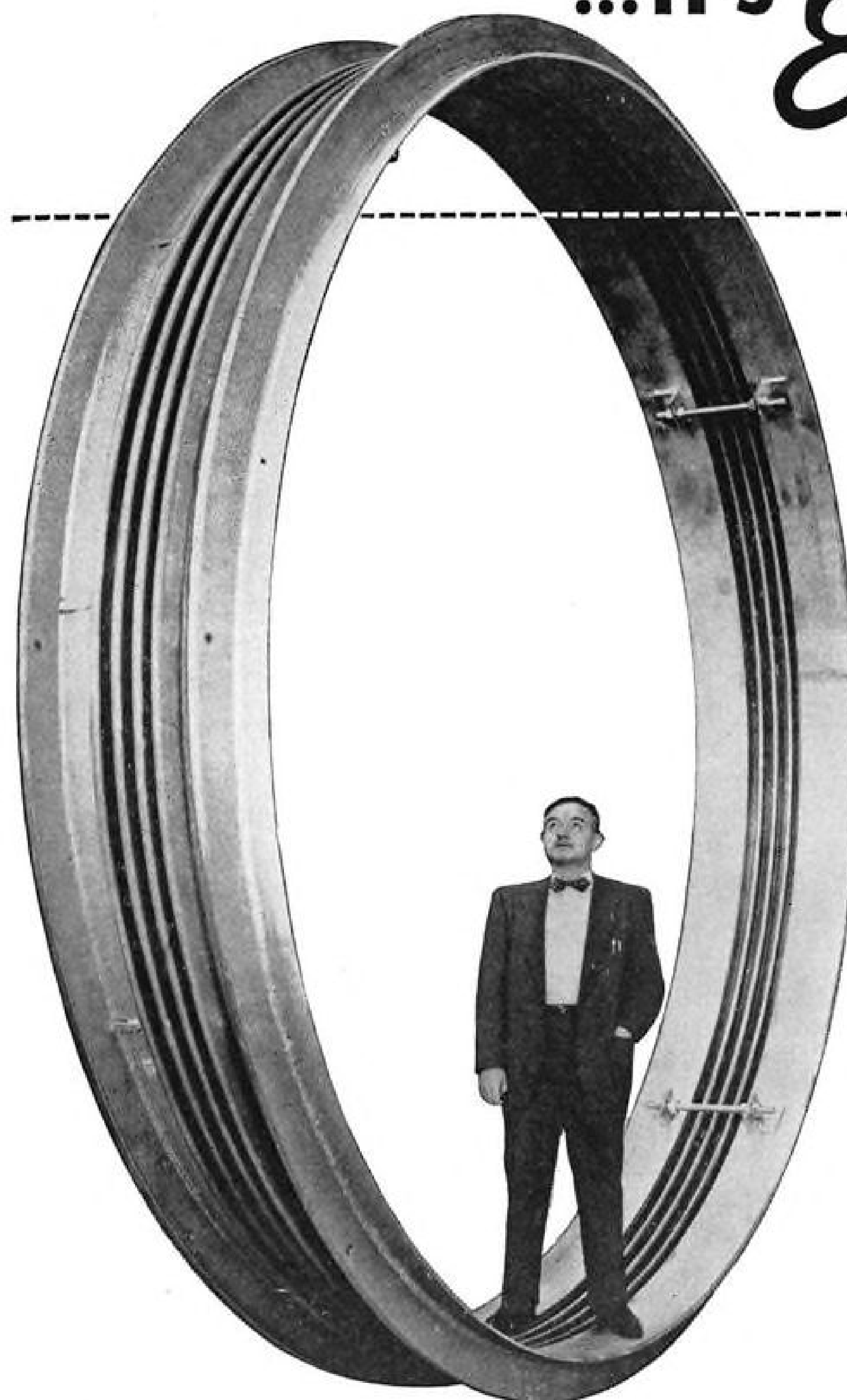
Close-up of J-M Goetze metallic gaskets used as inner and outer annulus gaskets on jet engine turbine frame.

JOHNS-MANVILLE
JM
PRODUCTS

Johns-Manville PRODUCTS for the AVIATION INDUSTRY

IT'S BIG ... IT'S TOUGH

... IT'S Enduro!



Yes, it is big and it is tough—it has to be! It's in a modern "torture chamber".

This ENDURO Stainless Steel expansion joint—thirteen feet in diameter—is part of an aircraft laboratory wind tunnel.

Eight of these giants are installed in the header between primary and secondary coolers of altitude exhaust ducts. They handle gases from full scale thermal jet engines, reciprocating engines, turbines, burners and other equipment tested in simulated high altitude conditions. Working pressures range from vacuum to 60 pounds... temperatures as low as -50°F . There's punishment aplenty.

Here's another application in which Republic ENDURO Stainless Steel demonstrates its great strength, toughness, resistance to heat and to corrosion... and its fabricating possibilities. Where can you next use these qualities? Republic metallurgists are ready to help you apply ENDURO to all types of aircraft development. Just write:

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Alloy Steel Division • Massillon, Ohio
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Export Department: Chrysler Bldg., New York 17, N. Y.

Zallea Brothers, Wilmington, Delaware, use ENDURO Stainless Steel in manufacturing expansion joints of all sizes. Under the Zallea process, there are no circumferential welds in the corrugated section subject to flexing stresses.

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ENDURO STAINLESS STEEL



Other Republic Products include Carbon and Alloy Steels—Pipe, Sheets, Tubing, Lockers, Shelving, and Fabricated Steel Building Products

networks, and quartz delay lines. The details:

- **K-band-klystron** can be thermally tuned over the frequency range of 23,504 mc. to 24,464 mc. in 1.2 to 2.6 seconds. Minimum power output of the new JAN 2K50 klystron is 8.5 mw. Tuning is accomplished by varying the grid bias voltage of a triode section incorporated in the klystron metal envelope. Resulting variations in triode plate current cause thermal expansion and contraction of the triode plate, attached to the klystron structure, thereby changing its gap spacing. Manufacturer is Bendix Aviation Corp., Red Bank Div., Eatontown, N. J.

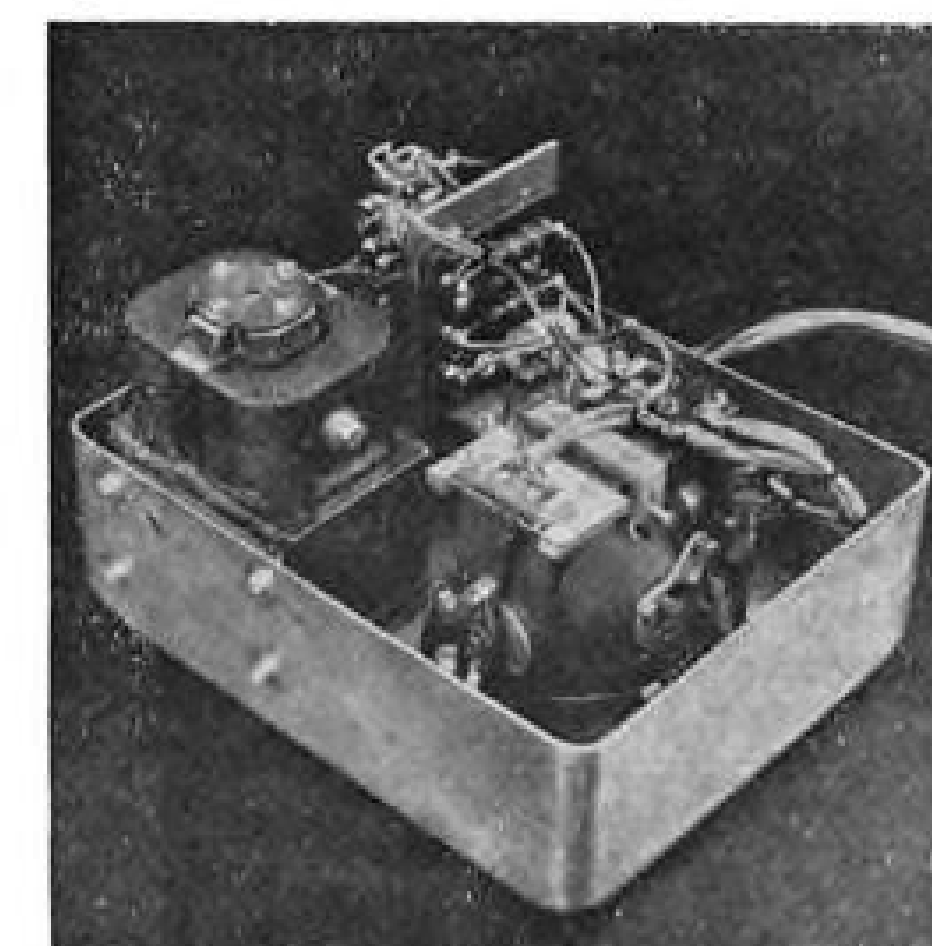
- **Miniature attenuator pad** employs platinum film microwave resistors. It is reportedly capable of withstanding overloads of more than 100%. Manufacturer is Telewave Laboratories, Inc., 100 Metropolitan Ave., Brooklyn 11, N. Y.

- **Pulse-forming networks** are available in two new types for laboratory and hydrogen thyratron tube testing. Model H-850 provides choice of five pulse lengths, $\frac{1}{4}$, $\frac{1}{2}$, 1, 2, and 3 microseconds, with no distortion of the pulse shape, manufacturer says. Designed for operation with a 50-ohm impedance load, network is rated for peak voltage of 13 kv. New series of five networks, H-851 to H-855, is designed for testing different types of thyratrons. Manufacturer is Sprague Electric Co., 291 Marshall St., North Adams, Mass.

- **Delay lines** of fused quartz have delays of 1 to 3,000 microseconds at operating frequencies of 5 to 100 mc. Spurious response is up to 60 db. below desired signal, reports the maker. Specialties Div., Laboratory For Electronics, Inc., 75-4 Pitts St., Boston 14, Mass.

Gyro Combination for Unlimited Maneuvers

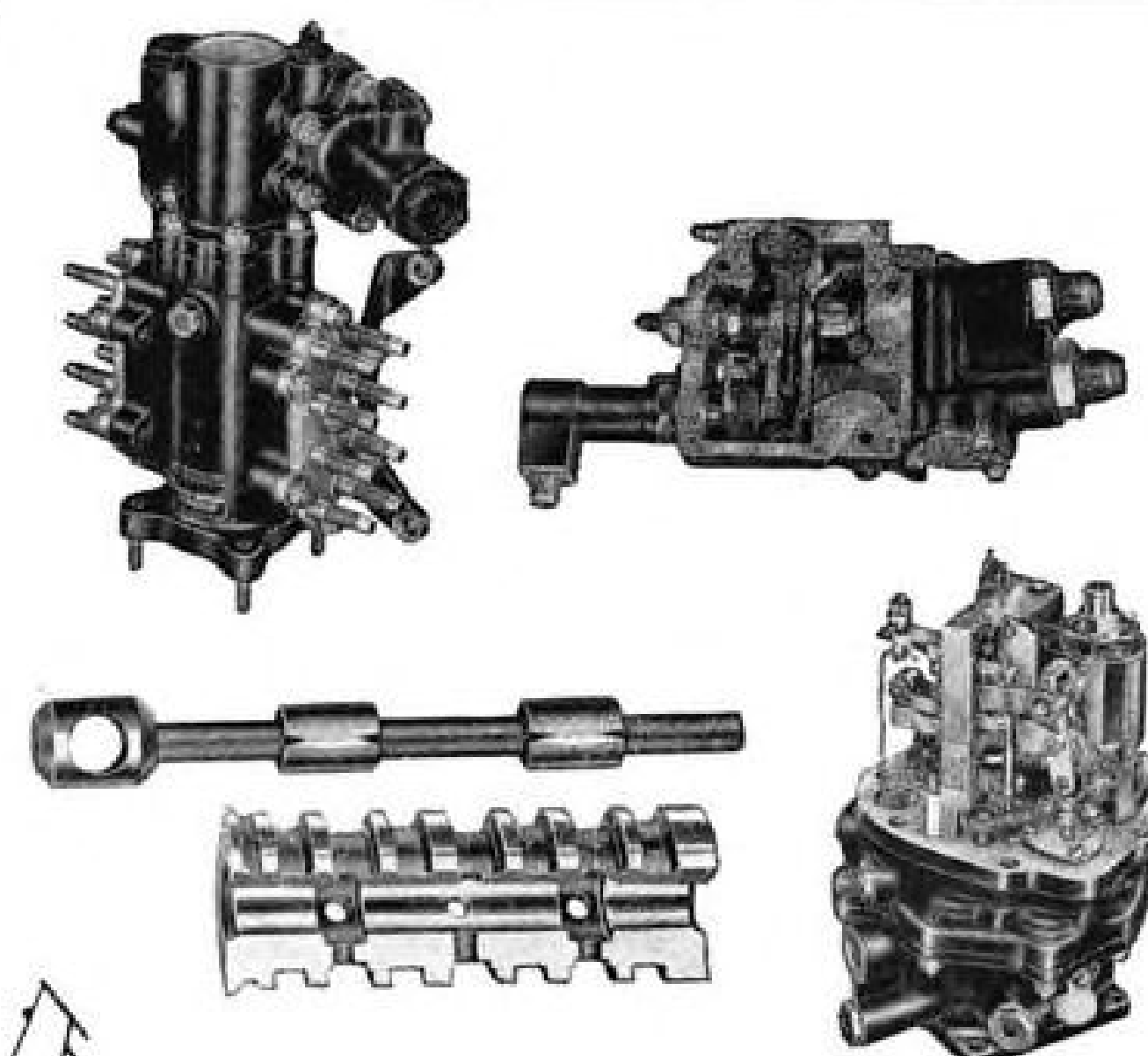
Summers Gyroscope Co. has combined a rate gyroscope and a small integrating motor to obtain the practical equivalent of a combination rate and



AVIATION WEEK, December 14, 1953

jet

**fuel controls
precision parts
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built to your specifications by

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Engineering Assistance—Pierce engineers will work closely with you, give you the benefit of our more than 40 years' experience in design and manufacture of engine speed and fuel controls, servo mechanisms, high-precision parts and assemblies.

Experimental Work—Pierce will build pilot models to your specifications, assist in testing and experimental work, set up tooling and production procedures and help carry development projects quickly and economically to production stage.

Production Runs—Our modern, fully equipped plants are available for production of component parts for jet aircraft engines... fabrication of parts, precision machining and/or assembly... in quantities needed, to exact specifications. Skilled personnel and rigid quality control practices assure workmanship to exacting standards required of all products bearing the PIERCE Mark of Quality.

For Quality... Precision... Satisfaction, call on PIERCE. Your inquiry will receive our immediate attention.



THE PIERCE GOVERNOR CO., INC.
1684 OHIO AVENUE, ANDERSON, INDIANA

Ask for our new brochure, "40 Years of Manufacturing Precision Controls"

displacement gyro for some uses.

The new 3-lb. Model 97 Rate Integrating Detector, as the device is called, is currently in production for use in a Summers lightplane autopilot and a number of classified missile control systems. One advantage of the device, compared to a displacement gyro, is that it is non-tumbling, permitting unlimited airplane maneuvers.

The new device uses the Summers Model 120 integrating motor whose low rotor inertia design gives it a speed proportional to applied voltage over its operating range, the company says. When the signal voltage from the rate gyro pick-off (proportional to airplane

or missile angular velocity) is applied to the integrating motor, its rotor moves through an angle proportional to the integral of the rate gyro signal. Thus the accumulated motor rotation angle is essentially proportional to the plane or missile's angular displacement.

The integrating motor drives a precision-wound potentiometer (through a suitable gear reduction) to provide a source of displacement signal.

The Model 97 is supplied in a case whose dimensions are $4\frac{1}{2} \times 5\frac{1}{2} \times 4\frac{1}{2}$ in. The rate gyro motor can be supplied to operate from direct current or 400- or 800-cps. a.c. Company address is: 2328 Broadway, Santa Monica, Calif.

These pneumatic devices give you reliable controls for modern aircraft

AP-1 BRAKE VALVE



• Compressed air is the reliable power medium for landing gear, wheel brakes, and innumerable other uses on both military and commercial planes. Air has two important advantages: equipment is lightweight; and it is flexible.

Westinghouse Air Brake Co. makes a complete line of pneumatic devices that assure you this flexibility. Our aircraft controls are small and light in weight but ruggedly built to provide long, dependable service on any type of plane.

Why not talk to our engineers now? They'll be glad to discuss all the possible applications of pneumatics on your planes. Just drop us a line—mark it to the attention of the Aircraft Section, Westinghouse Air Brake Co., Industrial Products Division, Wilmerding, Pa.

AP SHUTTLE VALVE



Check valves, Line filters and Strainers, Two- and Three-way Valves, Cylinders, etc.

AP REDUCING VALVE



Westinghouse Air Brake COMPANY

WILMERDING, PA.

AIRCRAFT SECTION

INDUSTRIAL PRODUCTS DIVISION

FILTER CENTER

► **Arinc Reprints Synchro Manual**—Aeronautical Radio, Inc., has exhausted earlier editions of its Synchro Systems Manual (which it calls "the Bible of navigation synchro instrumentation") and will shortly print a new edition. Orders received prior to printing (Jan. 1, 1954) for quantities of 50 or more will be filled for \$1.00 each. After that date the price will be \$3.00 each. Arinc's address: 1523 L Street N.W., Washington 5, D. C.

► **Link Missile Trainer**—Link Aviation, known for its aircraft simulators and trainers, has completed USAF-sponsored study on guided missile training aids and facilities for teaching operation of different types of missiles. Link has reportedly built one missile training aid and has several others under development.

► **IBM Computer for Jet Problems**—General Electric has installed a new International Business Machines Corp. Model 701 electronic computer at its Aircraft Gas Turbine Development lab in Evendale, Ohio, to speed calculations on jet engine problems. Computer has magnetic drum, tape, and electrostatic storage provisions. —PK

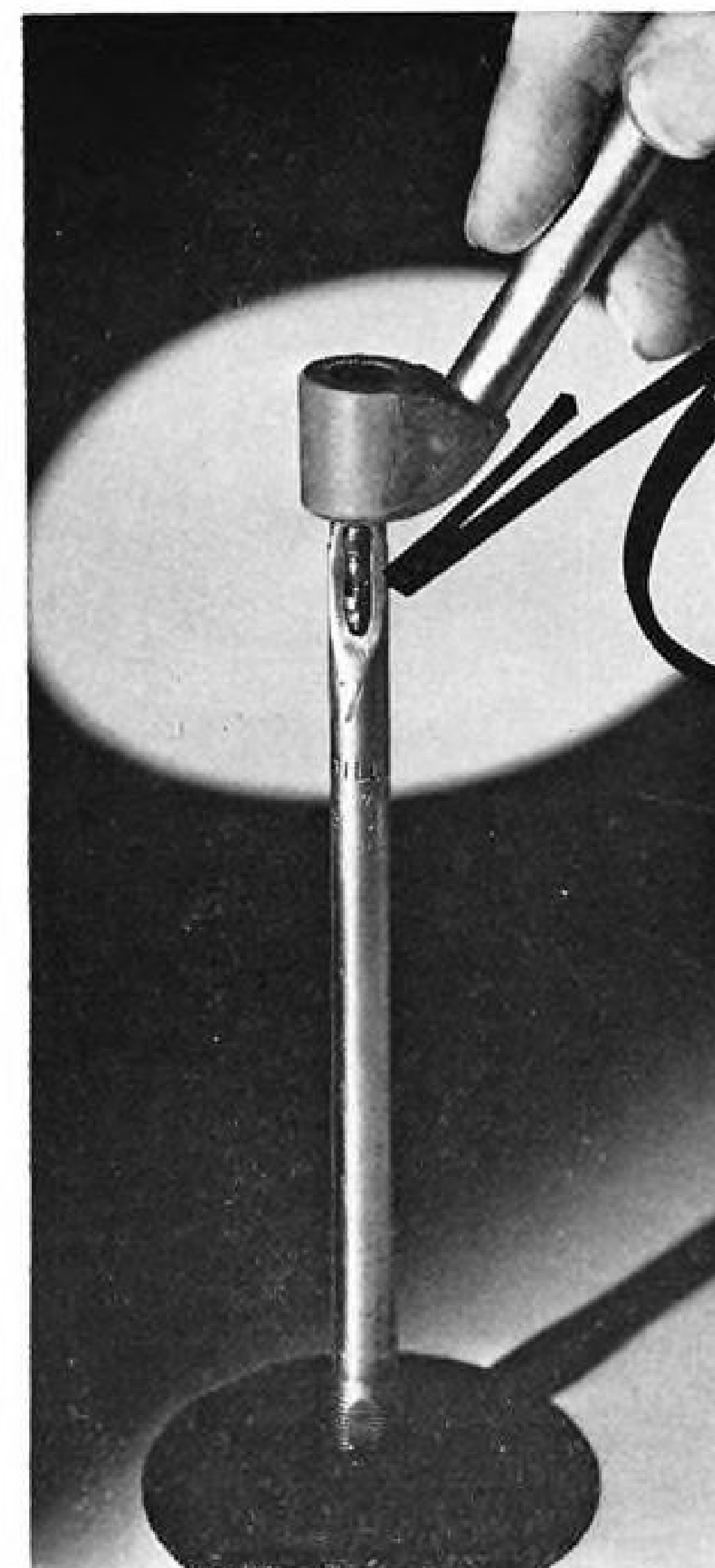


PERMADIZING A New Concept of Rubber-to-Metal Bonding

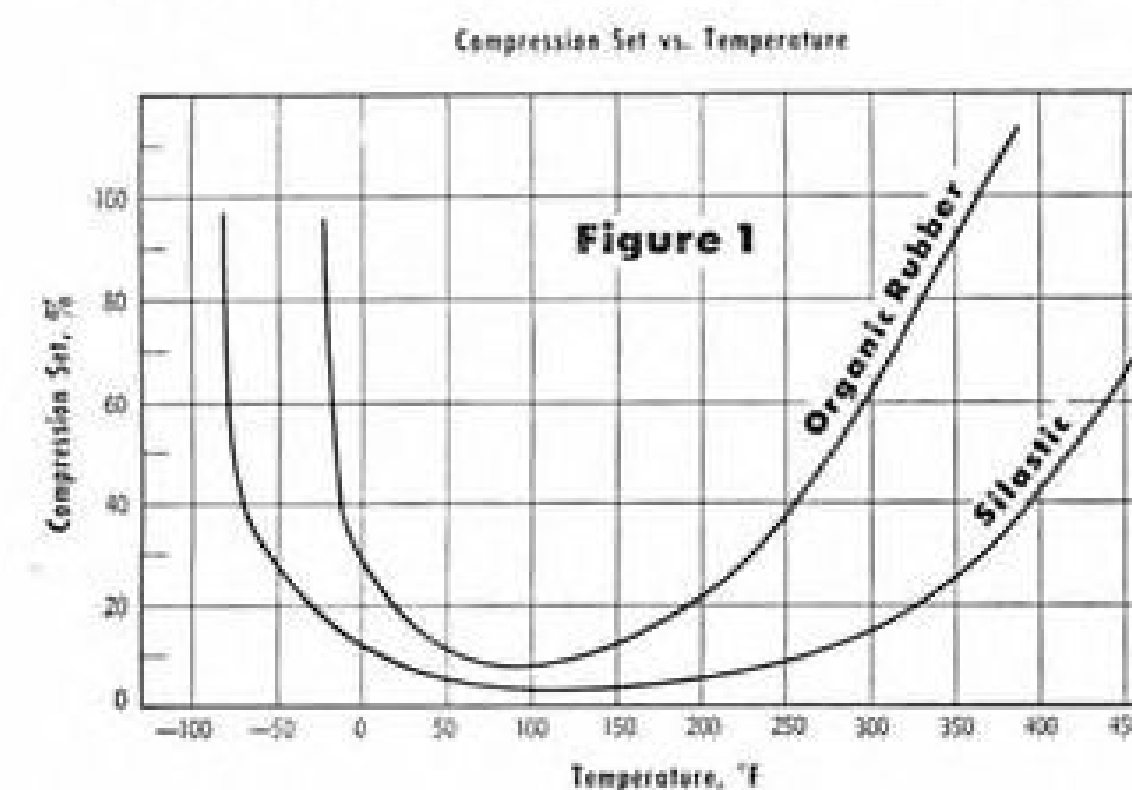
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If you need a rubbery material that retains its physical and dielectric properties; remains water repellent and nonadhesive to most sticky materials even after long exposure to weather, contact with a variety of hot oils and chemicals, or service at temperatures from below -100 to above 500 F, **TRY SILASTIC.**

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LETTERS

Early Zero Launching

I have recently received my Oct. 5 issue of AVIATION WEEK and, as always, have read it cover to cover.

The article on the Matador ("Matador Prompts Fresh Look at Design," p. 28) is particularly interesting and I am writing to "keep the record" straight! The boxed account of the development of the Matador goes into some detail regarding zero launching and presents the claim that this method was first used with the Matador and by the Martin people.

I am enclosing three pictures (please return them) that show the American version of the German V-1 weapon being launched in the zero fashion in mid-'45. This is a true zero launching (one of many), for the gripping cleats of the sled shoes were removed. Picture number three shows the missile while under full rocket power but traveling at considerably less than 50% of the stalling speed.

Four rockets were used with an external structure while the Matador has the refinement of one rocket with direct attachment BUT no basic difference.

Much credit for the conception and early design work should properly go to a Reserve Officer, Maj. (then Capt.) Lyle Dreibelbis. It was his idea to develop a method whereby the missile could be launched from the transporting crate or a trailer.

Zero launchings were made from angular supports or beds as well as from the level. I recall, with amusement, that one person of high rank and little faith declined to be at the launching site for the first attempt, being of the firm belief that the missile would go into a wild loop and descend on the camp.

Maj. Dreibelbis deserves recognition for this development for he had a large part in the rather difficult problems incident to putting the project through the "impossible" stage.

HARLOW B. GROW, Lt. Col., AFR
Tri G Co.
Pacific Palisades, Calif.

The informative article describing the Matador in your Oct. 5 issue contains reference to a claim that it is the first flight

vehicle to which the zero launch principle was applied. I realized your reference to this statement as a "claim" properly qualifies this statement from the average reader's standpoint. However, because of my company's and my own work in this field, I feel it proper to submit the following:

By 1947, zero launching was old stuff at Northrop Aircraft, Inc. As a pioneer in the missile field, Northrop engineers applied themselves to the problems of missile launching as early as 1943. At Air Force suggestion, we took up the idea of zero launching in 1945, and as a result we developed and built successful zero launchers for JB-2 missiles. I personally witnessed zero launchings at Eglin Field in 1945 with launching equipment designed and built by Northrop.

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*Goes the old refrain,
Here comes Jolly Santa Claus
Across the Texas Plain.*

*Jingle bells, jingle bells
Loud the tune rings out
He's happy an' a feelin' good
Oh, can't you hear him shout...*

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lem of aligning the axis of thrust with the flight vehicle's center of gravity. Our first launcher was also roadable, since mobility was one of the prime factors in requiring this development. The first launcher was built on a large trailer, such as is used for moving heavy equipment. This development has not hitherto been publicized, since it was classified at the time.

HERBERT G. BLINN
Preliminary Design
Northrop Aircraft, Inc.
Hawthorne, Calif.

Credit to Immel

Reference is made to your Nov. 9 AVIATION WEEK, where on p. 44 you show a picture of a suction pendulum. The caption under the picture says that this unit is a product of the B. F. Goodrich Chemical Co. The part is made by our company. . . . We feel it only fair that you print a correction and explanation of this error.

JOHN R. IMMEL
Immel Engineering & Development Co.
Dallas, Tex.

(AVIATION WEEK regrets this slip and re-prints the photo here. The error resulted from the fact that Goodrich announced the



product in one of its own press releases. The product is made by Immel from Goodrich Hycar American rubber.—Ed.)

No Isolators?

In a recent avionics article by Philip Klass covering the Electronic Components Symposium at Pasadena, California, you summarized some of Mr. F. A. Paul's comments on shock and vibration mountings as follows: "Hard mounting; i.e., no shock or vibration mounts. Paul believes that resonances resulting from shock mounts and the sharp bottoming of shock-mounted equipment are more hazardous than possible ill effects from hard mounting."

If the implied advice, to eliminate the use of isolators, is followed indiscriminately, an element of risk which will lower reliability will most certainly be introduced in installations of electronic systems subjected to environmental shock and vibration. This risk will be introduced because without isolators, the natural frequencies of supporting structures or brackets for the electronic systems become critical, and these are difficult to predict and almost impossible to control. During shock, the supporting structure is set vibrating (like a bell) at its natural frequency. Should this

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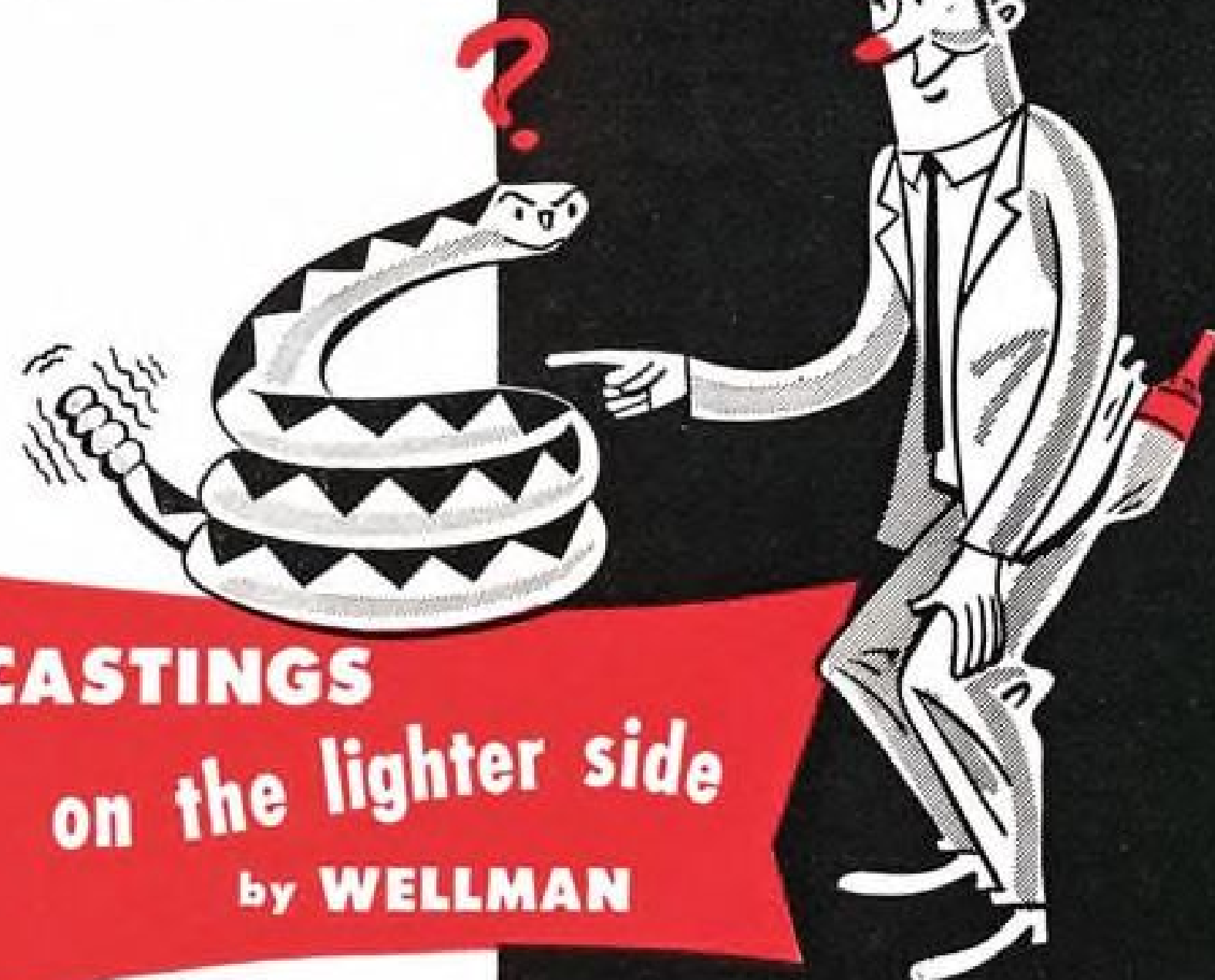
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frequency coincide with the natural frequency of a component in the system rigidly attached to the support, a dangerous condition of resonance exists, which increases the likelihood of failure in the component.

The use of mounts almost completely eliminates the effect of these chance resonances, between electronic components in complex systems and their supports, by creating a condition in which the natural frequency of the support bracket becomes unimportant. The natural frequency of the mountings becomes the only critical frequency to consider, and this is a known value or can readily be determined. Care in the selection of components or mountings can be exercised to see that their natural frequencies do not coincide. The advantages of having only one critical frequency to contend with should be apparent.

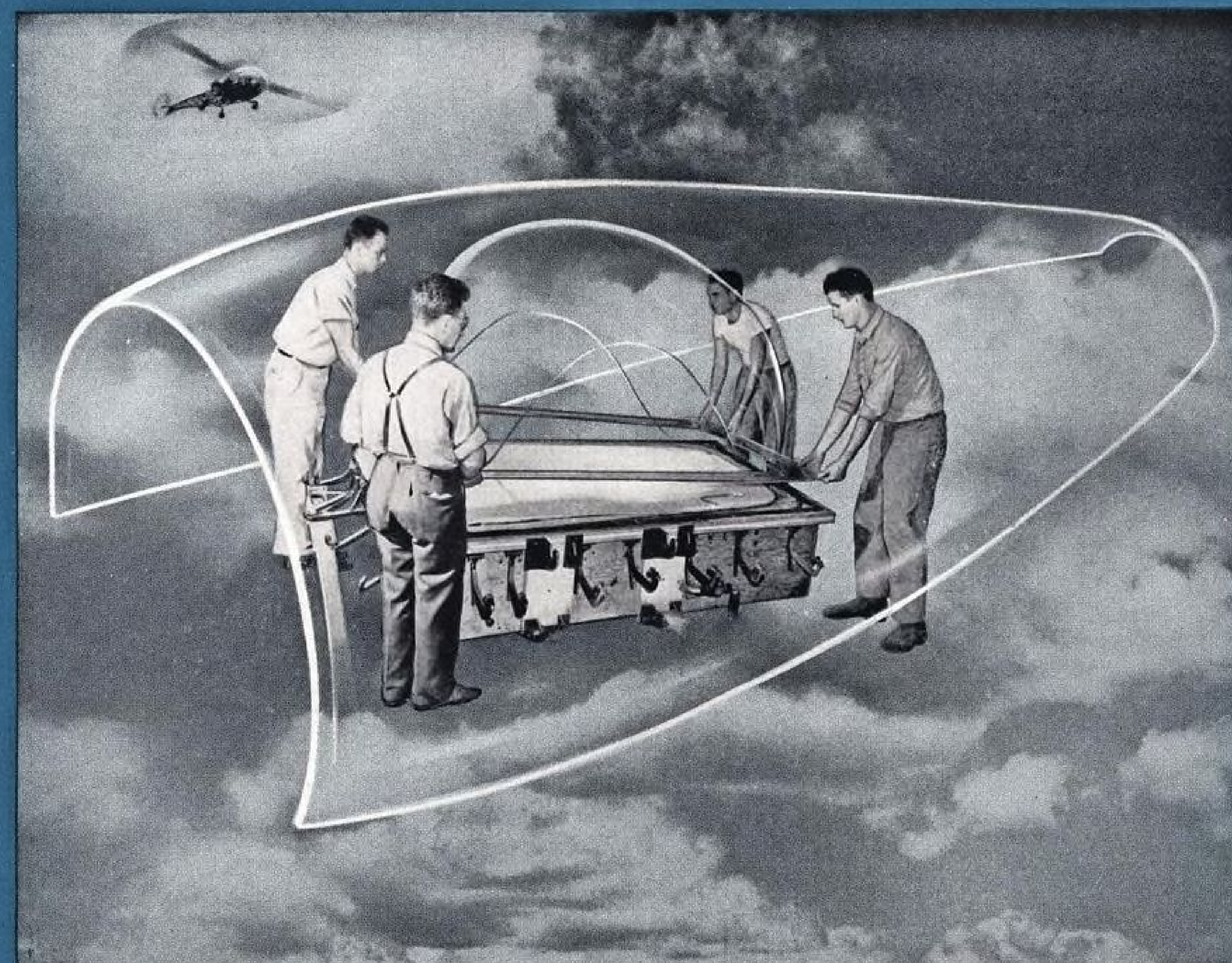
With regard to Mr. Paul's comments on the hazards associated with the use of shock mounts which display sharp bottoming characteristics; this is merely evidence of an improper shock mount application or possibly the use of a vibration isolator in place of a shock isolator. Sometimes, specifications inadvertently call for vibration isolators where shock protection is desired. Standard vibration isolators, of the type used in aircraft, are generally low natural frequency devices and are susceptible to bottoming under shock. This is largely due to specification imposed deflection limitations. Shock isolators for limited space applications, on the other hand, generally have a higher natural frequency, and embody more gradual cushioning than possible in a vibration isolator. Shock isolators with gradual cushioning characteristics have been used successfully under the rigorous shock conditions experienced by Naval combat vessels for years.

MAURICE GERTEL, Section Engineer
The Barry Corp.
700 Pleasant St.
Watertown 72, Mass.

(My answer to Mr. Gertel would be one of clarifying my argument. My argument was based upon the fact that such strong amplitudes of vibration existed at such frequencies that shock or vibration mounts in our specific problem would have bottomed and would create shock that we feel would be far more severe than the vibration would be if a component or package were hard-mounted. This thinking is not one that should be used indiscriminately by other missile manufacturers, and there are certainly many specific problems where shock and vibration mounts will aid in damping higher resonant frequencies. Therefore, my only defense in this argument is, of course, that we had a specific problem in which we would rather accept the vibration from the airframe rather than risk the shock.—F. A. PAUL)

No Norseman Orphans

Ever since the first Norseman was delivered to an operator in 1936, I have always felt it to be one of the prime duties of the manufacturer to make spare parts available promptly. After all, a commercial operator buys an airplane to use for making a profit, and it should be part of the obligation of the manufacturer to do whatever he can



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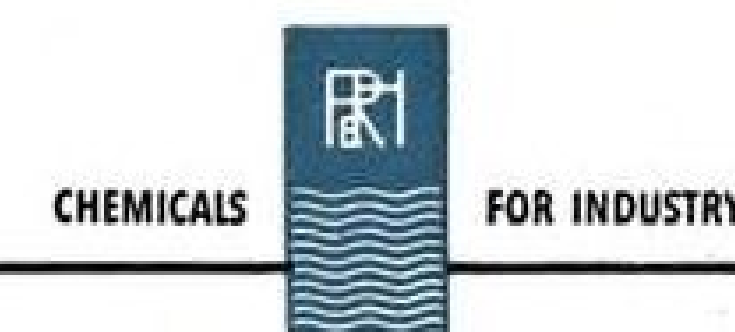
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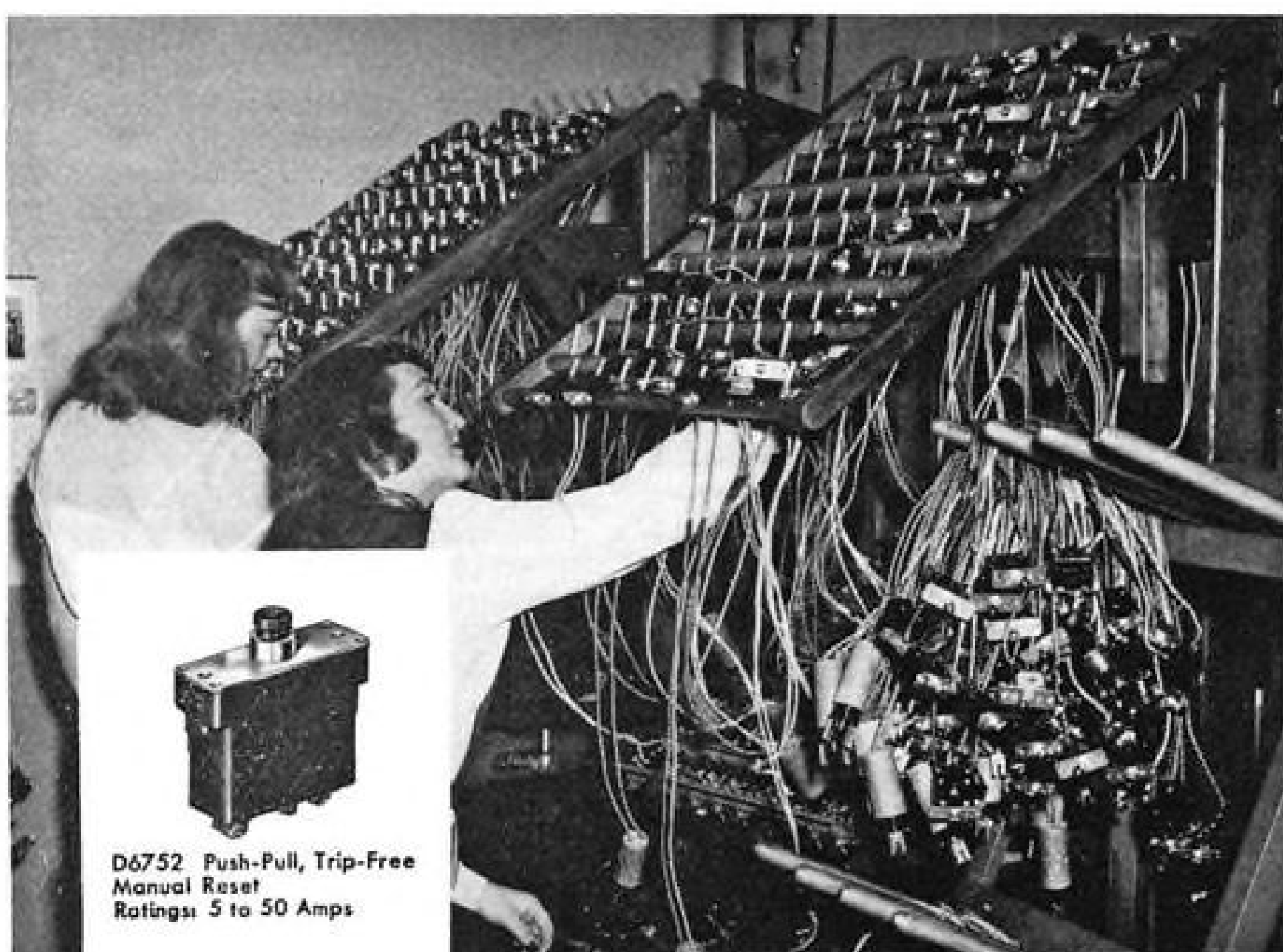
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to help keep the equipment in use.

When the principal shareholders of Noorduyn Aviation, Ltd., decided to discontinue manufacturing and service at the end of 1945, the main objective in turning the Norseman business over to Canadian Car & Foundry Co. was that that would place it in the hands of an industrial concern, in the transportation field, which appeared to be able and willing to continue to serve the operators, in Canada and wherever there were, or would be, Norseman.

I have recently . . . with some of my friends in Montreal, bought back the whole Norseman project from Canadian Car & Foundry Co.

Included in this transfer is the subsidiary company, Noorduyn Norseman Aircraft, Ltd., which holds the rights to the Norseman design, name, and trademark, the drawings, jigs and tools, purchased accessories, materials on hand, and parts (finished and unfinished), but not including those which Can Car currently had in process against firm purchase orders, as of May 22, 1953.

My associates in the deal are Austin Latremouille and Joseph Zinnato, both formerly for many years with Noorduyn Aviation, Ltd. These men have since the war built up a successful and well-reputed business in the sale of parts, under the name of Aircraft Parts and Supplies, Reg'd., in Montreal.

My own functions in Noorduyn Norseman Aircraft, Ltd., will be mainly of a consulting nature, but I do want to impress on you, (and it is the purpose of this letter to assure you) that everything will be done to see that all Norseman operators are provided with prompt, professional and expert service as to parts. We do not want any Norseman operator ever to feel that he has an "orphan" airplane on his hands.

Arrangements are made to have any parts not otherwise obtainable manufactured, mainly by old-time Noorduyn employees, who know their business and have the proper facilities available, which are operated at a reasonable overhead. Prices will always be as low as possible, consistent with quality.

For the repair and overhaul of complete aircraft or airframes, we intend if possible and in suitable locations, to make arrangements with existing establishments who are equipped to perform such work to the customer's satisfaction.

Such arrangements will be in the nature of "authorized service," for which we will be prepared to furnish engineering information, as far as may be required, and parts. As and when such arrangements are completed, you will be advised of them, at least where they are likely to be of specific interest to you, as to location.

We are putting up a suitable building, close to Cartierville Airport.

In the meantime, any inquiries, or orders, with which you may favor us will receive prompt attention.

It would also be useful, and appreciated, if we were told the models and serial numbers of any Norseman your readers now own, or have in use, so that we can compile and maintain a record of all those still in operation.

R. B. C. NOORDUYN
Noorduyn Norseman Aircraft, Ltd.
P. O. Box 5,
Montreal 9, Que.

AVIATION WEEK, December 14, 1953



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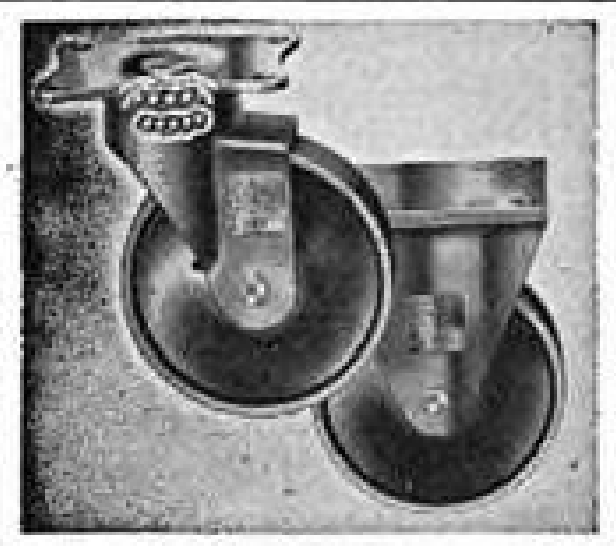


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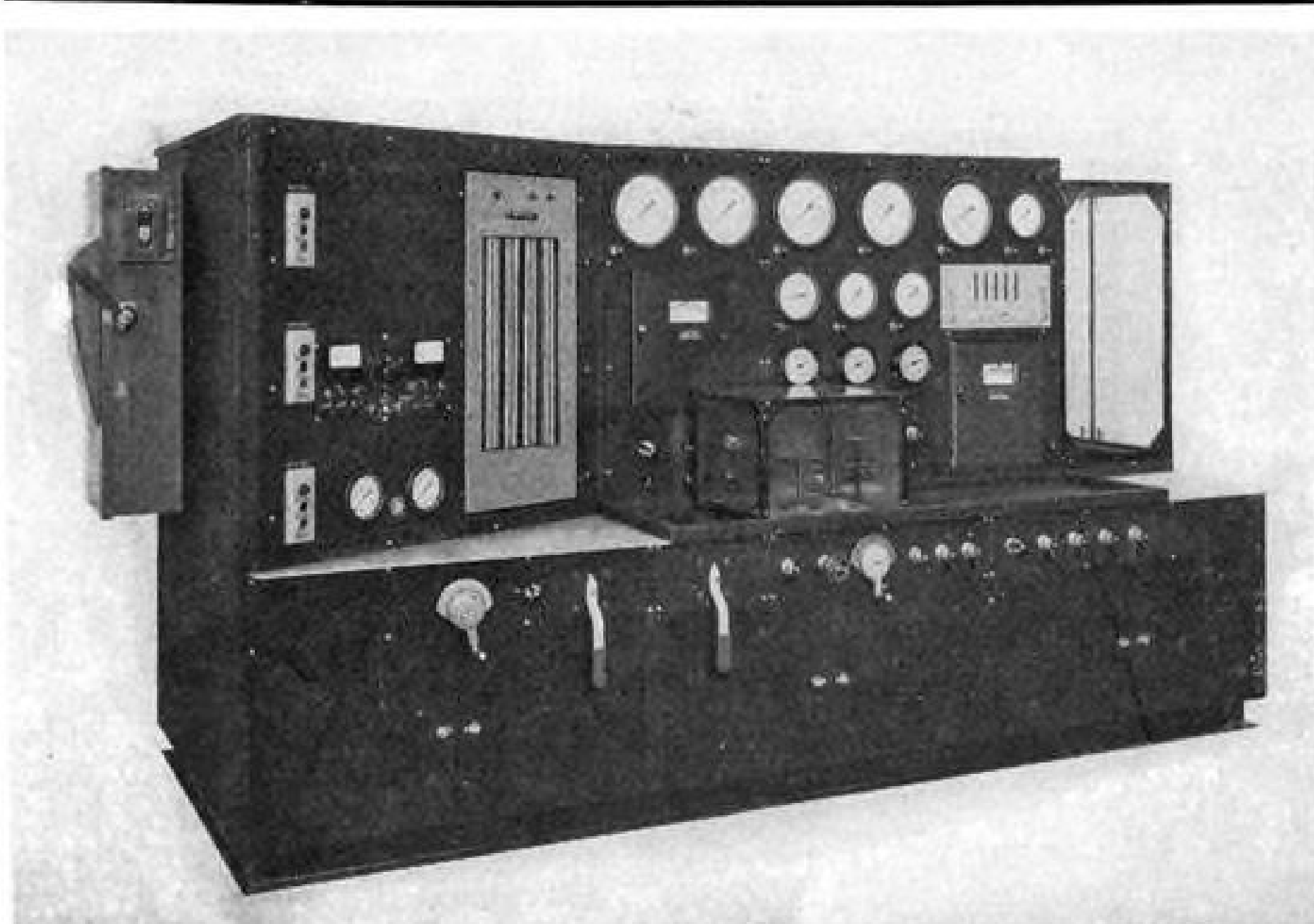


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EQUIPMENT



HSP 3040 STAND checks hydraulic components used with Turbo-Hydromatic propeller.

Turboprop Test Stands Developed

By George L. Christian

Hartford, Conn.—The growing interest of commercial airlines in turboprop power for aircraft has focused attention on the need for equipment capable of testing propeller control components of this new type of powerplant.

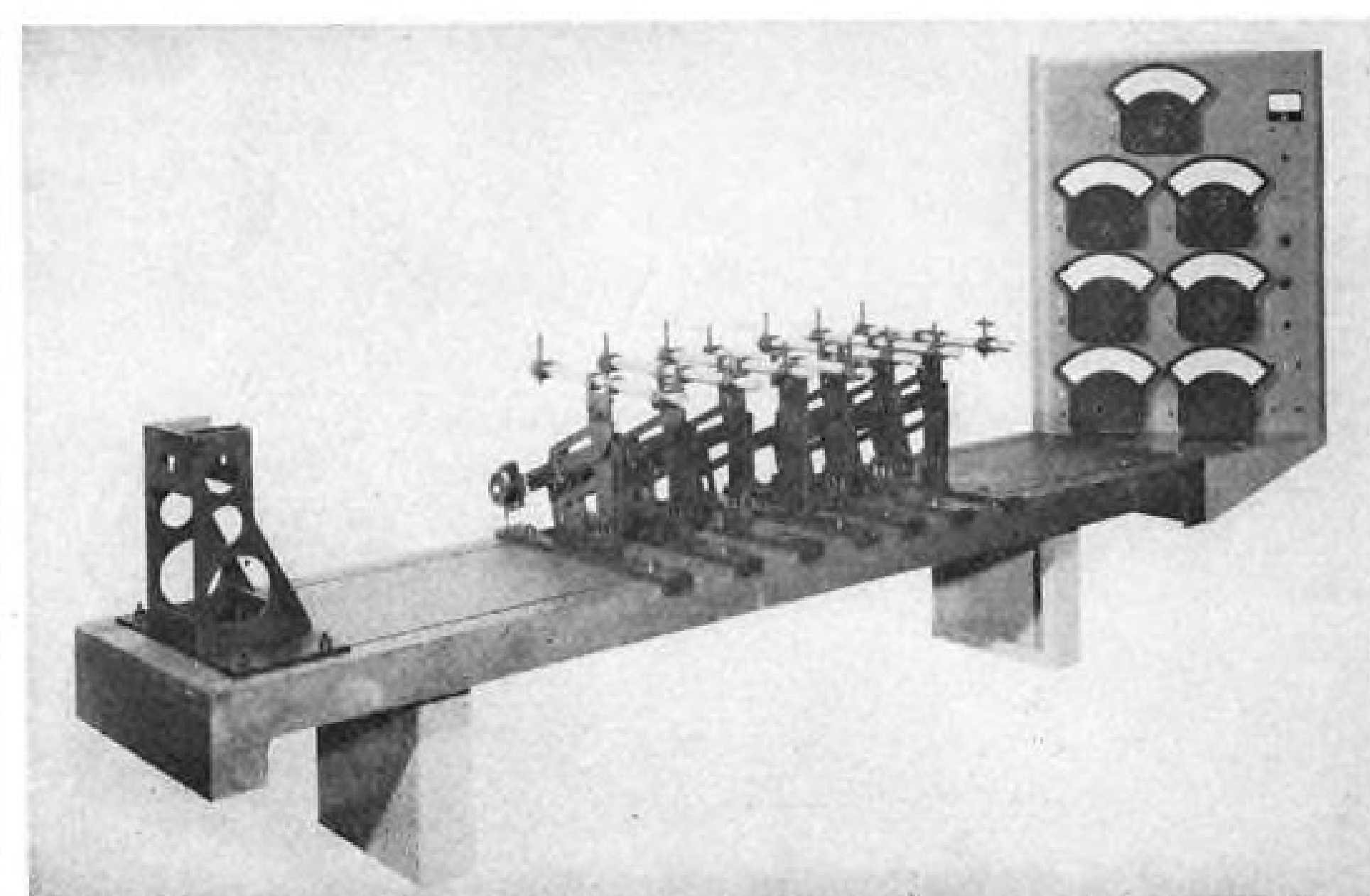
Kahn and Co., a small but active organization in this city, has developed a trio of turboprop propeller test stands with Hamilton Standard Division of United Aircraft Corp., which makes the 5,600-hp. T34 engine's propeller. This equipment can run tests of all complete hydraulic and electric assemblies in the prop pitch control system and

all components of these assemblies. Units are already at work on the floor of Ham Standard's large, modern plant in nearby Windsor Locks.

► **Turboprop Trio**—The trio includes HSP Model 3040 hydraulic component test stand; HSP Model 3047 electronic governor test stand, and HSP Model 3048 electronic synchronizer test stand.

In addition to these three units Kahn manufactures a large variety of test equipment for anti-icers, fuel regulators, thermocouples, fuel pumps, gyro compasses, afterburner controls and fuel regulators.

Other Kahn products are engine rpm. control switches, aircraft propeller blade



PROP BLADE PROTRACTOR measures propeller blade unbalance at six stations.

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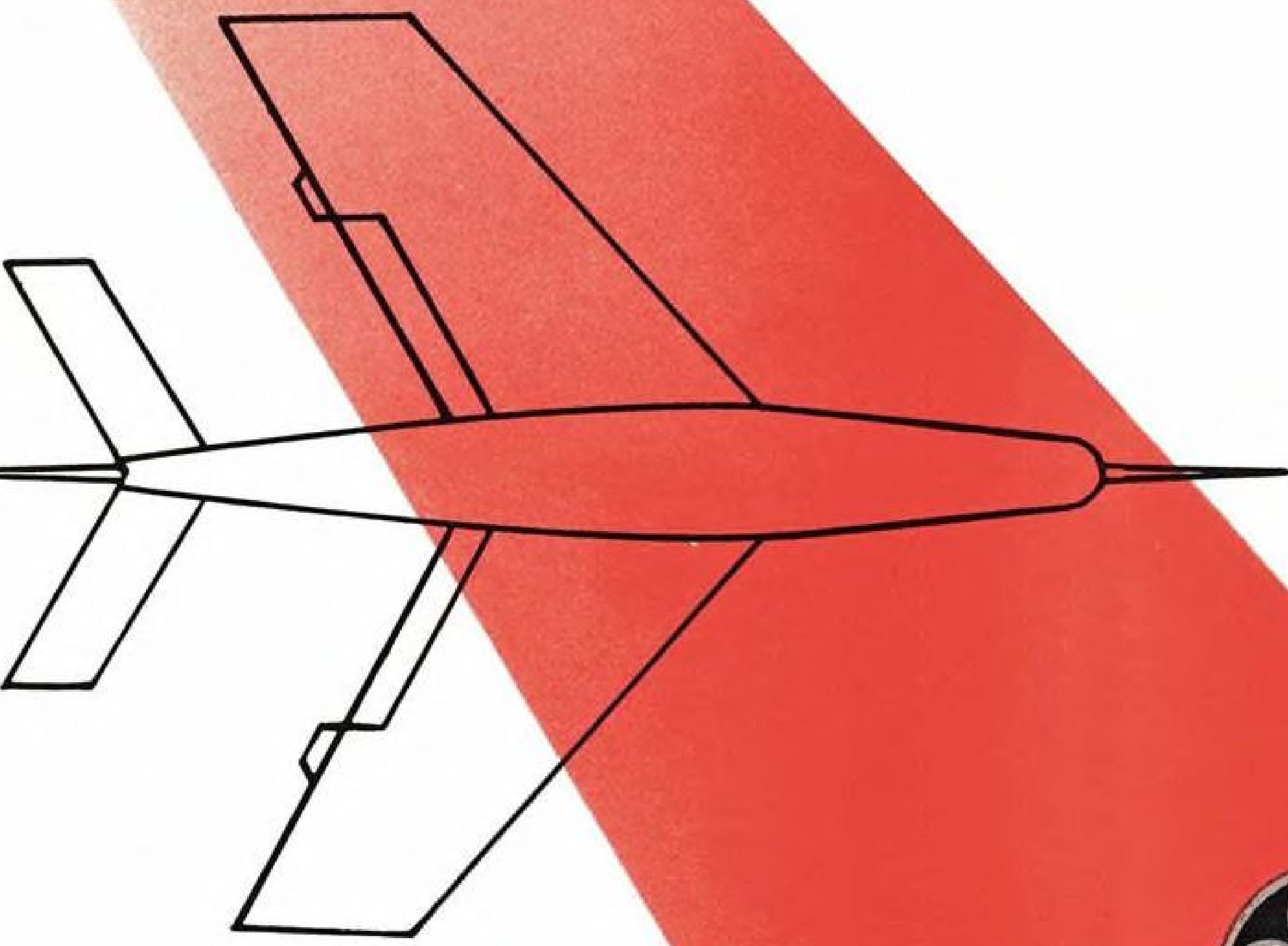
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They're important—to everyone working there and to neighbors, too. One prerequisite for working with jets is top-notch exhaust silencing—for health reasons and, obviously, for personnel efficiency.

Here is another example of Maxim's contribution today to the aircraft field. For more information, write to: **THE MAXIM SILENCER COMPANY**, 115 Homestead Avenue, Hartford 1, Connecticut



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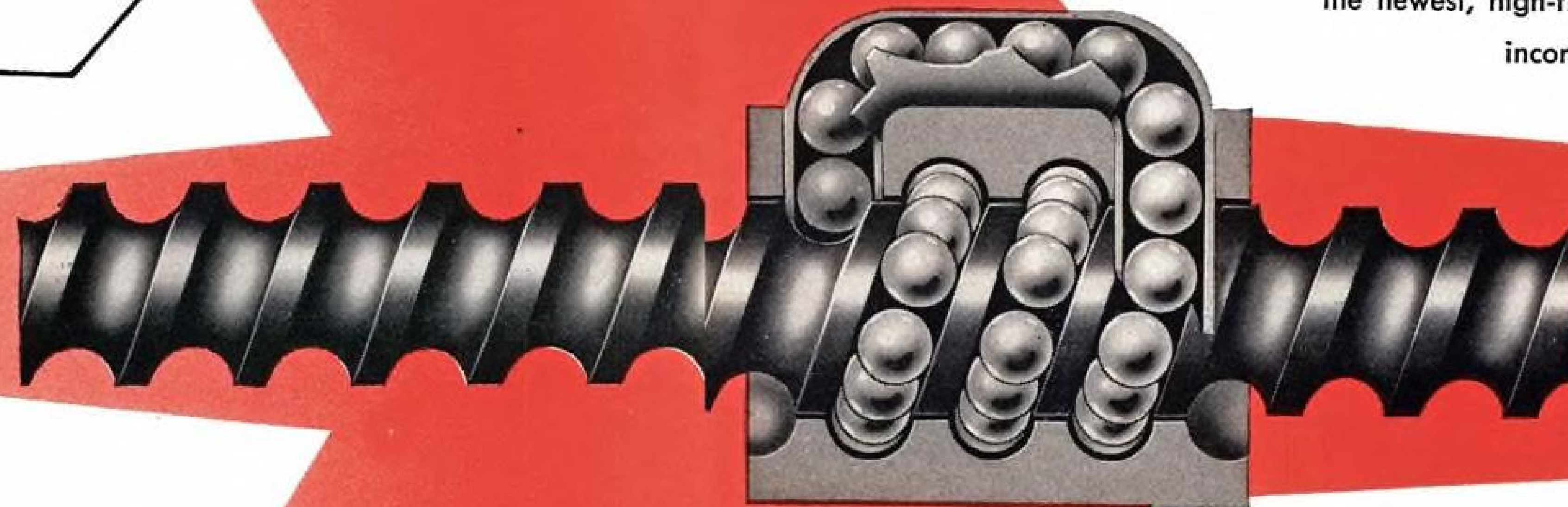


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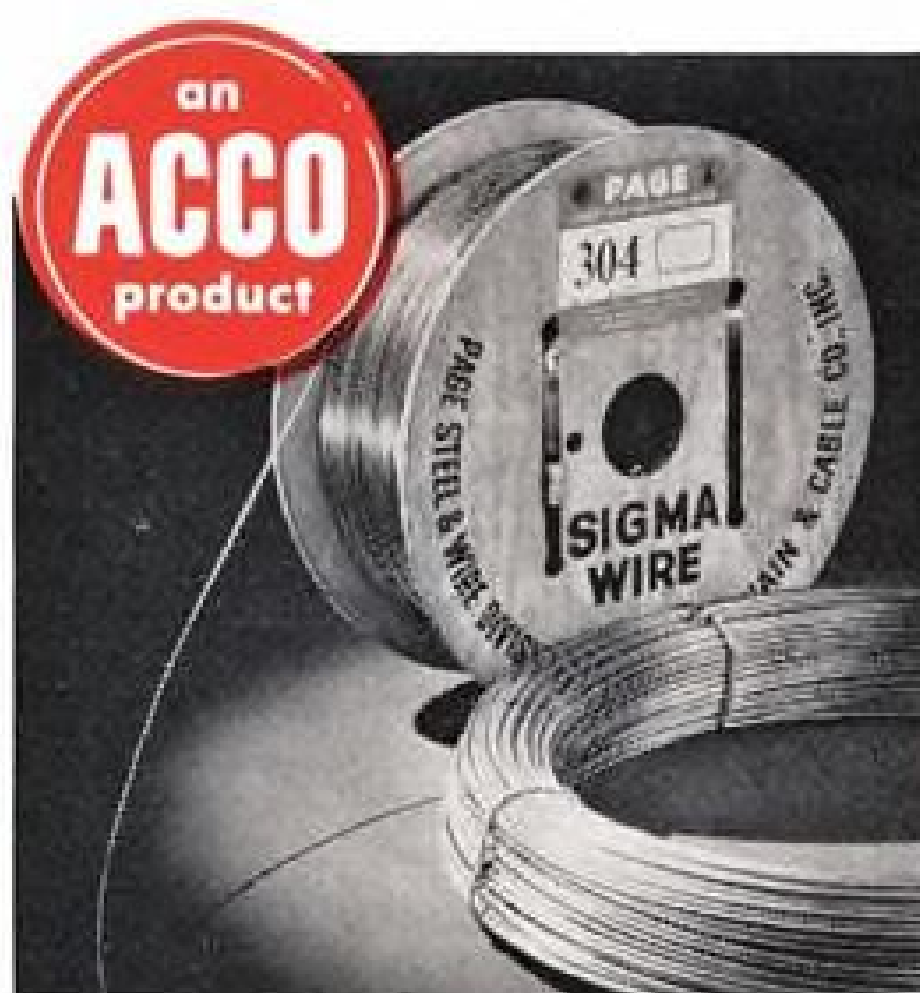
Whether you're racing with sound up in the stratosphere or making a final approach to a landing strip at sea-level, it's reassuring to know that you have the most efficient, most reliable controls built. It is for this reason that the actuators on so many of the newest, high-flying military jet fighters and bombers incorporate Saginaw Ball Bearing Screws.



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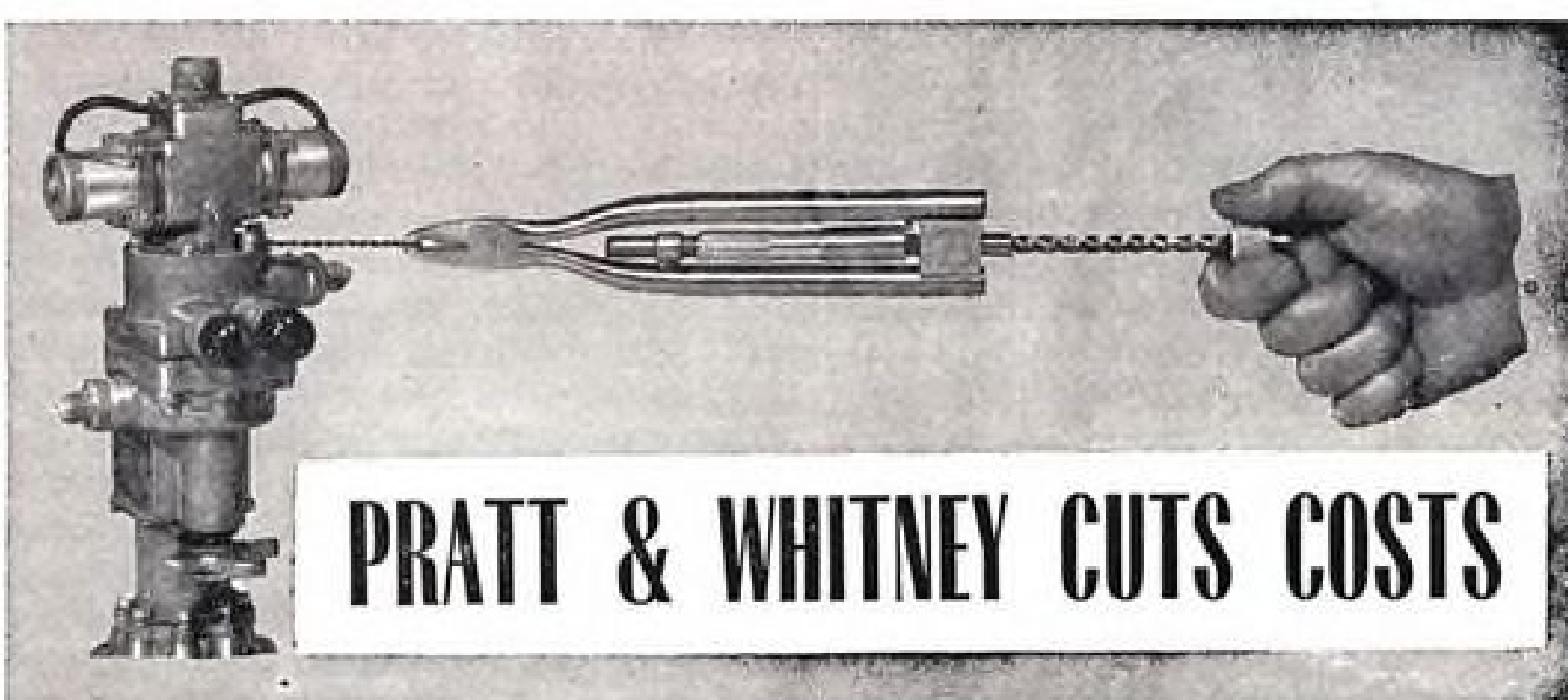
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► **Built for the Future**—I. Kahn, president and J. Kardys, vice president-engineering, say that among the highlights of the equipments they make for Ham Standard's Turbo-Hydromatic propeller governor and controls are their flexibility, versatility and wide range. The units were designed in conjunction with Ham Standard and made by Kahn.

The stands will accommodate any foreseeable changes in the units and components now being tested, Kahn says.

► **HSP 3040**—The hydraulic component test stand can check every unit, from lowest capacity and pressure to the highest, used in the entire range of Ham Standard's Turbo-Hydromatic props. Adapters have to be used in some cases.

The stand features two independent, variable-speed drives; one delivers 15 hp., the other 25 hp. Speed range is 0-3,600 rpm.

Two pressure systems are included. The high-pressure system that can test units up to 4,000 psi. uses stainless steel lines. Low-pressure system of 400 psi. uses copper lines in the test stand. Pressure gages have an accuracy of 1/4 of 1%.

Provisions within the machine have been made to heat or cool the oil used. Limits are 150F down to ambient (50-60F). All oil used in the machine is passed through large-capacity filters.

Built-in d.c. power allows the stand to check d.c. solenoid-operated hydraulic valves.

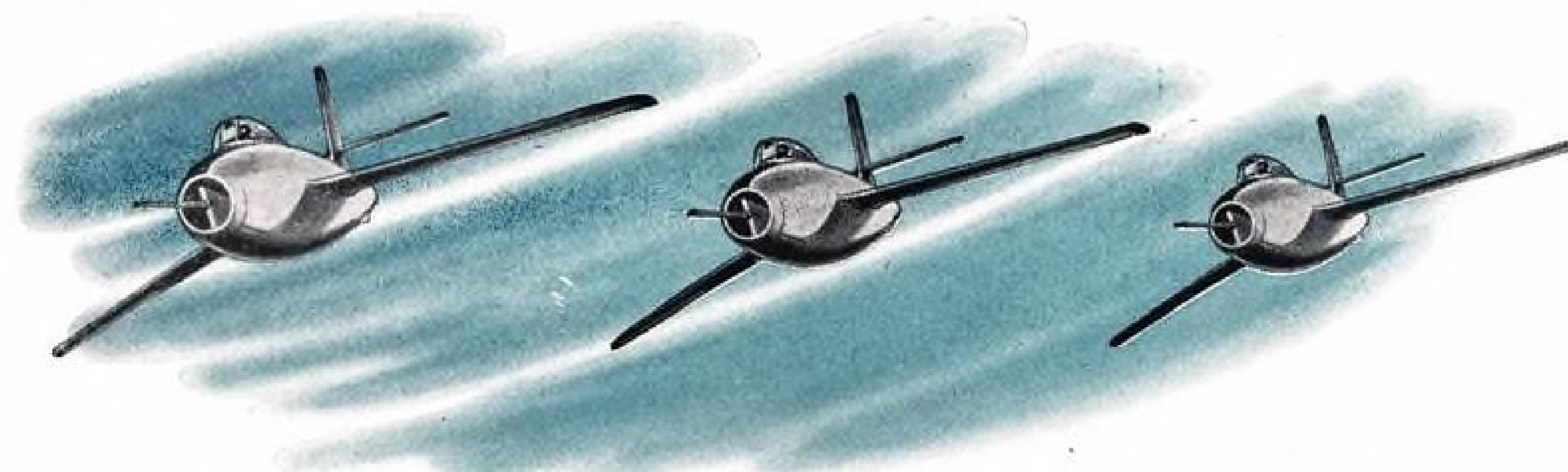
Machine is equipped with high-pressure flowmeters (Kardys says the 3,000-psi. Potter flowmeter is "a very good and accurate instrument"), flow-rate meters, strain gages and torque-meters. The latter are to measure continuously torque required.

Transparent plastic hood over units being tested protects personnel from being sprayed during operation of the machine.

Interior of the cabinet is painted white to make all components stand out better and to brighten inside as much as possible to simplify servicing.

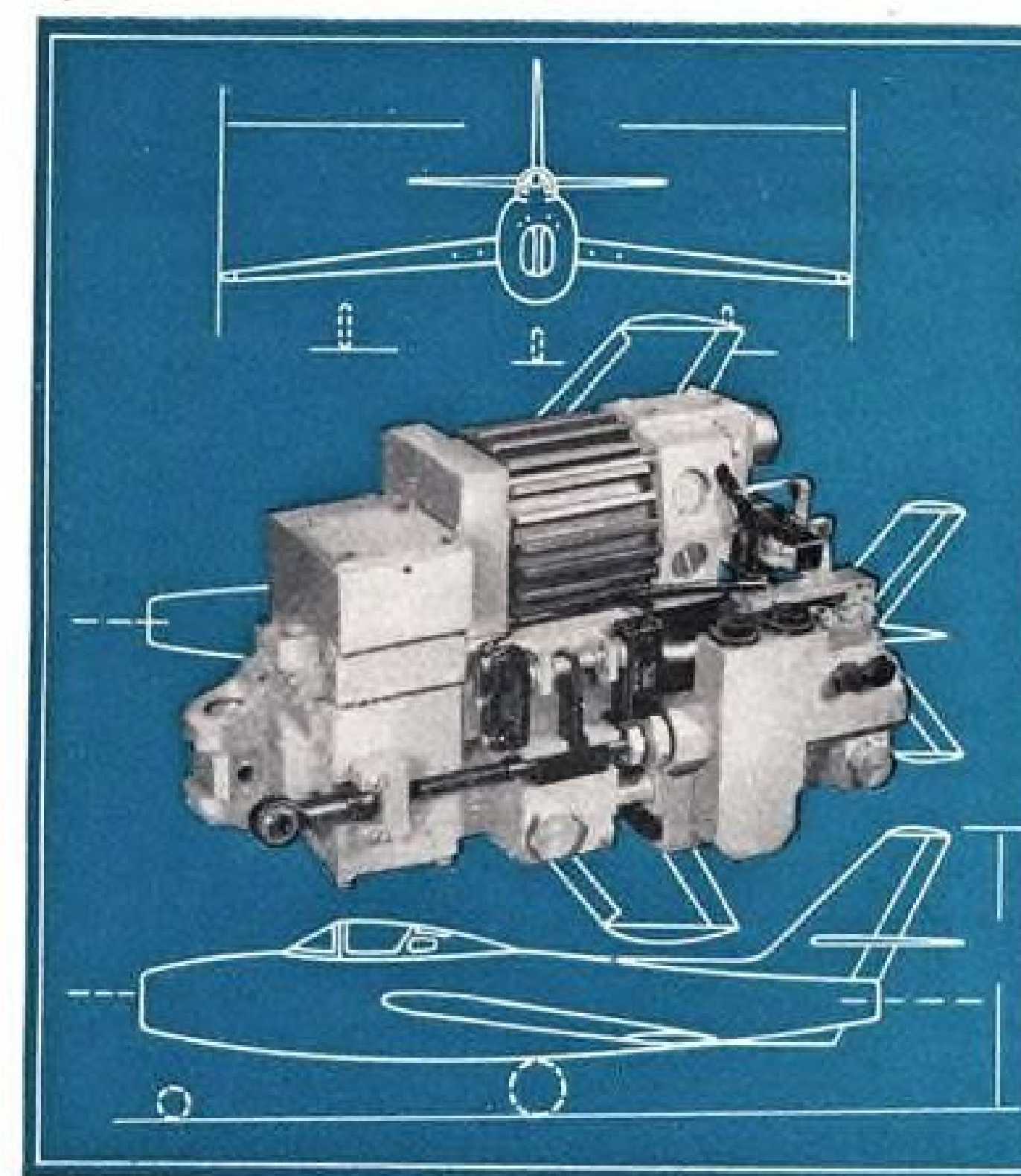
► **Any Component**—Kahn spokesmen say the test stand can "test any existing aircraft hydraulic component for either pressure, flow or both unless the unit exceeds the power output of the stand.... It can test any hydraulic component on a Hydromatic or Turbo-Hydromatic Hamilton Standard propeller."

These components include piston motors, distributor valves, main, scavenge and standby pumps, high- and



AEROPRODUCTS ACTUATORS CONTROL "FLYABLE TAIL"

Self-locking features aid Republic's new F84F



Typical Aeroproducs Actuator

The broad adaptability of Aeroproducs actuators has helped to solve problems encountered in the design of the "flyable tail" of the new Republic F84F jet fighter. The application of these actuators permits instantaneous adjustment of a variable surface to any position within its design range. The self-locking feature of Aeroproducs actuators secures the adjustment until it is changed by the pilot.

Any combination of systems—hydraulic, pneumatic, electric or manual—can serve as the primary power source for Aeroproducs actuators. They can be synchronized readily in tandem or in series to provide coordinated control of related movements.

Announced uses of Aeroproducs actuators include those for the control of the "flyable tail" of the Republic F84F, the horizontal stabilizer on another high-speed jet fighter and the afterburner nozzle in a jet engine. Additional applications include control of wing flaps, dive brakes, bomb bay or cargo doors, gun turrets, variable wing sweep and incidence, wing fold and canopy slides.

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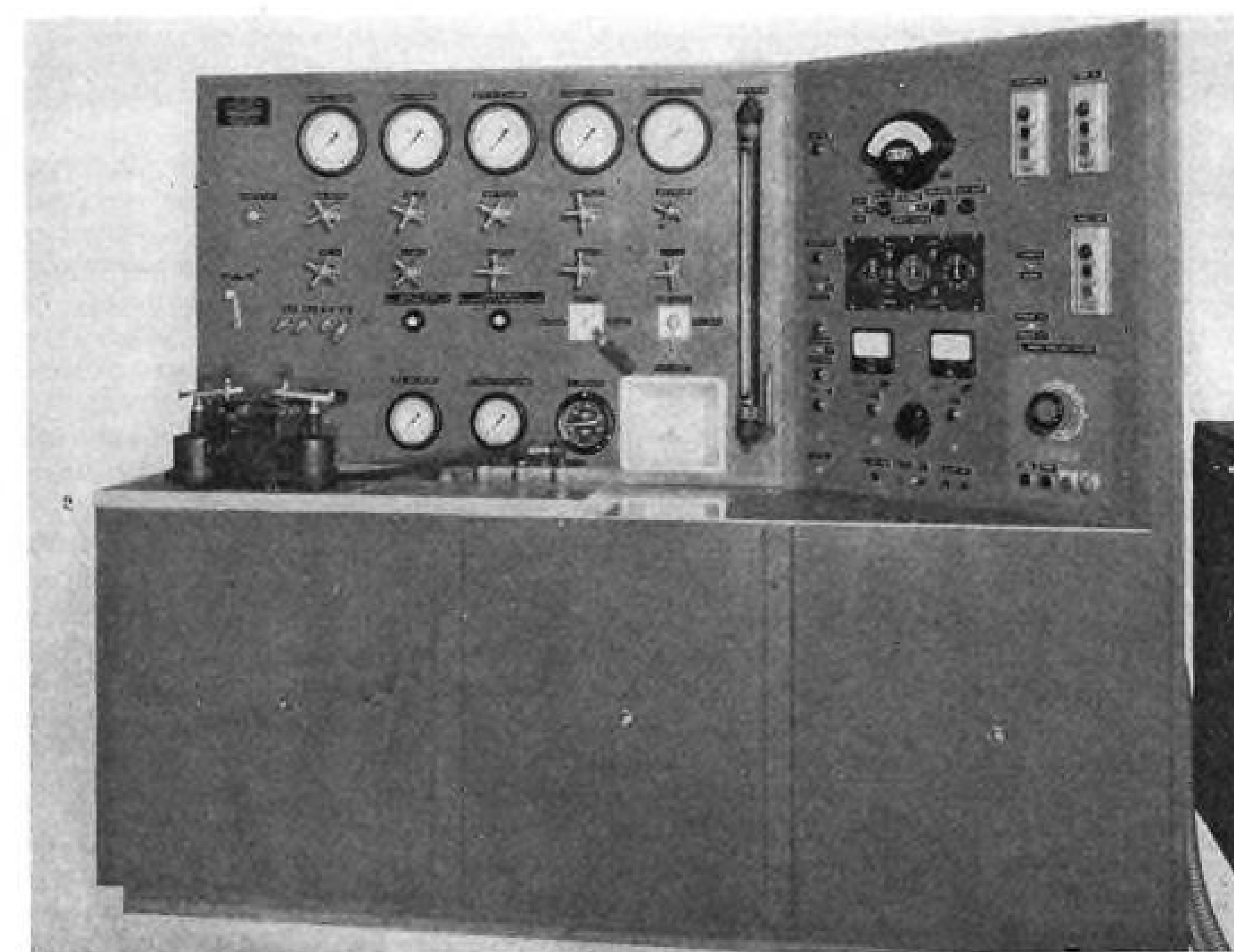
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HSP 2805 GOVERNOR test stand will check all such Hamilton Standard units.

low-pressure relief valves, backup pressure relief valves, sump relief valves, pressure regulating valves, solenoid valves and feathering motors.

►HSP 3047—The electronic governor test stand for Turbo-Hydromatic propellers checks the whole governor, and every component of the governor.

Features of this machine include: 400-cycle, 115-v. power supply and 140-cycle, variable voltage (0-300 v.) with precision frequency regulation to within .001%—both are temperature-compensated; electronic tachometer giving drive speed accuracy of $\frac{1}{4}$ of 1%; variable drive with speed range of 80-4,600 rpm.

Some of the components which the machine is built to test are amplifiers, potted power supplies, feed and input frequency pots, frequency sensing pots and regulator pots.

►HSP 3048—The electronic synchronizer test stand features the same drive speed accuracies of $\frac{1}{4}$ of 1% as the HSP 3047. Drive speeds range from 0 to 2,300 rpm.

Machine incorporates a sawtooth generator and several power supplies, such as a 400-cycle a.c. and d.c. supply at different levels.

This stand is also built to test the complete assembly and all of the assembly's components. Among those that it can test are power supply, sawtooth former pot, filament transformer pot, and three sampler and integrator pots.

►Standard Governor Stand—Kahn also manufactures a stand which will test any governor made by Ham Standard. This is the HSP 2805.

The machine offers means to duplicate propeller dome action to simulate

blade pitch change; it automatically compensates for variations in engine rpm., and it automatically compensates for propeller blades' tendency to go to low pitch—it works harder moving blades into high pitch.

Stand supplies high-flow, low-pressure hydraulic force and is equipped with complete electronic controls for the governor's electric control head.

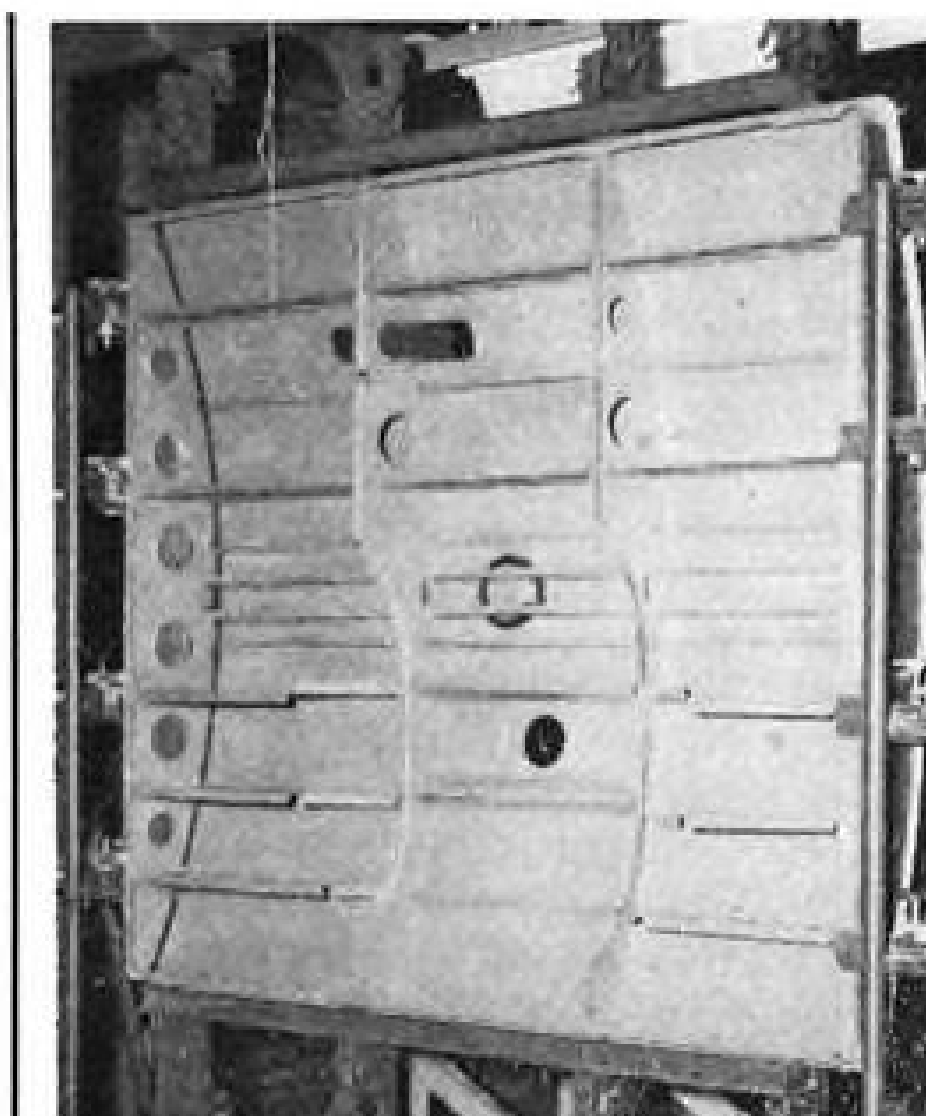
►Electrical Accessory Stand—This machine, the HSP 2882, was originally conceived to test HS propeller electrical accessories. Actually, when completed, it proved capable of testing these other aircraft components as well: de-icer timer, auxiliary pump, timer blade heaters, tachometer generators, differential motors, circuit breakers, and a variety of relays and switches.

HSP 2882 can handle electrical accessories for most commercial aircraft built by Boeing, Convair, Douglas, Lockheed and Martin, Kahn says. It can be used for Ham Standard electrical equipment on U. S. military aircraft and on the Swedish Saab-90, the French S.O. 30P and the Breguet 763.

This stand includes a panel-mounted oscilloscope, multi-channel strip recorder, variable-power resistor, variable-speed drive and tachometer, precision timer, six-range precision resistance bridge, and two 0-30-v., 0-15-amp. d.c. filtered power supplies with indicators and controls.

►Other Test Stands—Among other test stands manufactured by Kahn are:

•Low-flow pneumatic and hydraulic test stand, Model HSP 2603. This stand was worked out for certain guided missile programs. Purpose is to test various relief and check valves, check



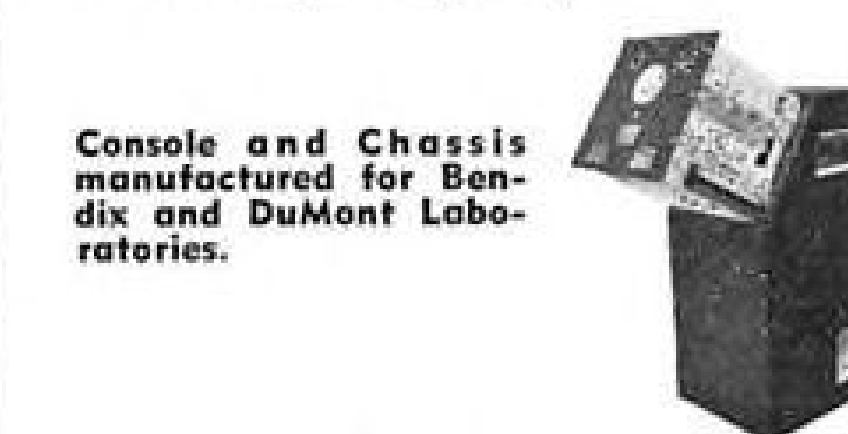
Cargo Hatch, one of 23 doors, hatches, fairings, dive brakes and work platforms manufactured by REF for Grumman's "Albatross" Rescue Ship and Cougar Jets.

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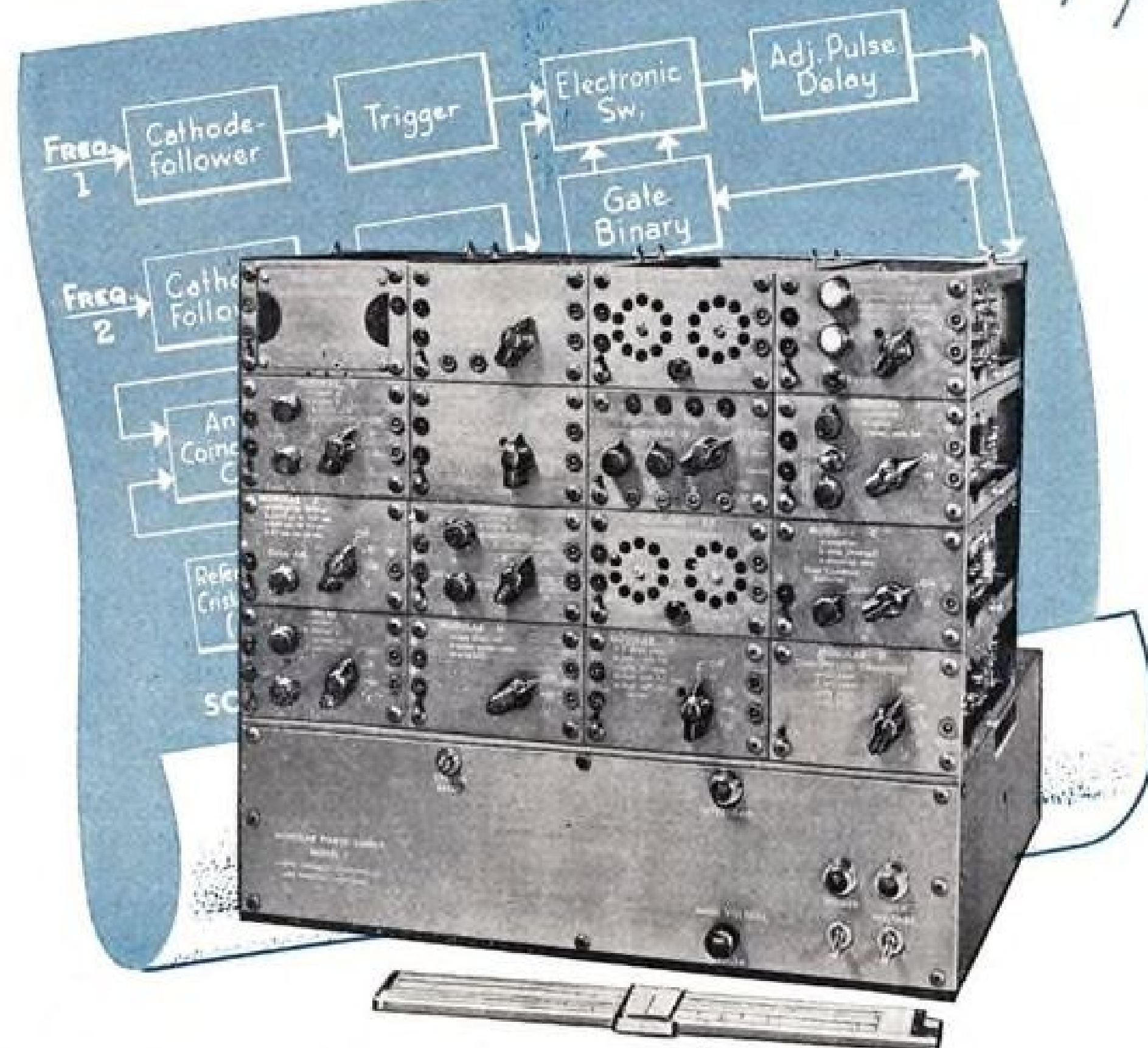
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static pressures, etc. Stand uses a three-stage, Rix compressor to supply pneumatic pressures up to 4,000 psi. This makes stand useful to re-charge air bottles. It can also supply hydraulic pressure up to 5,000 psi. Model HSP 2603 is mobile.

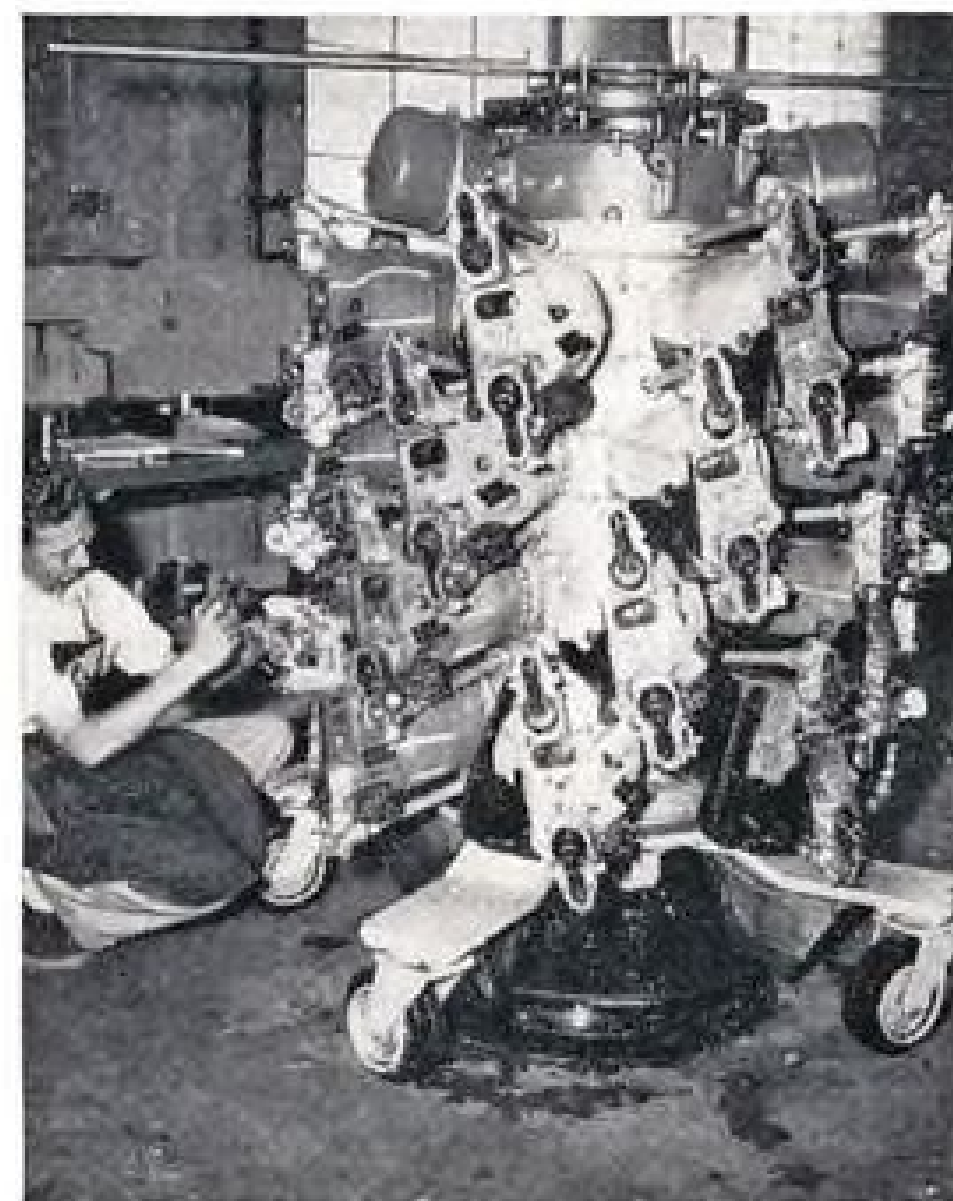
• Generator test stand, Model HSP 2604. This mobile unit was also developed for certain guided missiles. Used to test generators, its makers say that it is capable of simulating all loads that may be encountered in the missiles.

Its variable-speed generator drive can turn up to 24,000 rpm. It is equipped with a balance cradle and fish scales to measure inch-pounds of torque of generator being tested. Machine can also test all cable assemblies associated with the generators.

► Prop Blade Protractor—Kardys has designed and built a mechanical averaging propeller blade protractor to measure the aerodynamic unbalance of a given propeller blade at six predetermined stations. This unit was developed in conjunction with Ham Standard.

Stand has a V block at one end to support the butt of the blade. Blade's other support is a fixed station set at the blade's reference station. There are six sensing stations to be positioned along the length of the blade to take angular measurements.

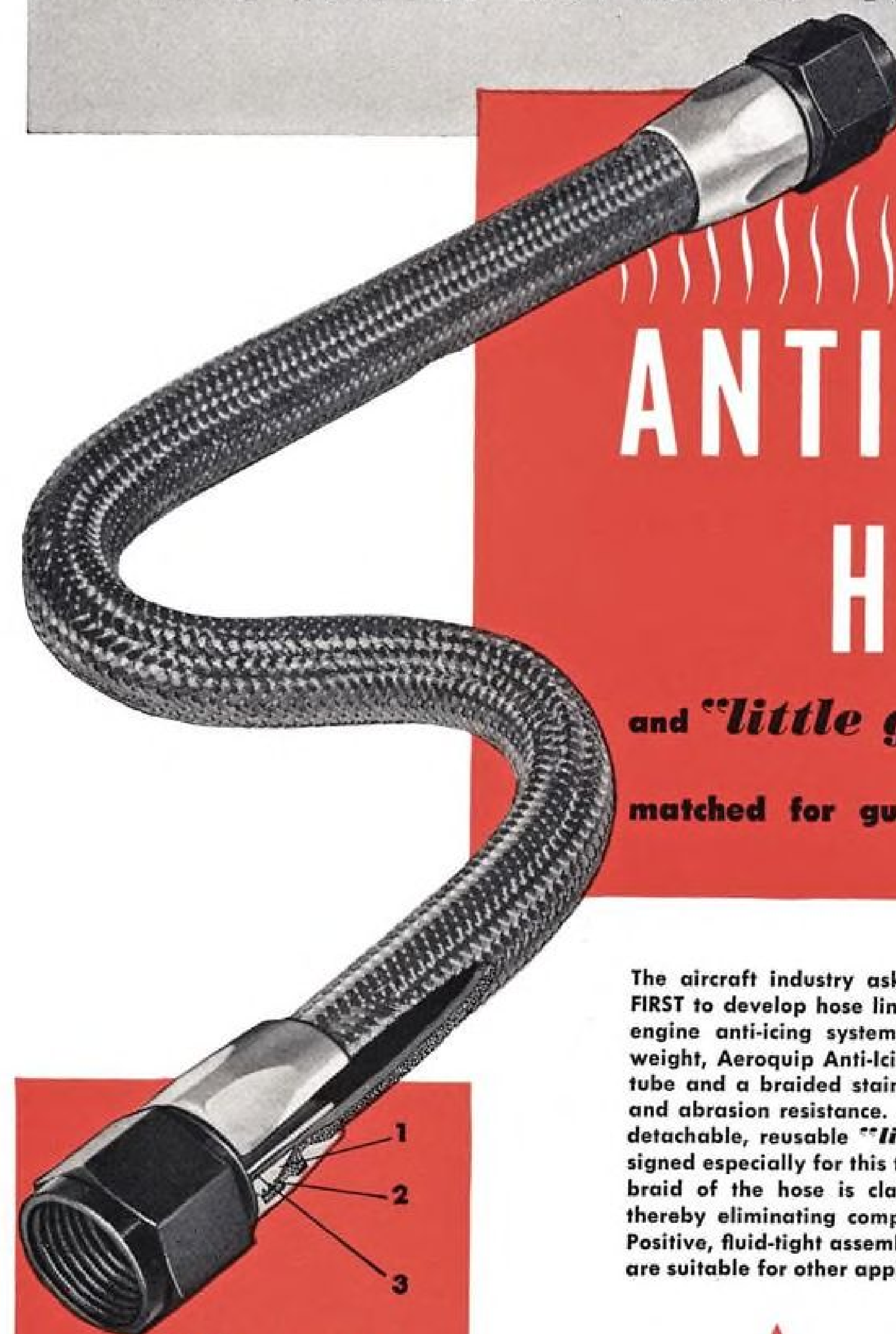
Unit can measure blade angles to accuracies of 1/100th of a degree. Readings are given on six individual 12 1/2-in. scale meters with 300 graduations—each equal to 1/100th of a



PAD's First Engine

This is the first Pratt & Whitney R4360 passing through Pan American World Airways' Pacific-Alaska Division's new San Francisco overhaul shop. The engine is ahead of schedule, PAA says. Overhauling R4360s for Boeing Stratocruisers and R2000s for Douglas DC-4s, the shop has a peak monthly capacity of 60 engines.

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THAT CONVEY HOT AIR UP TO 500° F. *plus*



ANTI-ICING HOSE

and "little gem" fittings

matched for guaranteed performance

"Little Gem" is an Aeroquip Trade Mark

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"little gem" FITTING FEATURES

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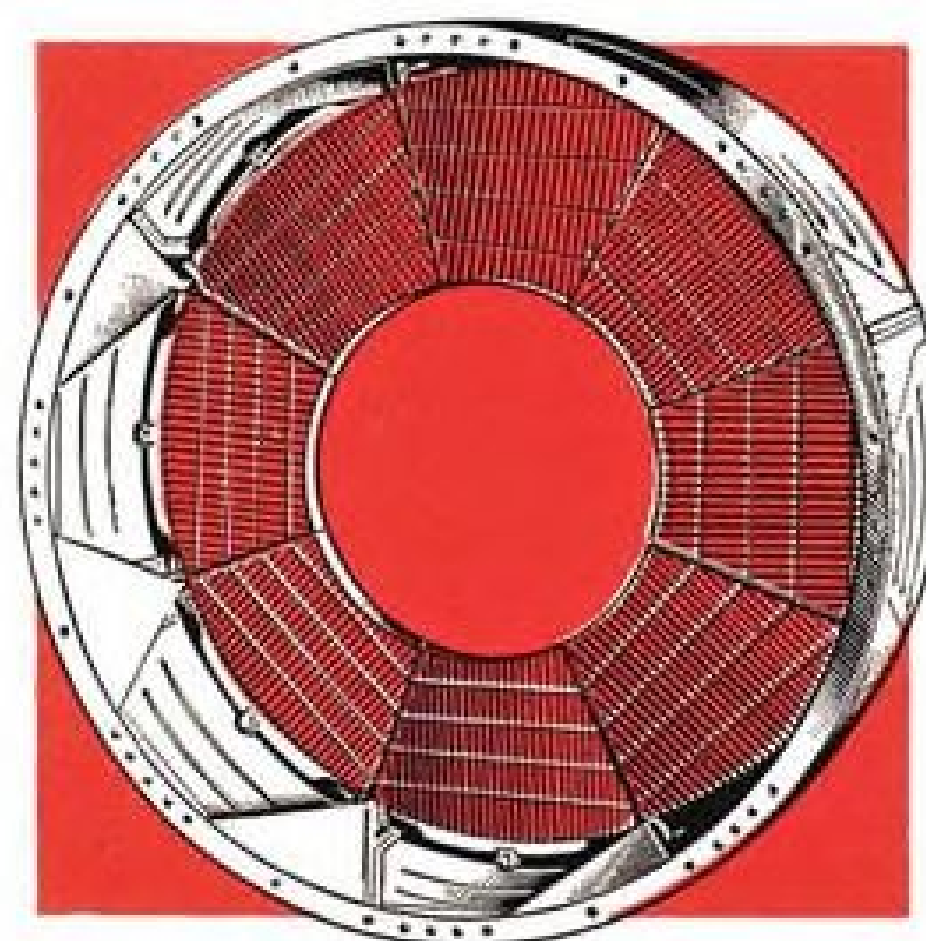
Today's aircraft are substantial investments in the security of our nation. We cannot afford to lose a single one to causes we can control.

Foreign articles entering a single unprotected engine can rapidly reduce a multi-engine jet bomber to a smoldering pile of rubble.

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degree, assuring easy reading. Stand can handle blades up to 26 in. wide and 11 ft. long.

The machine is simple to operate and is readily adaptable to most types of blades.

Protractor is set up with a master blade. Then blades to be checked are fastened in position and the floating angle-sensing stations are positioned along the blade. Springs push the sensing station arms against the blade and angle it assumes is immediately indicated on the appropriate meter. In addition to giving the angular deviation of each of the six stations, these deviations are fed into a computing resistor bank so that the average angular error is indicated to the operator on a seventh meter.

► **Next Step**—Kahn and Co. is fast developing its own engineering, design and development staffs. Still operating with but a handful of employees, it is confident about its place in the test stand business. It soon expects to announce expanded lines of test equipment tailored specifically to the needs of the aviation industry.

Address: 541 Windsor Street, Hartford 1, Conn.

Submerged Booster Combats Vapor Lock

Lear, Inc.'s Lear-Romec Division has developed a totally submerged fuel booster pump for use on helicopters and small fixed-wing aircraft.

Known as Model RG-11250, unit is designed to meet specification MIL-P-5249, type B-26 configuration. Motors and impellers are matched to deliver specific pressure and flow required of the aircraft.

Pump throws out part and compresses balance of entrained vapor to furnish a solid line of fuel to inlet of aircraft engine driven pump, eliminating vapor lock and allowing engine driven fuel pump to function normally with fuel boiling in tank surrounding booster pump, the company announcement says.

According to manufacturer's test reports unit is satisfactory up through 25,000 ft. It is vertically mounted and totally submerged in bottom of fuel tank on round 12-hole flange. Only exposed items are electrical leads and plumbing connections.

Pump has alternate discharge port available for connection inside tank. It pump should run inadvertently on empty tank, it is designed to permit dry running.

Weight is 2.7 lb. Motor is 0.04 hp., 27-v., d.c., 2.4 amp. It pumps 100 gal. per hr. at 7 to 8 psi.

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

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From Lindbergh's history-making flight to today's record breaking jets, Bendix ignition equipment has played a spectacular part in aviation progress.

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Just as a chain is no stronger than its weakest link, dependable ignition is the result of components designed and manufactured for unfailing efficiency.

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There can be no compromise with craftsmanship in the production of components for these planes. They must be made precisely as designed. For this very reason, leading aircraft producers rely more and more on Lavelle for jet components—turned out to meet most exacting specifications.

Years of experience in fabricating stainless steel, aluminum alloys and other allied materials have earned Lavelle a reputation as a truly unique and reliable subcontractor.



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NEW AVIATION PRODUCTS



Photoelectric Control for Airport Lighting Circuits

A simplified photoelectric control device for turning airport lights on or off is offered by General Electric.

Built around a dip-soldered etched circuit, the unit permits easier maintenance and provides built-in lightning protection, GE engineers state.

Types P-2 and P-2A handle high-level illumination for airports, while low-level illumination is provided with types P-1 and P1A. Plug-in elements are interchangeable with all types previously supplied and with those used in GE form 110 street lighting units. P-1 unit converts to P-2 by addition of phototube shield.

Unit adjusts to operate under any conditions at light level from 1 to 6 or 10 to 60 ft.-candles at the phototube. Shield permits maximum light from sky to strike phototube while minimizing effect of stray light from nearby sources.

High amplification of the two amplifier tubes provides greater sensitivity at lower light levels, GE says. Estimated life of the phototube is 20,000 hr., while that of amplifier tubes is 10,000 to 20,000 hr.

GE engineers feel that photoelectric control is the answer to problems involved in turning on lights as soon as they are needed, since photo cell "measures" amount of light in sky. Use of this unit eliminates expensive installation and maintenance of pilot wires, time clocks and overlapping circuits.

General Electric Co., Lighting & Rectifier Dept., Schenectady 5, N. Y.

Pilot Headset Eases Ear Pressure, Chafing

Receivers of new type of earphone sets, known as the Telex Twinset, rest on temples, eliminating chafing, pressure and cumbersome earcups associated with earlier types. Sound is piped directly into ear through thin, tubular sound arm mounted on ball-and-socket



Want to "hang a Watch" in a furnace...and make it run?

Something as technically difficult *is* being done now. For instance, the "buckets" (paddles) and turbine rotor assemblies we make for aircraft jet engines.

These buckets have to stand up against 10,000 revolutions a minute and a flame 1400° hot. Yet, they are made to closer tolerances than many of the parts in your watch and your automobile.

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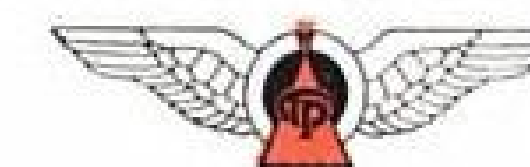
You're probably planning a new product...or how to make a present one better, stronger, at lower cost. *Now is the time to call on the Jet Division for recommendations and technical advice.*

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JET DIVISION

Thompson Products, Inc.

DEPARTMENT JC-12 • CLEVELAND 17, OHIO



Delta-C&S Air Lines

GENERAL OFFICES - MUNICIPAL AIRPORT - ATLANTA, GEORGIA

August 24, 1953

Vickers Incorporated
1462 Oakman Boulevard
Detroit 32, Michigan

Attention: Mr. F. T. Harrington, Vice President

Dear Mr. Harrington:

It was interesting to note that both Delta and C & S while still separate companies had specified Vickers pumps, motors, motorpumps, accumulators, valves etc., for the hydraulic systems of new Convair 340 aircraft. Vickers hydraulic accessories were already in service on the DC-6s and Constellations. This simplified integration of our flight equipment at the time of the merger.

Working separately, Delta and C & S arrived at the same reasons for specifying Vickers Hydraulic Accessories. We wanted accessories which would have outstanding reliability, high overhaul periods, low overhaul costs, interchangeability between aircraft and minimum parts stock requirements. We also wanted the attention of service personnel when necessary, ready parts availability for normal overhaul and repairs plus indications of continuing product improvement. As a merged company (the fifth largest U.S. Airline), we still feel that Vickers and their Hydraulic Accessories meet our requirements.

We thought you would like to know that Vickers accessories have also been specified for our new DC-7 aircraft. We are sure your company will continue to provide the effort and attention necessary to maintain the position you now enjoy with us.

Very truly yours,

DELTA-C&S AIR LINES



C. H. Dolson
Vice President, Operations



Serving the Heart of America
and Six Caribbean Countries



joint. Manufacturer feels that use of set will reduce pilot fatigue.

Conventional Y cord connection to receivers has been replaced by a 5-ft. monocord, reportedly permitting greater freedom of movement. Unit is constructed of tenite and nickel. A Z-nickel steel-wire headband is encased in flexible plastic.

Twinset boasts matched, in-phase magnetic receivers. Sensitivity is 101 db. above .000204 dynes per sq. cm. for 10 mw. input.

Manufacturer lists commercial airlines, business and private flyers as good potential markets. Unit is CAA-approved.

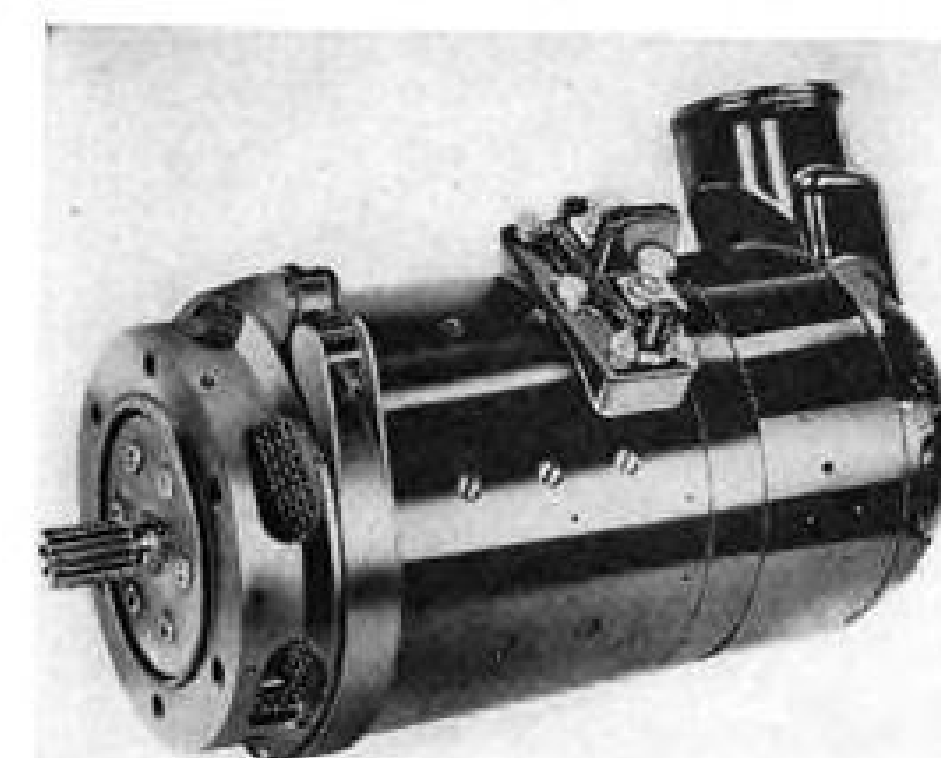
Telex, Inc., Dept. KP, Telex Park, St. Paul, Minn.

Highspeed D.C. Generators For Continuous Duty in Jets

Three new highspeed d.c. generators for jet engines have been developed and will go into production soon, manufacturer Jack & Heintz, Inc. announces.

Designated Models G123, G124 and G128, units are called "true 8,000-rpm. continuous-duty generators" by J&H. The company cites a need for a unit which can operate continuously at high speeds because of the characteristics of the highspeed accessory pads presently used on jet engines.

J&H points out that generators currently in use, designed primarily for the reciprocating engine, do not function continuously at 8,000 rpm. Reason given is that heat generated within the units at 8,000 rpm. is considerably more than at 6,000 rpm. they are de-



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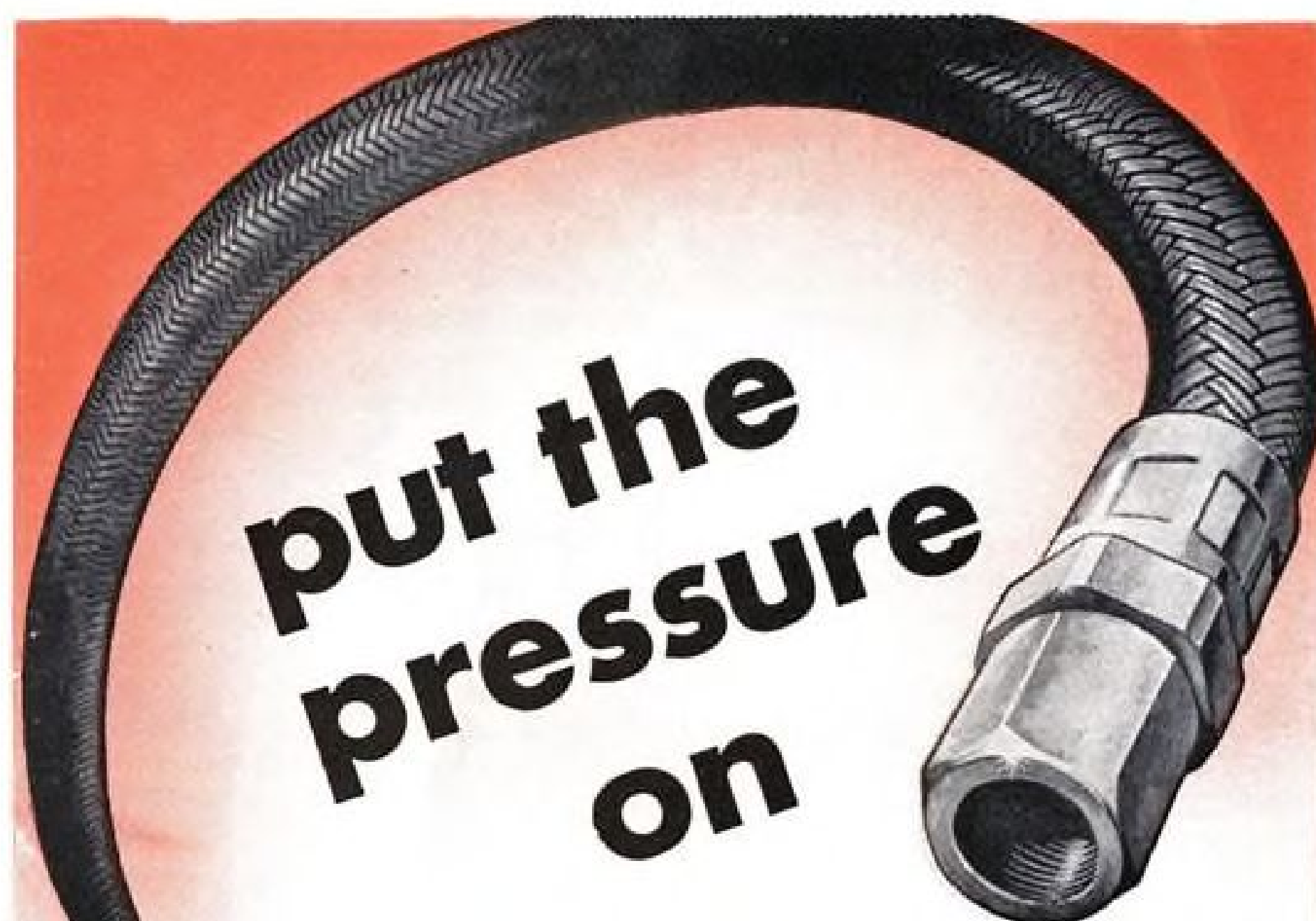
Pneumatic control systems for aircraft designed by Century Controls Corporation.

Write for details



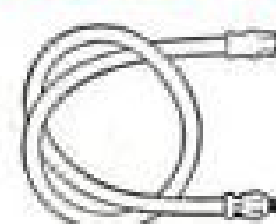


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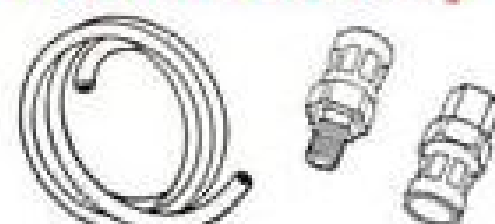
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signed for, and mechanical stresses increase as the square of the speed.

Combination of high temperature and high stress reduces service life of such items as bearings, commutators, brushes and insulation, Jack & Heintz states.

Big feature in the new design is the incorporation of a "straight-through" air path, designed to provide maximum cooling of the unit. Commutator is open so that air is free to pass under it and through remainder of armature. Air space through stator is increased through an intercoil design.

The G123 model is designed to supply 300 amp. at 30 v. with speed range of 3,000-8,000 rpm. It has a 3-in. diameter air inlet and requires cooling air at pressure equivalent to 6 in. water. Approximate measurements are 13 5/8 in. length and 6 1/2 in. diameter. Unit weighs 64 lb., has overhung moment of 360 lb.-in.

G124 will supply 400 amp. at 30 v. also with a speed range of 3,000-8,000 rpm. Air inlet size and cooling air pressure is same as for G123. Measurements are approximately 13 5/32 in. long and 8 in. in diameter. Generator weighs 81 lb., has overhung moment of 430 lb.-in.

G128 will supply 400 amp. at 30 v. with a speed range of 3,100-8,000 rpm. Cooling air is required at pressure equivalent to 12 in. water. Unit measures approximately 14 1/2 in. long and 6 1/2 in. in diameter, weighs 68 lb., has overhung moment of 450 lb.-in.

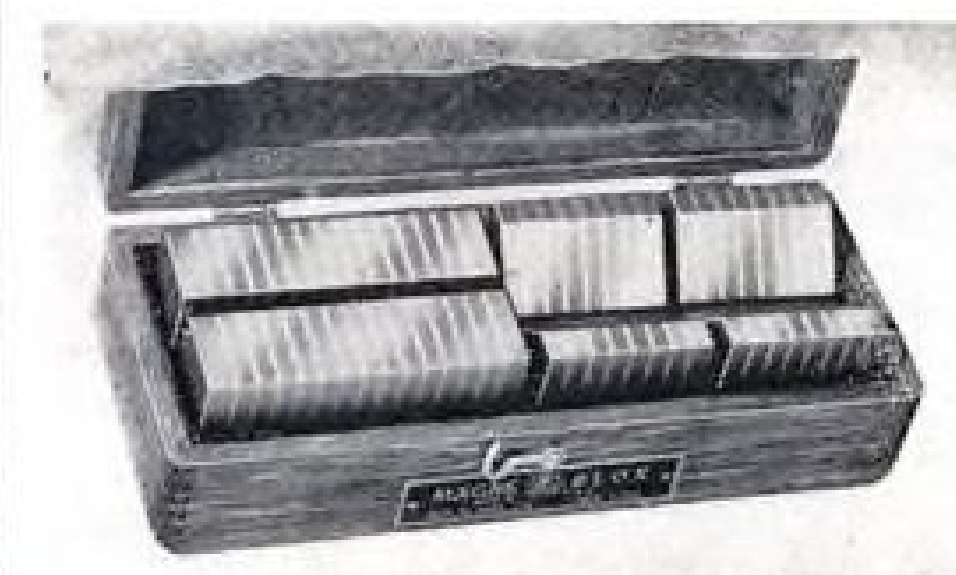
Jack & Heintz, Inc., Cleveland 1, Ohio.

Magnetic Setup Blocks Simplify Grinding Work

Complete line of magnetic parallels and V-blocks, in all sizes and shapes, has been put on the market by the George Scherr Co.

Known by the trade name of Magne-blox, units are manufactured of alternate layers of brass measuring 3/8 in. and iron laminations of high magnetic capacity measuring 3/8 in. With these dimensions, Magne-blox may be used on all types of magnetic chucks, including permanent magnetic type.

Chief advantage claimed is saving in time and labor by simplification of difficult set-ups, elimination of complicated holding devices enabling operator to



FIRST commercial tvor to be installed by COLLINS RADIO

The first purchase of TVOR by any city in the U.S. was made recently by Santa Monica, California, for use at Clover Field. The equipment chosen — Collins.

Packaged Terminal Visual Omni Range equipment has been in the experimental stage for some time, but not until Collins Radio developed the equipment purchased by Santa Monica has any TVOR actually been purchased by a municipality for use at its airport.

Collins TVOR is to be installed on Clover Field (location of Douglas Aircraft) early next year. It will be operated by the city. Negotiations were completed through Collins' authorized dealer, the Airesearch Aviation Service Company.



COLLINS TVOR installation similar to that purchased by Santa Monica

COLLINS RADIO COMPANY

Cedar Rapids, Iowa

11 W. 42nd Street
NEW YORK 36

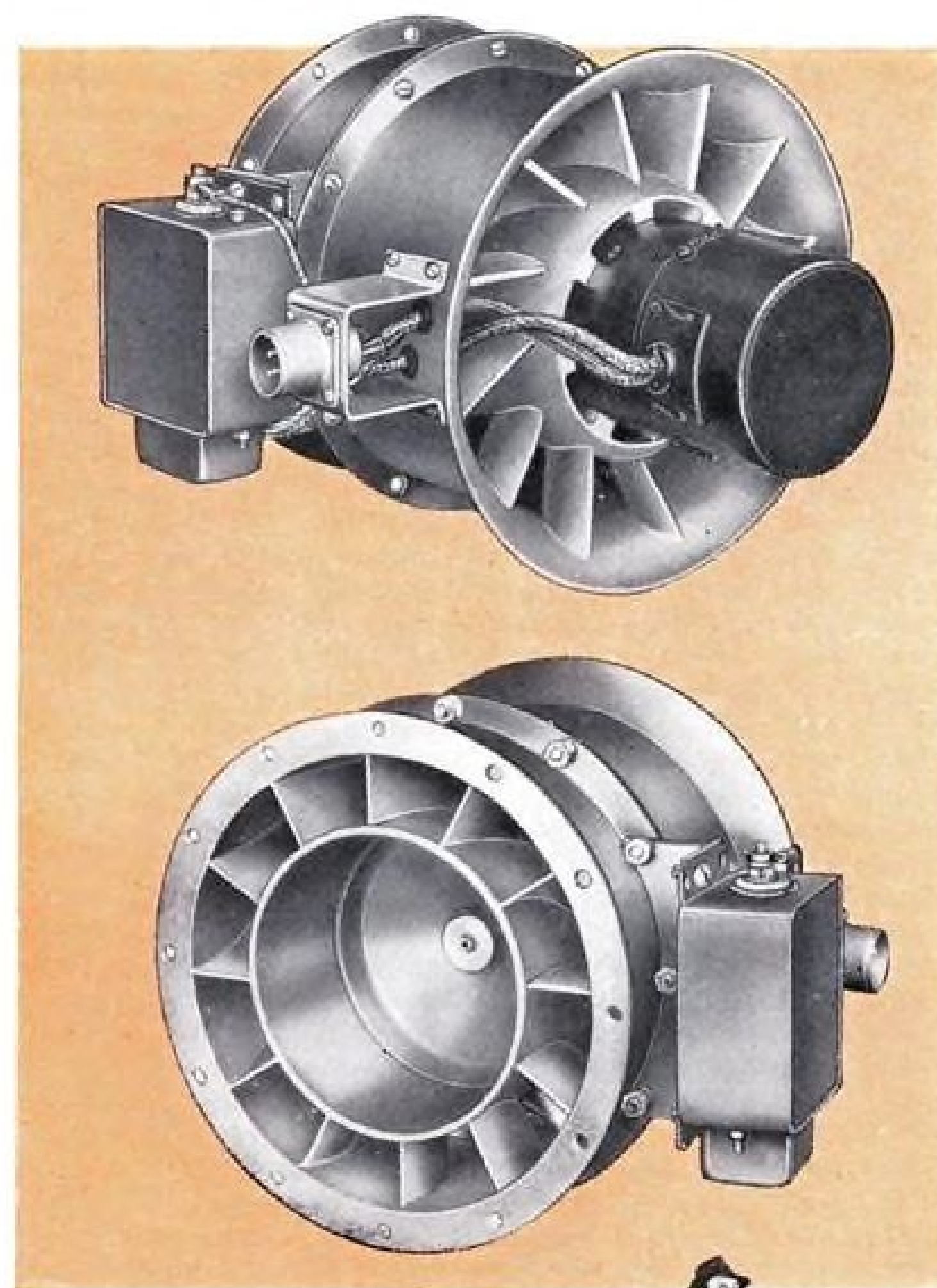
2700 W. Olive Ave.
BURBANK

1930 Hi-Line Drive
DALLAS 2



A Breeze for a Tornado

from JOY AXIVANE[®] AIRCRAFT FANS



The North American B-45 "Tornado" Bomber, like most U. S. aircraft, has many features designed solely for the flight personnel's comfort.

Acting on the logical assumption that a more comfortable pilot is a better pilot, North American engineers called for a cockpit-cooling system of Joy Axivane Fans to keep the flight personnel from melting while waiting for take-off on hot days. When the "Tornado" is airborne, the fans are used in conjunction with a heating system to furnish warm air for canopy defrosting. On the RB-45 photo-reconnaissance bomber, the same fans also keep the camera ports free from frost or fog.

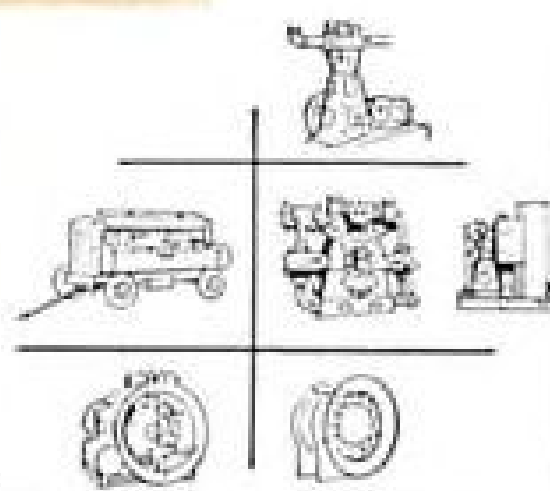
The versatility of this system is largely dependent upon that of the Joy AXIVANE Fan. The fans used on the B-45A, B-45C, and RB-45C provide 250 CFM at 6.5" W.G., yet they are only 6.5" in diameter and weigh but 9 lbs.

• Joy designs and builds each fan to the exact requirements for which it is intended. Each fan, therefore, is custom-engineered for highest efficiency. For many purposes stock fans can be supplied from the extensive line already designed. Both single and two-stage units available. Optional features include straight or flared inlets, beaded or flanged connections, radio noise-filters, anodization, and cooled motors where required.

Here are some of the many uses for JOY AXIVANE Aircraft fans: Windshield de-frosting, windshield or wing de-icing, cabin heating, cabin ventilating, cockpit heating, cooling radio and electronic equipment, cooling voltage regulators, oil cooling, gear-box cooling, instrument cooling, air recirculation, and high-altitude pressurizer boosting. • Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa., In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.

Consult a Joy Engineer

for Vaneaxial Fans . . . Compressors, Vacuum Pumps and Boosters . . . Oxygen Generators



W&A 4678

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Small universal set, consisting of two parallels measuring 1x1 1/2 x 3 1/2 in., with two V-blocks, 1 1/2 x 2 1/2 x 1 1/2 in., sells for \$22.25. Large Magne-blox parallels, consisting of two units measuring 1x3x7 1/2 in. sells for \$36.00, while a set of matched double pair parallels of the same size sells for \$72.00.

George Scherr Co., Inc., 200 Lafayette St., New York 12, N. Y.

Airborne Power Unit Supplies 4,000-V. A.C.

An airborne, hermetically sealed power supply, rated at 6,000 v. \pm 5%, with an output current of 100 micro-amperes, has been developed by Perkin Engineering Corp.

Unit is also provided with d.c. output voltage tap at 600 v. and is designed for a.c. input of 100-120 v. a.c., 380-420 cps., single phase. It is designed to operate over temperature range of -55C to 85C.

Perkin Engineering Corp., 345 Kansas St., El Segundo, Calif.

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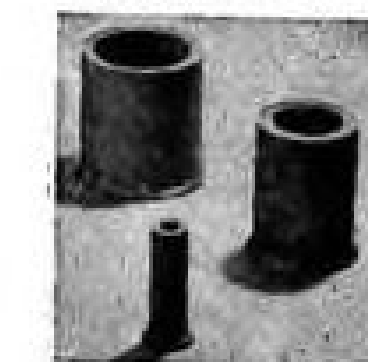
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facturer. Polish cleans and polishes painted, lacquered or doped fabric airplane surfaces in one operation, contains 4% silicone. Aircraft fabric cleaner removes stains and smudges without damage to upholstery materials. Both items are available in pint and gallon containers.—Permatex Co., Inc., Brooklyn 35, N. Y.

Siphon spray gun for continuous spray cleaning by solvent emulsion or aqueous solutions is designed to draw fluid directly from 55-gal. drum, eliminating time loss. Unit features die-cast handle designed to withstand over four tons of shock, airflow control valve on the haft, ball-check to prevent fluid flow-

back, and an adjustable lock-tip nozzle. Model B-202-M's price is \$19.95.—John B. Moore Corp., P. O. Box 3, Nutley 10, N. J.

Marker system, called Speedy-Marx Hi-Temp Wire Markers, is capable of resisting heat up to 400F, can be used for identification on selenium rectifiers, electric motors, transformers or any application where temperature rise is considerable over ambient. Manufacturer states that markers insure identification with no effect from cold, humidity, vibration or heat. Made to specification, if desired.

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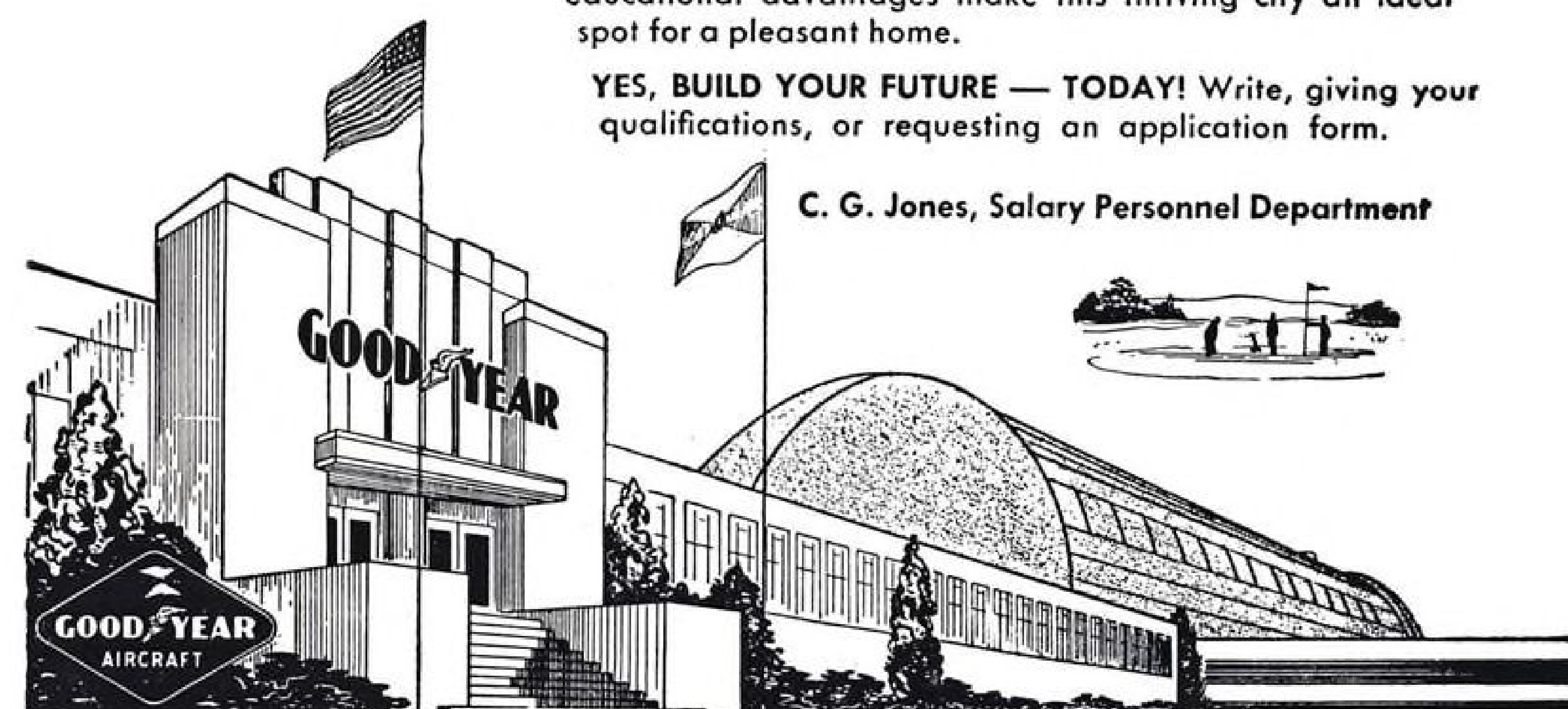
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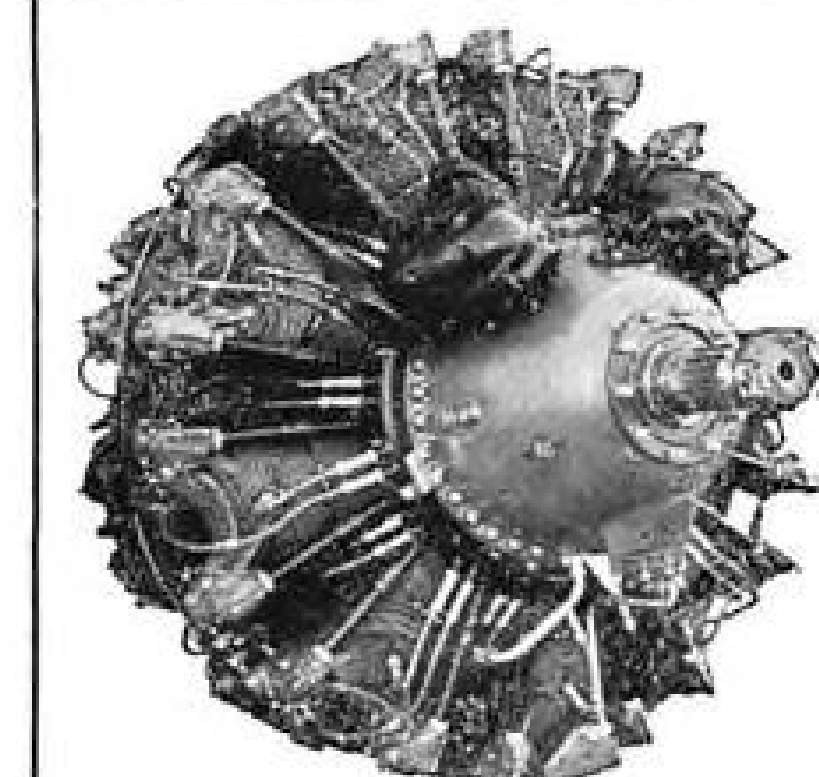
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Heater	Stewart Warner (200,000 BTU)	921B	230
Blower	Dynamic Air Engine	4582-AA-6C	18
Blower	Joy Manufacturing Co.	U-702-15	24
Tank Unit	Minn. Honeywell	G-1098D	11
Trim Tab Controller	Pioneer	#15701-R	20
Oil Cooler Assembly	U.A.P.	U8416-MM	12
Oil Cooler Assembly	U.A.P.	U8013-MM	14
Hydraulic Pump	Vickers	MF9-713-15H	120
Hydraulic Pump	Vickers	PF12-713-25BCE	124
Hydraulic Pump/3000 P.S.I.	Vickers	PF4-713-20BCE	397
Hydraulic Cylinder	Vickers	MF45-3911-20Z	423
Hydraulic Cylinder	Air Associates	HC2109	29
Hydraulic Cylinder	Air Associates	HC2110	8
Fire Detector	Edison	117-47	46
Fire Detector	CO ₂ Mfg. Co.	ASDC2	65
CO ₂ Cylinders	Kidde	981280	185
CO ₂ Cylinders	Kidde	M8700368	47
Anti-Icer Pump	Adel	D7818	125
Auxiliary Power Unit	Eclipse	NEP-2	29
Pump	Lawrence	LER-30D	16
Pump	Pesco	1EAR-280BH	15
Pump	Pesco	1E-621	8
Pump	Pesco	2E258SA	21
Separator	Pesco	3V-217-HC	32
Accumulator	Vickers	AA14002A	35
Actuator	Air Associates	M-2031	22
Wobble Pump (D-3)	Erie Meter	AN4014	17
Oxygen Cyl.	Kidde	923748	74
Windshield Wiper Kit	Marquette	K14949E	140

ENGINE ACCESSORIES

Starter Generator	Eclipse	1416-12E	75
Generator	Eclipse (NEA-3A)	716-3A	100
Starter Motor	Jack & Heinz	JH950-R	90
Generator	G.E.	2CM46A2	4
Generator	Eclipse	1003-4	71
Carburetor	Stromberg	PD12K10	550
Carburetor	Stromberg	PR48-A1	236
Carburetor	Holley	1685-HAR	90
Carburetor	Holley	1375-F	19
Magneto	Scintilla	SP9-LN-2	407
Fuel Pump	Pesco	2P248EB	6
Fuel Strainer	U.A.P.	U635A	76
Governor	Woodward	5x18	10
Prop. Reversing Control	Ham. Standard	72400	20
Oil Separator	Eclipse	564-2A	384
Oil Filter	Purolator	27314	100
Pressure Relief Valve	Aerotec	V301B7	20
Tachometer	Eclipse	2227-11-D3A	11
Vacuum Pump	Eclipse	610-2C	6
Spark Plugs	Aero	LS4-AD1	185,000

AIRCRAFT ENGINES & PARTS

Engine	Wright	R-1820-52	1
Engine	Wright	R-1820-54	16
Engine	Wright	R-1820-60	4
Engine	P & W	R-1830-43	1
Bearing	P & W	1045A	166
Flange	P & W	3506	500
Follow-up Assy.	P & W	8288	130
Blower Assy.	P & W	3M814	814
Shaft	P & W	48362	53
Shaft	P & W	48363	75
Gear	P & W	48461	390
Gear	P & W	76236	78
Bearing	P & W	84289	1178
Housing	P & W	84487	113
Noise Housing	P & W	84591C	77
Crankcase Assy.	P & W	84350-D	200
Pump Assy.	Wright Aero	490313	33
Drive Assy.	Wright Aero	416421	46
O.E.C. Unit	Wright Aero	FM1	36

AIRCRAFT ENGINES & PARTS (Cont.)

Description	Mfg.	Part No.	Quan.
O.E.C. Unit	Pyram (B24)	NR6L12	25790
Bearing	Torrington	AN200-K3L2	18273

GAUGES

Compass	Eclipse	36001-0	20
Gyro Indicator	Eclipse	14601-1F-B1	11
Gyro Indicator	Eclipse	10078-1AG	62
Position Indicator, Wheel & Flap	Weston	AN5780-2	400
Position Indicator, Wheel & Flap	G.E.	AN5780-2	1000
Position Indicator, Wheel & Flap	Eclipse	20100-11C-4-A1	23
Pitch Trim Gauge	Eclipse	15100-1B-A1	19
Cowl Flap Indicator	G.E.	8DJ29AA7	21
Oil Temp. Indicator	Lewis	77C3	23
Oil Temp. Indicator	Lewis	77C4	13
Oil Temp. Indicator	Weston	8287Y13Z2	71
Manifold Pressure Gauge	Manning, Maxwell & Moore	AN5770-2	28
Manifold Pressure Gauge	U.S. Gauge (Metric)	AW2-3/4-25K	146
Fuel Quantity Gauge	Eclipse	3801-3B	128
Dual Carb. Temp. Gauge	Weston	8287Y12Z2	40
Carb. Air Temp. Gauge	Lewis	77C3	22
Carb. Air Temp. Gauge	Weston	119862	40
Air Temp. Gauge	Weston	7271Y70Z2	11
Air Temp. Gauge	Weston	7271Y72Z2	85
Air Temp. Gauge	Weston	7271Y73Z2	88
Air Temp. Gauge	Weston	7271Y74Z2	83
Air Temp. Gauge	Weston	728-40Z9	10
Air Temp. Gauge	Weston	727-1Y37P	298
Air Temp. Gauge	Lewis	47822	33
Air Temp. Gauge	Lewis	47823	28
Air Temp. Gauge	Lewis	47824	54
Air Temp. Gauge	Lewis	47821	30
Cylinder Head Temp.	Lewis	76819	8
Torque Indicator	Eclipse	20100-42B-14A2	9
Tachometer Indicator	G.E.	8DJ13ABK	6
Tachometer Indicator	Eclipse	2222-1F-2A	200
Magnetsyn Pos. Indicator	Eclipse	20000-8A-14	9
Magnetsyn Transmitter	Eclipse	20000-43A-13A1	8
Magnetsyn Indicator	Eclipse	23000-2A	67
Pressure Transmitter	Eclipse	22101-11-A4	15
Pressure Transmitter	Giannini	47114-D2.0-20	8
Differential Pressure Gauge	Kollsman	906-6-011	22
Differential Pressure Gauge	Kollsman	2548K-6-052	48

AIRCRAFT (RADIO)

Transmitter	Bendix Radio	TA-12B	20
Receiver	Bendix Radio	RA10-DB	35
Amplifier (PB10)	Eclipse	15401-1	10
W/EDs Mount	Eclipse	12086-1C	11
Amplifier	G.E.	1C-200	740
Radio Noise Filter	G.E.	NF10084	959
Radio Noise Filter	G.E.	JAN6AL5	327
Tube	Hewlett Packard	415A	3
Standing Wave Ind.	Eclipse	12086-1C	11
Antenna Switch	Bendix Radio	MS49A	26
Control	Bendix Radio	3616	81
Station Box	Bendix Radio	3620	23
Insulator	Bendix Radio	MT48C	518

ELECTRICAL PARTS

Transformer	Eclipse	DW33	11
Transformer	Eclipse	DW28	80
Transformer	Eclipse	DW47	33
Transformer	G.E.	70G3	26
Servo Motor	Transcoil	#1300-20	57
Motor	G.E.	5BA40NJ1A	425
Motor	G.E.	5DP65-MB1	189
Motor	G.E.	5BA25D-J4B	44
Motor	Airesearch	26675	25
Motor	Diehl	FD65-5	21
Circuit Breaker	Spencer	PM-5	2094

ELECTRICAL PARTS (Cont.)

Description	Mfg.	Part No.	Quan.
Circuit Breaker	Spencer	C6363-1-5A	115
Circuit Breaker	Spencer	C6363-1-2A	115
Circuit Breaker	Heinemann	AM1614-80	1700
Circuit Breaker	Cutler Hammer	6141-H69A	237
Amplidyne	G.E.	5AM31JJ9A	31
Amplidyne	G.E.	5AM31NJ10	111
Switch	Kidde	A4614	151
Ignition Switch	Scintilla	AN3213-1	70
Ignition Switch	Nesco	A-9394-3226	250
Master Switch	As Pollack	M862A	66
Thermo Switch	Fenwall	17322-2	126
Heater Control Switch	White-Rodgers	1033-4E1	287
Air Ram Switch	Minn. Honeywell	PG208AS1	148
Air Ram Switch	Minn. Honeywell	PG208AS7	40
Pressure Switch	Aerotec	M-101-B	20
Pressure Switch	Eclipse	3135-11C	88
Impact Switch	Kidde	SA/3A	18
Switch	C.H.	8909-K99	2000
Dome Light	Grimes	AN3096-4	2585
Dome Light	Grimes	AN3096-5	775
Dome Light	Grimes	AN3096-6	1365
Plug	Annon	NAF310310-4B	2747
Relay	Annon	NAF310310-5B	409
Relay	Leach	7264-404	47
Relay	Leach	7210	24
Relay	Allied	BOBX-2	31
Relay	Square D	82A	718
Relay	G.E.	CR2791-G100-K4	281
Relay	G.E.	CR2792F101-A3	626
Relay	Guardian	G3446A	350
Relay	Guardian	G31502-A	45
Relay	C. P. Clark	D9060	34
Control Box	Vapor Car	9804B	25
Compensator	Heating Co.	468311	25
Solenoid	Interstate Aircraft & Eng. Co.	A812	209
Flex. Cable	Airesearch	25432	66
Temp. Control	Fulton Syphon	715E	52
Noise Filter	Malloy	NF3-5	500
Regulator	G.E.	3GBD1A18A	13

VALVES

Valve	Kidde	982585	326
Valve	Oh. Chem.	AN60009-1B	325
Valve	Oh. Chem.	AN60009-2A	247
Valve (3000 PSI)	Parker	9-1046-76	147
Restrictor Valve	Parker	SP4-2746-77	68
Restrictor Valve	Parker	SP4-2746-78	105
Restrictor Valve	Parker	SP4-2746-79	40
Restrictor Valve	Parker	SP4-2746-80	48
Restrictor Valve	Parker	SP4-2746-81	60
Restrictor Valve	Parker	SP4-2746-76	142
Restrictor Valve	Adel	18784	33
Cone Check Valve	Parker	PL2-2546-75	127
Cone Check Valve	Parker	PL2-2546-76	123
Cone Check Valve	Parker	PL2-2546-77	620
Cone Check Valve	Parker	PL2-2546-78	540
Check Valve	Parker	PLY-843-54	119
Check Valve	Parker	PL2-1846-77	67
Check Valve	Kenyon	19100-2-101B	23
Check Valve	Eclipse	3575-9	9
Valve	U. S. Gauge	A-W-CV-1-1	180
Valve	Parker	6-746-10	68
Valve	Vickers	AA31400	28
Restrictor Valve	Adel	18784	33
Lock Valve	Adel	12924-2	85
Brake Valve	Vickers	146102	92
Selector Valve	Parker	SP-1-445-8	7
Selector Valve	Adel	D9530	478
Selector Valve	Adel	D9530-2	668
Selector Valve	Adel	D9560-2	428
Selector Valve	Adel	D9632	179
Selector Valve	Adel	D9696	237
Selector Valve	Adel	D10044	744
Selector Valve	Adel	D10051	244
Solenoid Valve	United	37D6210	2200
Magnetic Valve	General Control	AV1B1174	114
Throttling Valve	73-A-01		1865
Relief Valve	Airex	1265-900	240
Pressure Relief Valve	Aerotec	V301B7	20
Valve	Aero Supply	74247 (TyPH3)	814
Valve	Whittaker	AN5830-1	335
Valve	Whittaker	AN5830-6	74
Valve	Parker	AN5831-1	60

AIR TRANSPORT

Report on Northwest Management

New NWA Chief Builds Up Fleet, Services

- Operations produce first multi-million-dollar gain.
- Carrier launches DC-6B coach—major expansion.

By Lee Moore

Honolulu—Northwest Orient Airlines' new management is completing its first year of modernization and expansion, a year that produced NWA's first multi-million dollar operating profit since the carrier was founded in 1928.

The airline took a major step in its buildup program this month with inauguration of Hawaii and Portland-Chicago coach service, following delivery of two of four Douglas DC-6Bs on order.

The DC-6B coach service marks a big gain in a difficult program of Northwest management—obtaining additional equipment and expanding sales without resort to new financing.

► **Northwest Progress**—Developments since Harold Harris left Pan American World Airways to become NWA's president last Jan. 1 include:

- Passenger capacity increased about 25%, without buying new equipment.
- Total revenue gained 15% in the first nine months of 1953.

- Operating profit increased from \$199,000 for first three quarters of 1952 to \$3,166,000 during the same period of 1953.

- Company debt was reduced from \$4,295,000 to \$2,505,000, including prepayment in August of \$835,000 due this month.

- Stratocruiser fleet has been modified to improve engine reliability and increase seating capacity. Northwest now features this Boeing transport on trans-continental as well as some Orient runs. These improvements have changed the Stratocruiser from a money-loser to a profit-maker for the company, Harris says.

Major improvement on the Boeing airliner is ruggedization of its Pratt & Whitney R4360 engine modification to the B-6 configuration. Further strengthening of piston heads is underway now, with several engines already improved. Resultant improved reliability has enabled NWA to increase Stratocruiser utilization to more than nine hours per day.

Finally, eight extra revenue seats on



FIRST DC-6B of four ordered by Northwest inaugurates Seattle-Honolulu aircoach.

the transport's main deck were gained by making the overseas dressing room readily removable for domestic service. It is changed as the plane comes through Seattle. All lower-deck lounge seats now are put up for sale, increasing total domestic capacity to 83 passengers.

- Six Lockheed 1049E Turbo Compound-powered Super Constellations were ordered for delivery in late 1954 and early 1955, with options on six additional Super Connies.

► **Management Changes**—When Harris took over he found the company's board and policy officials bound by more day-to-day administration than he considered best for longterm effectiveness of management.

Under the revised, largely conventional arrangement, the board determines policy and general methods only. Top executives command their individual operations in accordance with board policy but without being required personally to handle excessive administrative detail.

Many administrative functions (such as expense-account control) are overseen by division managers, largely under supervision of the Continental Division vice president, Malcolm MacKav.

Other management changes: Frank Judd was promoted to vice president-operations (including engineering); C. L. Stewart to assistant vice president-sales; J. W. Mariner to vice president-public relations; William Eiden to budget director and assistant to president; H. Don Reynolds became assistant to the president; Dale Merrick was appointed assistant vice president-properties. Vice president and comptroller E. I. Whyatt is resigning Jan. 1.

► **Equipment Problems**—When Harris took office, the airline had three prob-

lems connected with its predominantly obsolescent equipment. Northwest needed:

- Quick acquisition of modern four-engine planes to meet an acute shortage aggravated by disposal of its Martin 2-0-2 fleet.

- Future orders for equipment to meet the requirements of competitive long-haul routes.

- Capital to finance expansion.

The first problem was met by an expensive but debtless seven-year lease of four DC-6B aircoaches from Flying Tiger Line, with additional three-year option.

Problem two was solved by ordering six Lockheed 1049Es, considered the best bet for the long-range requirement that would be acute if Air Force should abandon its Shemya base between Anchorage and Tokyo.

Operations vice president Judd says the appearance of the Douglas DC-7 as a possible competitor in this category now is undergoing intensive study. But the transport's extreme-range potentiality is as yet untested, he adds, and competitive conditions may not dictate conversion to this faster type.

(Observers say part of the latter question may hinge on whether Pan American wins from Civil Aeronautics Board permission to use the Great Circle route to the Orient flown by NWA.)

At the time Northwest faced this problem, the DC-7 design was tailored mainly to the particular needs of American Airlines, NWA officials say. Northwest is confident its selection of the Lockheed 1049E was the wiser one under the circumstances. Relatively early delivery date on the Super Connie is another important factor, airline officials say.

To finance the equipment purchase

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New official insignia of the Strategic Air Command . . . the long-range air arm of our nation. The shield depicts through the mailed fist a powerful potential for defense, at the same time stressing the olive branch of peace. The clouds and field of blue sky symbolize the global capabilities of this mighty striking force.



The insignia which identifies the Strategic Air Command's F-84 Thunderjet fighters serves as a definite symbol of U. S. Air Force might, for aircraft such as the Thunderjets have established their role as an integral and versatile part of strategic air power. Group flights on the same day, such as from the U.S.-to-England and from U.S.-to-Africa, both non-stop . . . using in-flight refueling,* emphasize the valuable role the F-84 is playing in SAC as a strategic jet fighter airplane with amazing mobility. > >

For these accomplishments and other assuring demonstrations of our air power, credit must fall to the laudable teamwork of each individual in the Strategic Air Command, and to their Commander, General Curtis E. LeMay.

*AUGUST 20, 1953.
TURNER A.F.B., GEORGIA TO NOUASSEUR, AFRICA. (31ST STRATEGIC FIGHTER WING)
TURNER A.F.B., GEORGIA TO LAKENHEATH, ENGLAND. (50TH STRATEGIC FIGHTER WING)

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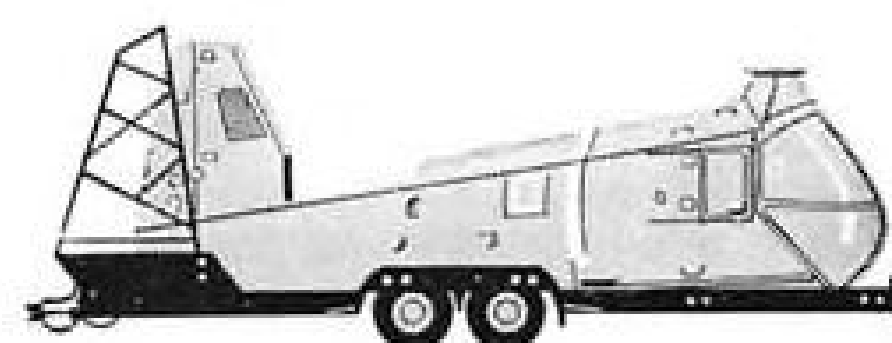
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was the final problem. Recapitalization in the equity market with the existing market price of Northwest (and many other subsidized airlines) was too low to consider. Instead, a standby credit of \$15 million was arranged with a large group of banks. Until drawn upon, the interest remains a fraction of 1%, yet the resources stand ready for any eventuality.

► **Seattle Move**—One possible but not necessarily probable capital requirement may be transfer of NWA's main overhaul and operations base from Minneapolis to the milder climate of Seattle. Decision deadline is the end of this month.

Minneapolis-St. Paul already have tapered their high tax bite and offered Northwest fairly liberal lease-purchase terms for needed expansion of facilities. Seattle also is making a strong bid.

Reactions to the possible transfer are mixed among company officials. Some favor the move but predict that it will not occur.

► **Present Equipment**—Main workhorse of Northwest's domestic and Orient fleet still is the World War II-designed Douglas DC-4, with 24 in operation on NWA rotates.

Prestige leaders now being exploited on the transcontinental route are Northwest's double-deck Stratocruisers.

The airline also operates eight Douglas DC-3s on its "Montana service" routes between Twin Cities and Spokane.

All four leased DC-6Bs will be delivered for Portland-Chicago and Hawaii coach service by February. They are scheduled to carry 74 to 76 passengers on domestic routes and 70 on the 27,000-mi. run to Hawaii.

► **Long Term Uptrend**—Business improved the first nine of this year, as shown by the statistics. But operating revenues dropped lower than usual during the current season. Sales and traffic officials primarily blame the decrease on a drop in Korean embarkation and rotation travel, most of which funneled to the Seattle embarkation port. A 1,500-man strike of the Brotherhood of Railway Clerks also hurt the November financial showing.

Improved services increasing sales promotion effectiveness are expected to reverse this trend soon and return it to the relatively steep long-term uptrend.

► **Route Changes**—President Harris says Northwest is not out to build a flimsy, sprawling route empire. He cites three main cases under way:

• **New York-Chicago.** NWA wants CAB to lift old restrictions prohibiting the airline from direct New York-Detroit-Chicago service.

The carrier serves all these cities, but Chicago presently is a spur from

the direct New York-Twin Cities franchise. Chicago is a major terminal for Northwest, however, because of its community of interest with the North Central and Northwestern cities on its route.

• **Trans-Pacific route renewal.** Vital Northwest aim in this case is the purely defensive one of gaining permanent certification of its direct, Great Circle route to the Orient and preventing Pan American from gaining competitive rights on it, if possible. NWA and Trans World Airlines are trying to parallel PAA's Japan-India route, but this is a secondary possibility.

• **Hawaii service case.** Northwest originally won the exclusive Northwest-Hawaii franchise. Pan American had not sought it actively but maintained that if any carrier should get the route, PAA was the logical choice.

Two weeks after CAB gave it to Northwest, President Truman added a competitive right for Pan American on the then thinly-travelled route.

Lowest Rates Will Win Airmail, PO Rules

Postmaster General Arthur Summerfield's decision to ship airmail only by the lowest-rate airline on competitive routes after Jan. 1 is expected to force at least three major changes in the pattern and rate structure for airmail.

Government and industry officials say these are:

• **Immediate rate cuts** by high-tariff carriers on competitive routes. Civil Aeronautics Board is working on a policy statement and show-cause order to be issued soon.

• **Complete revision** later of the entire mail-pay structure, changing from the present single-rate-per-carrier to the more conventional point-to-point rate system used by CAB and the airlines on passengers and cargo.

• **Diversion to surface** carriers of some shorthaul airmail service if CAB and the higher-cost airlines try to offset lower longhaul rates by higher short-haul tariffs.

Post Office will ship by the low-rate service after Jan. 1 only on certificated domestic and territorial routes. Officials say they contemplate extending this point-to-point low-rate policy to international routes later. But they say Post Office probably cannot or will not ship mail on foreign carriers where U. S. carrier service is available.

New Terminal

Erection of a \$350,000 terminal building at Sacramento Municipal Airport, Calif., is expected to begin in late spring. The city council has authorized preparation of architectural plans.

Reversing the usual procedure of inserting a semi-close tolerance fastener into a close tolerance hole—

the HS51P-52P series

HI-SHEAR rivet

with a close tolerance

shank, fits into a

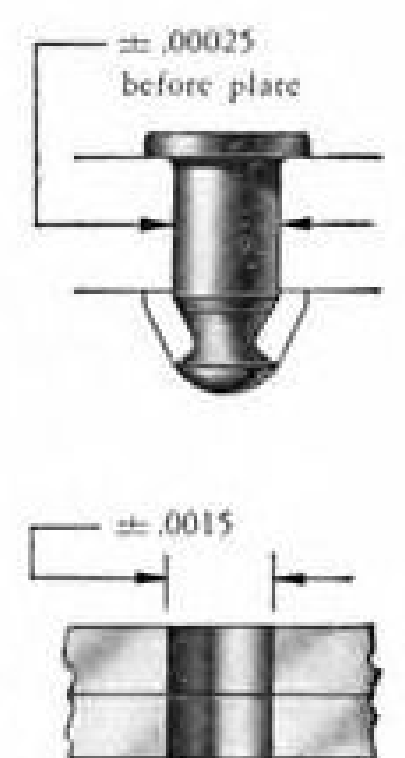
semi-close tolerance

hole, pilot and

core drilled.

This easier made

hole



reduces installation costs

Additional savings are realized in less drilling skill needed, equipment and inspection.

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British Independents Discouraged

Private U. K. carriers find little hope for more freedom in competing with two government-owned airlines.

(McGraw-Hill World News)

London—Britain's independent airlines are facing the prospect of defeat in their uphill battle for more freedom to operate profitable services alongside government-owned air carriers.

British Independent Air Transport Assn., representing 13 private airlines, gives this verdict in its first report on the Conservative government's 18-month-old promise to give the operators "wider scope" in Britain's civil carrier business (AVIATION WEEK June 23, 1952, p. 78).

BIATA sums up government action this way: very little effective encouragement.

► **Rejected Applications**—Biggest disappointment is approval by the government's Air Transport Advisory Council of only five of 25 applications for new colonial coach services.

On these routes between the United Kingdom and the British Empire, the independents are allowed to quote tourist fares 10% below those of nationalized British Overseas Airways Corp. and British European Airways. On first-class flights, the private lines can undercut their government-owned competitors 40%.

Of the 25 applications submitted, the council rejected 18 and still has not acted on two.

► **Aging Fleets**—BIATA says the most difficult problem its members face is how to finance replacements for out-of-date equipment, while BOAC and BEA can tap large sources of credit

from the government almost at will.

With no prospect of profitable routes guaranteed over long periods, the chances of finding funds to pay for new transports are remote, the association claims.

Only two independents have modern aircraft on order:

- **Silver City Airways**, operating several profit-making cross-channel ferry services, has ordered three of Blackburn & General Aircraft's Beverley cargo transports and three Bristol Mk. 31 Freighters.

The carrier has taken delivery of six Mk. 31s and eight Bristol Mk. 21 Freighters.

- **Hunting Air Transport**, which operates a series of scheduled services between Newcastle-on-Tyne and European cities, has ordered three Vickers turboprop Viscounts.

Other than one de Havilland Heron and a few DH Doves, the British independents operate 35 aging Avro Yorks, 30 DH Rapide biplanes, 13 Airspeed Consuls, 15 Vickers Vikings and 23 Dakotas.

In all, the private carriers control approximately 170 transports.

Aquila Airways, operating Short Hythe and Short Solent flying boats on twice-weekly flights to Majorca and Madeira, next year will add a new service to Capri—without prospect of new equipment.

The carrier has offered to buy Saunders-Roe's 10-engine Princess flying boats for more than \$3 million each (AVIATION WEEK Nov. 23, p. 92), but

this bid is not expected to materialize for several years, if at all.

► **Backbone of Independents**—Bulk of business for the private airlines is carrying military personnel on charter flights.

In the year ended last June, BIATA members flew 264 million passenger-miles, of which 200 million were operated under troop contracts. Of the 120,000 troops and military dependents flown by the British last year, independent airlines carried 100,000. Royal Air Force's Transport Command carried only 20,000.

Troop contracts undoubtedly will continue as the backbone of independent income for some time to come. The British War Office favors flying military personnel by private charter because of economy alone.

Here is how average fares charged by charter operations compare with other forms of transport on two military routes:

- **U. K.-Egypt:** troopship, \$84; commercial shipping, \$112; BOAC, \$241; charter aircraft, \$16.60.

- **U. K.-Singapore:** troopship, \$210; commercial shipping, \$378; BOAC, \$576.80; charter aircraft, \$280.

► **Best Hope**—BIATA believes the independents' best hope for a more secure financial outlook lies in long-term troop contracts. These charter flights appear to hold an edge on the chance of rescue by expanding scheduled services.

"BOAC's extensive network leaves little room for new traffic area," the association comments.

Freight services have shown little promise as an avenue of expansion. A year ago, BOAC and BEA said they would delay applications for new, all-cargo services pending efforts by the independents to gain government approval of freight flights.

So far, 14 applications by private carriers have been approved. But BIATA says these services cannot be started until suitable cargo transports are available. And the association indicates that Britain's present level of air-freight business is not such as to attract much new investment.

► **Looking for Help**—The BIATA report ends on a note clearly indicating where members are looking for help:

"All aspects of aircraft procurement and manufacture are now so dependent on government policy and direction that the government initiative is required to solve the independents' problems.

"The independents are not requesting any form of direct subsidy but consider that a form of security of tenure and access to opportunities is necessary."

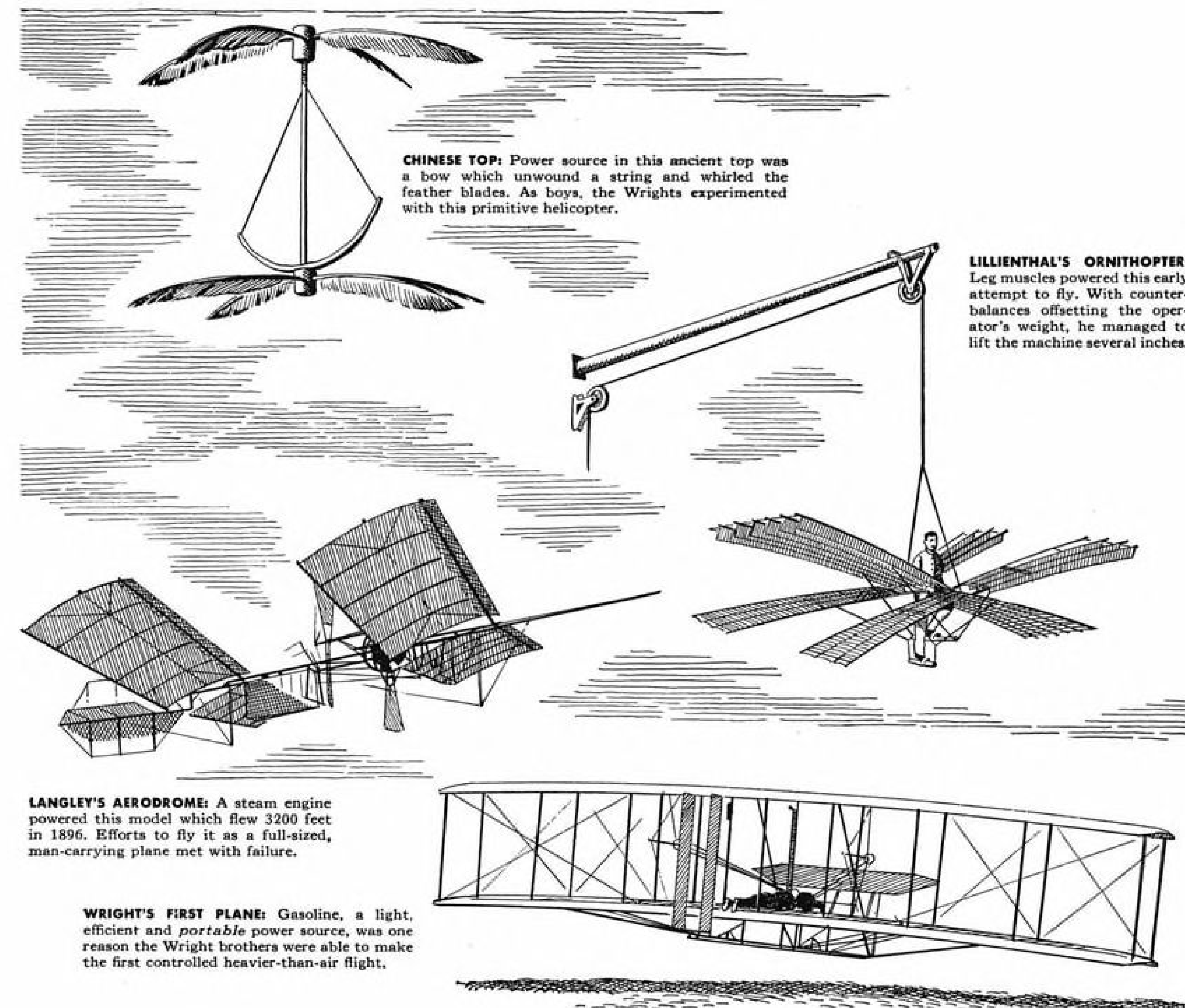
Coming more than a year after the government announced its new policy, this shows a considerable lack of enthusiasm. —NMCK



Japan Air Lines Flies to U.S.

Japan Air Lines officers and Japanese government officials disembark from JAL's flagship, City of Tokyo, in San Francisco after a trial trans-Pacific flight preparatory to open-

ing twice-weekly service early in February. The flight marked the first time the Japanese have flown passengers to the U. S. JAL hopes to operate 40 transocean-type airliners.



LANGLEY'S AERODROME: A steam engine powered this model which flew 3200 feet in 1896. Efforts to fly it as a full-sized, man-carrying plane met with failure.

WRIGHT'S FIRST PLANE: Gasoline, a light, efficient and portable power source, was one reason the Wright brothers were able to make the first controlled heavier-than-air flight.

The Power to Fly

AMONG popular misconceptions is the idea that the Wrights built a sort of box kite, added an engine—and flew. Actually, their success followed one of the most patient and original research programs ever undertaken.

From wind tunnel and glider studies they learned the basic aerodynamic laws which led to powered flight. Their thorough knowledge of earlier power sources—from rubber-band plane through attempts at using steam—showed them the key to success lay in the light, efficient internal combustion engine and its light, efficient source of energy, gasoline. For successful flight they needed the power to fly.

The combination of an aerodynamically correct plane, internal combustion engine and gasoline—first put together by the Wrights—was fundamental to the development of powered flight. Fifty years of progress in powered flight have come through research in each of these fields.

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1919—Shell begins the pioneer research which proves anti-knock superiority of cracked gasolines, formerly believed inferior.

1927—Evaluations of fuel performance, with the first variable-compression-ratio engine, mark the beginning of Shell's Wood River engine laboratory, later to become one of the nation's largest engine-testing centers.

1934—Shell delivers 100-octane gasoline to Army Air Corps in first commercial quantities at 71¢ a gallon. Its previous cost had been \$25.

1942—Cumene, fuel additive developed by Shell and made available to entire industry, results in 20% increase in production of 100-octane gasoline during first 2 years of World War II.

1949—Shell develops the additive, TCP, to increase the efficiency of military aircraft engines by counteracting the effect of metallic deposits.

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CAB ORDERS

(Nov. 27-Dec. 4)

GRANTED:

Pioneer Air Lines temporary subsidy and mail-rate increase of \$365,062, to \$1,502,439, a year from Oct. 12, 1953, forward.

Trans-Texas Airways temporary subsidy and mail-rate increase of \$157,071, to \$2,637,377, a year from July 1, 1953, forward.

Central Airlines temporary subsidy and mail-rate increase of \$148,000 from Sept. 15, 1949, to Aug. 31, 1953—a total of \$4,909,600 for the back period. Future temporary rate is proposed at \$1,677,955 a year from Sept. 1, 1953, forward.

Tulsa, Okla., chamber of commerce leave to intervene in Fayetteville, Ark., service case.

Stewart Air Service exemption to make one to four roundtrips a month between Los Angeles, and Las Cruces, Mexico, under contract to the Sportsmen's Travel Club.

Military charter rights on plane-load lots extended for list of airlines to Jan. 15, unless superceded by subsequent CAB order.

CONSOLIDATED:

Compania Cubana de Aviacion's request that CAB eliminate conditions in its foreign air carrier permit requiring severance of sales cooperation with Pan American World Airways. CAB consolidates this with the application for approval of interlocking relationships of Erwin Balluder, Cubana, PAA and certain companies affiliated with Pan American.

EXPANDED INVESTIGATION OF:

Atlas Corp., Northeast Airlines, Airfleets, Inc., and Convair sale of NEA planes without CAB approval, transferring profit thereon to a non-airline firm. The Board questions whether Airfleets' dealings are equivalent to acts by Atlas and/or Convair, which allegedly controlled Airfleets.

Charleston, W. Va., and Columbus, Ohio, service to include parts of Lake Central Airlines application.

APPROVED:

Pan American World Airways vice president Humphrey Toomey's interlocking relationship as a director of Panair do Brasil.

SUSPENDED:

Argonaut Airways and Quaker City Airways applications for reduced fares on certain routes.

Nonskeds Win Right To Fly First-Class Mail

Airfreight and nonscheduled airlines have won a legal battle that puts them in position to bid for a share of first-class mail the Post Office Department ships by air.

Civil Aeronautics Board can grant temporary rights to any carrier to fly mail, CAB rules in a three-two decision. The Board retains the right to set

Safety Record

The 1953 safety record of U. S. scheduled airlines through November shows an improvement of about 100% over the former best mark set during the previous 12-month period.

For the 12 months ended Nov. 30, the airlines carried 31,569,943 persons 18,425,381,000 passenger-miles. Passenger fatalities totaled 88 for local, territorial, trunkline and international services.

Fatality rate per 100 million passenger-miles in this latest 12-month record is 0.48, compared with 0.90 per the period ended Nov. 30, 1952. For domestic operators the 1953 rate is 0.58; for 1952 it was 0.35. For international, the rate is 0.06 for 1953 and 3.00 for 1952.

rate of compensation—even for a non-certificated carrier.

Postmaster General Arthur Summerfield told Congress last summer that he planned to ask a law change to permit airmail contracting at rates other than those set by CAB, but he has not formally requested such legislation.

► **Legal Ruling Only**—Majority opinion of CAB says: "This decision will deal only with the legal question of whether authority to perform mail service may be granted by the Board to a person who does not hold any certificate authorizing such transportation. . . ." Members Harman Denny, Josh Lee and Joseph Adams are the majority.

Chairman Oswald Ryan and Chan Gurney dissent. They say: "There is no way to square the majority's action with the carefully formulated Civil Aeronautics Act, which Congress adopted in 1938 and which places definite limitations on the Civil Aeronautics Board in the administration of that statute."

► **Post Office Move**—Summerfield had urged the Board majority to vote as it did on the legal question of whether CAB has the power to exempt an airline that is not certificated to carry mail in the public interest.

Big question now is whether the Postmaster General will follow up by asking the Board to grant such rights to one or more non-certificated carriers. Until then, Washington observers do not expect CAB to act upon carriers' requests for exemption to participate in the Post Office program of moving first-class mail by air between certain cities (AVIATION WEEK Sept. 28, p. 20). If Summerfield asks CAB to grant such rights to some airlines, the decision of the Board is expected to be close.

► **Carrier Comment**—Flying Tiger Line president Robert Prescott says: "If the CAB follows through soon with grants of exemption for our carriers to take part in this experiment, as we believe they will, a tremendous added capacity will be available to the Post Office Department for conduct of its essentially new service. This would be of special public benefit in the Christmas rush."

Riddle Airlines vice president, Philip Mann, hails CAB's legal opinion and says his carrier "has had under study for some months the problem of specially designed air transport interiors which will permit enroute sorting of mail." Meanwhile, a Post Office Department spokesman says the four airlines certificated on the experimental airlift probably will handle all or nearly all the preferential first-class mail shipped during the Christmas season on the New York-Chicago and Washington-Chicago routes.

SHORTLINES

► **Allegheny Airlines** has developed a system to notify passengers before they depart from their home, office or hotel for the airport when flights are canceled.

► **Argentine Airlines** (Aerolineas Argentinas) has been authorized to operate weekly passenger, cargo and mail service between Buenos Aires and Lima, with calls in Bolivia.

► **British Overseas Airways Corp.** will begin Comet service from London to Nairobi, East Africa, in April, the fifth BOAC route served de Havilland's jet transports.

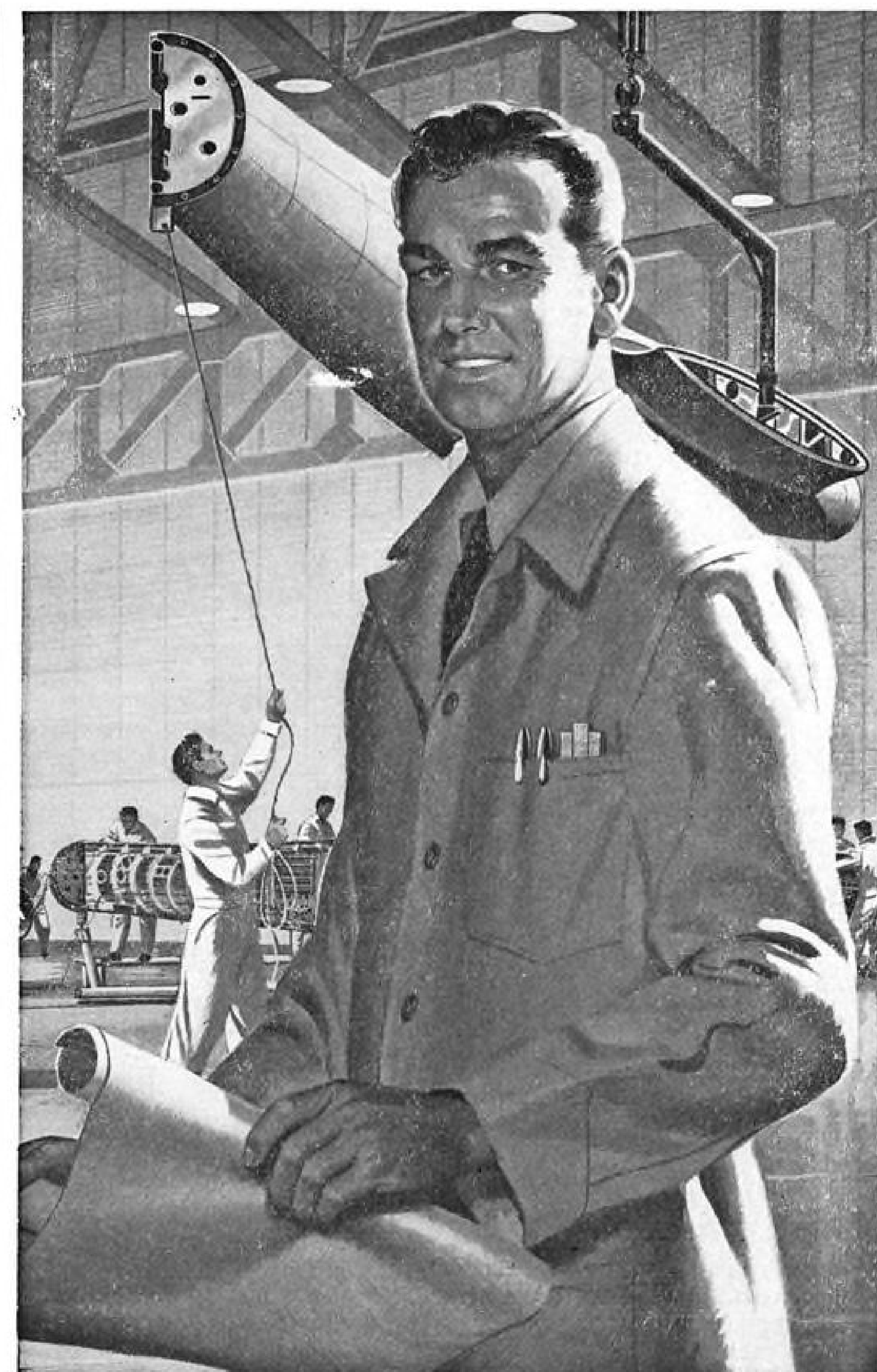
► **Hong Kong's Kai Tak Airport** reports an increase of 22.7% in traffic from July to September over the previous quarter.

► **International Civil Aviation Organization's** council will meet at Strasbourg, France, next spring to discuss coordination of European Air Transport.

► **Pan American World Airways** has replaced DC-4s with Constellations on Houston-New Orleans-Panama tourist flights.

► **Philippine Air Lines** has been granted traffic rights between Beirut, Lebanon, and London.

► **Scandinavian Airlines System** has concluded an agreement with a steamship line to provide Africa-bound passengers with air-sea travel at roundtrip discounts.



Northrop's Prime Equation

Northrop Aircraft production specialists initiate and install time-saving, cost-saving methods. The "half-shell" assembly technique, illustrated above, permits free installation of equipment in Scorpion F-89 interceptors now in production. Equations are used to solve problems. At Northrop Aircraft, the prime equation combines teams of administrators, outstanding scientists, and production specialists with modern industrial and research facilities. The combination efficiently converts imagination and knowledge into actual matériel of advanced design and incalculable value.



NORTHROP AIRCRAFT, INC.

HAWTHORNE, CALIFORNIA
Pioneer Builders of Night and All Weather Fighters

COCKPIT VIEWPOINT

By Capt. R. C. Robson



50th Anniversary Lesson

By now the experts have praised so completely the memorable events of the first 50 years of aviation that there is little left to be said. About all one can do is to note proudly, respectfully and with appreciation the splendid deeds of the industry's pioneers over that half century.

Now, what about the next 50 years? In speeches and testimonials this year we have heard of coming jet and helicopter travel, of space flight, of warfare at thousands of miles per hour and much more. And no doubt these will come true in time.

► **Brilliance Lost**—But these are technological achievements and technology has never baffled our country long. Of more concern will be our philosophical achievements for the human mind, and its way of thinking is always the limiting factor in progress.

Obviously we have many fine thinkers—the record proves it. On the other hand there is considerable evidence today that much of our progress comes as a result of muddling along and comes in spite of us. Brilliance too often seems lost through over-specialization, or in bureaucratic pigeon-holes.

In my own segment of the industry, for instance, when we have mechanical trouble we rarely get a mechanic. We get a carburetor specialist, or a generator man, or a prop expert and so forth.

► **Thinkers Stifled**—While this type of process leads to fine technicians and great mechanical perfection, it does not necessarily produce well-rounded minds capable of formulating sensible, usable theories.

In our governmental agencies concerned with aviation—both civilian and military branches—the few fine thinkers are so bedeviled with the many drones, with the undoing of bureaucratic mistakes, in some instances with low salaries, as well as politicking for their own existence, that brilliance rarely shines through.

Some 30 or 40 (nobody knows exactly how many) committees which study aeronautical matters include some good thinkers, but obscure relationships between groups, lack of clear authority and indefinite scope of operations produce a haphazard system. Some items are over-committed. (There were 17 groups investigating airborne radar beacons! And how many worked on approach lights? Neither issue is completely dead yet.)

► **Flying the Mail**—Contrast these methods with the birth of that great aviation idea—instrument flying. If memory serves me correctly—and I'm not at all sure that it does—it was a former postmaster who, being irked with airmail delays back around 1924, sent a telegram to pilot Wesley L. Smith which read to the effect: "Disregard visibility, fly by compass."

This, especially from one outside the industry, was a startling bit of philosophy. So Smith (still active in aviation, incidentally), proceeded to have a ball bank indicator made by an old German glass blower in Cleveland, added a rate-of-turn gadget to it and shortly thereafter began the first instrument flying on the first radio range at Bellefonte, Pa.

► **Getting It Done**—Besides indicating the advantage of brilliant postmasters, we see here an example of the simplicity of genius. It wasn't necessary to have umpteen committee reports or conferences between numerous departments. These people simply went ahead and got things done.

So if there is one lesson we may take from our 50th birthday, it is the need for strong, clear thinking leaders who are willing to "disregard visibility" and go ahead with the job. Of such stuff progress is made.

(Editor's Note: AVIATION WEEK gives Capt. Robson an opportunity to express himself freely in this column. Comments from readers on his opinions are welcome.)

AVIATION CALENDAR

Dec. 14-15—Flight Safety Foundation, air safety seminar, Arrowhead Springs Hotel, San Bernardino, Calif.

Dec. 14-17—50th Anniversary Celebration of Aviation, Kitty Hawk, N. C. Program: Private Fliers and Aviation Pioneers' Day, Dec. 14; Aviation Industries Day, Dec. 15; Defense Day, Dec. 16; Anniversary Day, Dec. 17.

Dec. 17—Seventeenth Wright Brothers Lecture, U. S. Chamber of Commerce building, Washington, D. C. Aero Club Wright Memorial Dinner, Hotel Statler.

Dec. 17—Royal Aero Club, dinner commemorating 50th anniversary of powered flight, Dorchester Hotel, London.

Jan. 8-11—Florida Air Pilots Assn., 11th annual air cruise, Miami, Fla.

Jan. 10-12—Institute of Surplus Dealers, trade show and convention, Madison Square Garden, New York.

Jan. 12-18—Society of Automotive Engineers, annual meeting, Sheraton-Cadillac and Statler Hotels, Detroit.

Jan. 18-22—American Institute of Electrical Engineers, winter meeting, Hotel Statler, New York.

Jan. 20-22—Operations Research in Production and Inventory Control, Case Institute of Technology, Cleveland. Speakers include Paul Stillson of Lockheed Aircraft Corp.'s Military Operations Research Division.

Jan. 25-28—Plant Maintenance & Engineering Show, International Amphitheater, Chicago. Conference will be held concurrently at the Hotel Conrad Hilton.

Jan. 25-29—Institute of the Aeronautical Sciences, 22nd annual meeting, Hotel Astor, New York. Honors Night Dinner Jan. 25.

Feb. 3-5—Society of Plastics Industry, ninth annual division conference on reinforced plastics, Edgewater Beach Hotel, Chicago.

Feb. 4—Instrument Society of America, ninth annual regional conference, Hotel Statler, New York. Aviation section's papers will include: Afterburner Thrust Measurement in Flight.

Feb. 18-19—Institute of Radio Engineers and American Institute of Electrical Engineers, transistor circuits conference, Philadelphia.

Feb. 21-23—Third annual Texas Agricultural Aviation Conference, Texas A&M College, College Station, Tex.

Mar. 22-25—Institute of Radio Engineers, national convention, Waldorf Astoria Hotel and Kingsbridge Armory, New York.

Apr. 5-6—Society of the Plastics Industry (Canada), Inc., 12th annual conference, Mount Royal Hotel, Montreal.

Apr. 22-23—American Institute of Electrical Engineers, conference on feedback control, Claridge Hotel, Atlantic City, N. J.

Apr. 29-30—American Society of Tool Engineers, 10th biennial industrial exposition, Convention Center, Philadelphia.

May 4-6—1954 Electronic Components Symposium, Department of Interior auditorium, Washington, D. C.

May 5-7—Third International Aviation Trade Show, sponsored by Aircraft Trade Shows, Inc., 71st Regiment Armory, New York.

May 17-20—Basic Materials Exposition and Conference, International Amphitheater, Chicago.

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EDITORIAL

Big Problems for Business Flying

Although the postwar boom in executive or business aircraft operations is still flourishing, danger signals are flying, and few of us are heeding.

Maximum growth is hampered by an acute lack of basic information which, if it continues, can stunt the growth of this vital field of aviation indefinitely. There is still time for action, but not much.

Some widely accepted statistics about business flying are misleading or unfounded, yet these are used—for lack of better data—as basic information. All data disseminated on this subject must be analyzed carefully.

Unless business flying is studied and understood properly and completely it must stand the risk of an untimely and embarrassing discovery that it is not quite everything its promotionally minded enthusiasts have painted it.

These are harsh words from an aviation magazine that believes there is a big future for this kind of flying. But harsh words are needed at this time, or the technical and economic progress of aviation will pass up executive flying.

If accurate and adequate information, properly monitored and assimilated, is not sought soon, there can be little understanding of objectives by both operators and manufacturers of business aircraft. This lack of information is felt especially by the manufacturers.

In fairness to makers of many planes in current use, it must be said that by no means are all users dissatisfied. Scores of small aircraft are meeting their owners' needs. But pilots and owners of business planes generally are becoming more insistent in their pleas for production of at least one multi-engine type designed 100% for the business or executive market. They claim a guaranteed market of at least 300 planes.

At this point, however, the unanimity ends, according to Frank Shea, Jr., one of AVIATION WEEK's editors, who has been assigned to make a continuing study of the business flying field. Shea reports that ideas are many and diverse as to the best possible aircraft. Often, thinking appears to be based more on individual desires than on practical requirements. Part of this is chargeable, again, to lack of basic information on which to build valid requirements.

Certainly, there was no unanimity expressed by the pilots attending the recent annual meeting of the National Business Aircraft Assn., and one interested member signified his willingness to spearhead a separate inquiry if the association does not take adequate action to tell manufacturers the needs of corporation flying.

In addition to the lack of data, a big block to hammering out this new design is the absence of a common medium for exchanging ideas and information. Without such organization of individual requirements, Shea considers it doubtful that this new business plane will ever get as far as the drawing board, and the heavier and speedier elements of the business aircraft fleet will continue to comprise modified obsolescent ships that become relatively slower every year as new, faster and

more comfortable airliners enter the picture. And then come the jet transports!

With no other outlook than continued use of remodeled vehicles—maintained by spare parts from junk dealers, perhaps—business flying can look forward to nothing more than mediocre growth in the long term. Like the air cargo field, it must have an efficient vehicle to capitalize on the growth that is waiting around the corner. Year by year, meanwhile, new passenger airliners will push cruising speeds up to 400 and 500 mph. or better.

With these new airline speeds, improved comfort, more frequent schedules, how many business firms will decide to buy or keep 200-mph. company planes? The answer is obvious.

If the business flying fraternity fails to see that the vacuum is filled, how can we blame the airlines if they overlook this business opportunity?

The air carriers have experienced management, flight personnel, communications systems, operations departments, maintenance facilities, sales departments, experienced know-how, not to forget engineering and financing abilities, which could bring about intelligently designed executive ships that could be leased or contracted.

The business flying field has some long-range thinking to do from here on if it is to grow as rapidly as the rest of aviation. Otherwise it is doomed to secondary aircraft and a secondary future until the right group, with business acumen and sound basic information, takes over.

Unusual Talk About the Weather

Everybody in aviation talks about the Weather Bureau but nobody has ever seemed to do anything about it.

Accuracy vs. inaccuracy of forecasts is always a top subject for debate and grousing among pilots.

The last person most of us would expect to have made public confession of a slipup in a forecast would be the chief of the bureau himself. In the past, too many replies from the bureau—if any were forthcoming at all—have been alibis.

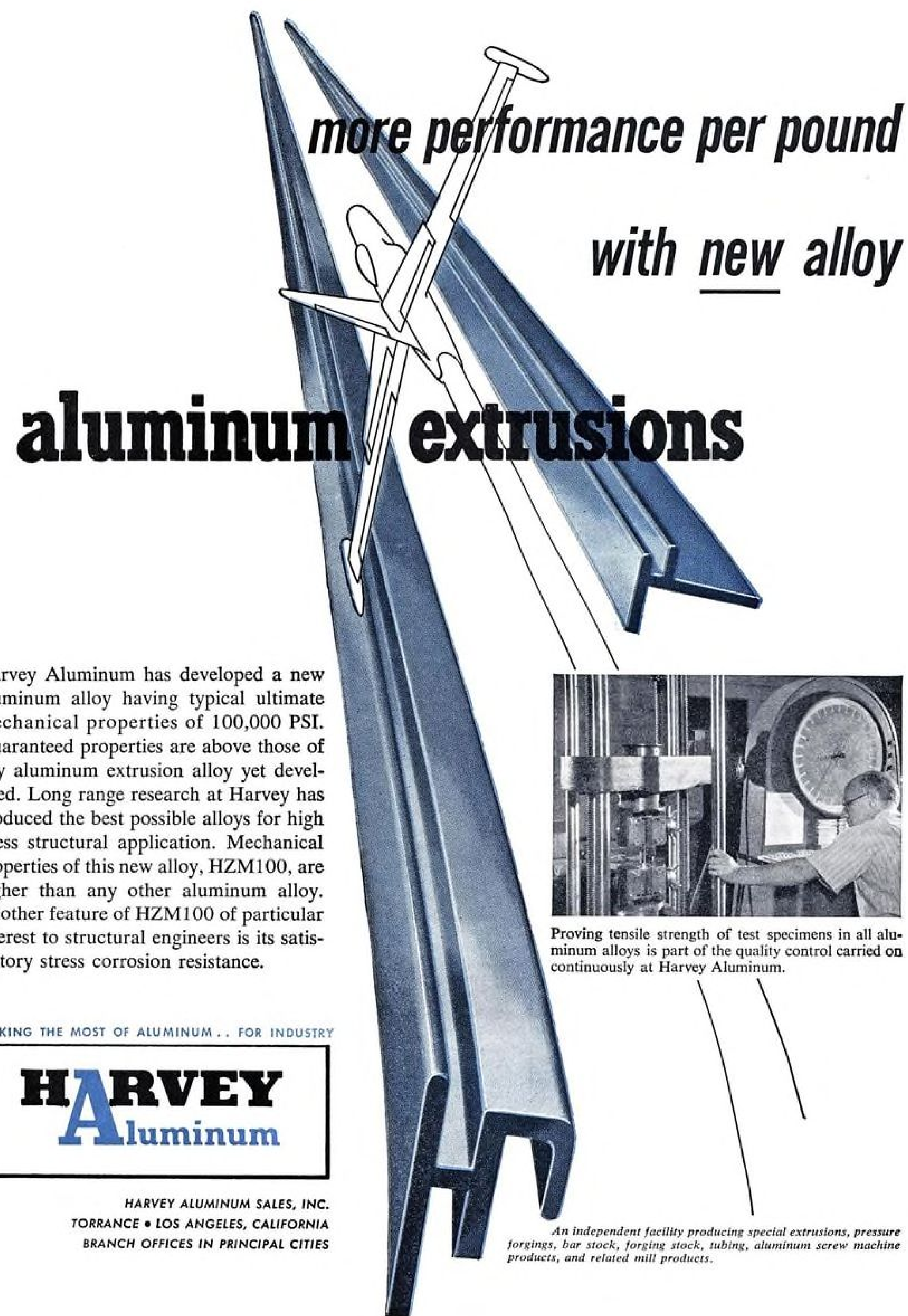
Yet Dr. F. W. Reichelderfer told the papers frankly that the violent snow and wind storm that hit the New York City area, closing airports, had taken his people by surprise. The original forecast for that day had been all right only "if you didn't look at the window," he said candidly.

Furthermore, he added, he intended to find out why the bureau didn't see that storm coming.

A week later, the investigation was still under way. "We expect to learn a lot from it," the doctor said.

Most pilots can remember many misfires on forecasts—some that wound up dangerous to life and limb. But we don't recall any other bureau spokesman anywhere who frankly and publicly refused to cover up for a failure. Dr. Reichelderfer deserves congratulations. We hope the lessons of the investigation are made public, and that remedial action is forthcoming.

—Robert H. Wood



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An Allison Technical School instructor leading class discussion on the J35 Turbo-Jet engine.

Training the men behind the men who fly the jets



Around the world there is an ever-growing fraternity of mechanics, engineers and instructors who have earned the title, "Allison Technical School Graduate." More than 10,000 members of the Air Force, Navy and Marines have received diplomas from the Allison Technical School, in Indianapolis.

But the activities of the Allison Technical School do not stop with the classes at Indianapolis. In addition, Allison instructors from the school go out all over the world to set up classrooms at air bases and aircraft manufacturing plants to teach thousands of other technicians the proper methods of operating and maintaining Allison turbine engines. These men include pilots, flight

engineers and technicians from aircraft builders and our own organization.

Students selected by the Armed Forces are usually engineering officers or enlisted personnel with long years of service. They are sent to the school for intensive 4-week courses which involve long hours in the classrooms and extra hours of homework every evening. Skilled Allison instructors with many years of varied experience make use of modern teaching aids including cutaways of J33 and J35 Turbo-Jet engines, the T38 and T40 Turbo-Prop engines.

Yes, thousands of the men behind the men who fly the jets proudly wear the badge, "Allison Technical School Graduate."



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World's most experienced designer and builder of aircraft turbine engines—J35 and J71 Axial, J33 Centrifugal Turbo-Jet engines, T38 and T40 Turbo-Prop engines