

AVIATION WEEK

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APRIL 5, 1954

50 CENTS



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"SUPER CONSTELLATION" is indeed the right name for this beauty—the latest in the famed Lockheed Constellation series. Backed by the years of experience of the former "Connies," the new "Super" will give its passengers new comfort and luxury.

Important to the airline will be her economical, trouble-free operation. With this in mind Northwest Orient Airlines specified the Honeywell Electronic Fuel Measurement System for installation in their Supers.

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Fuel Measurement System is going into every make of U.S. commercial transport plane now in production.

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Aviation Week

April 5, 1954

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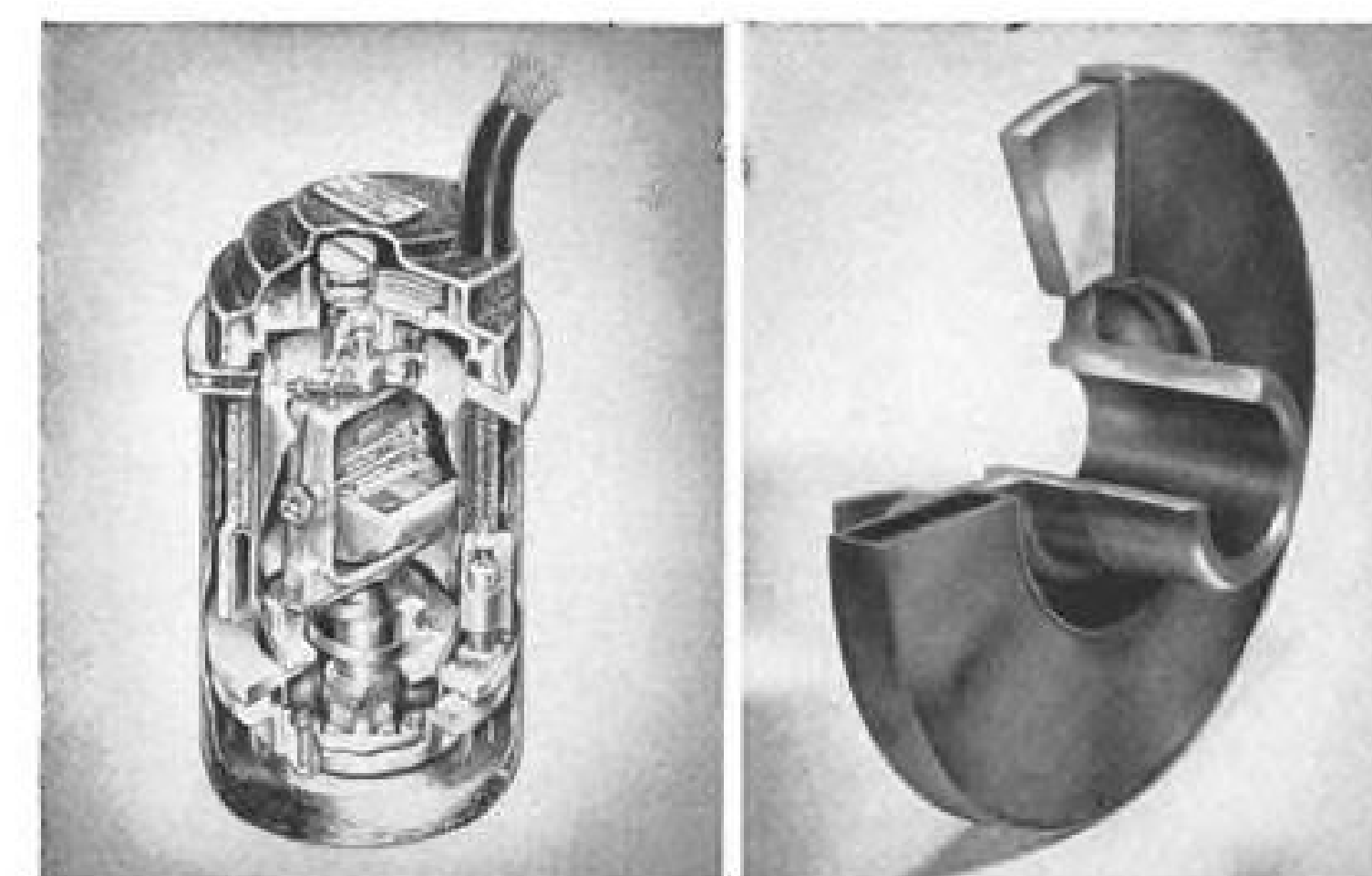
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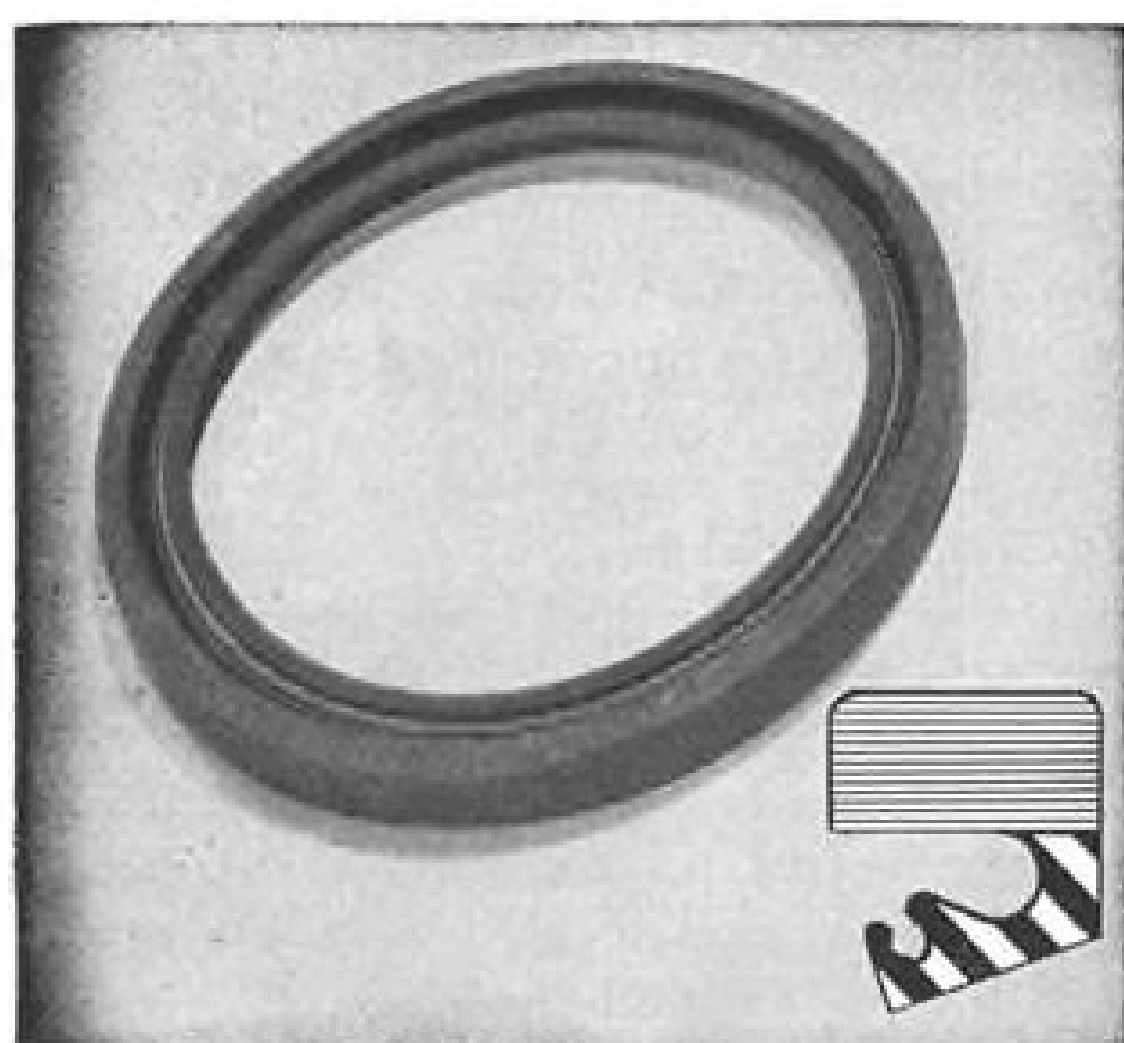
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IN CANADA: Mail to Canadian General Electric Company, Ltd., Toronto

J-M Clipper Seals fly with the Sikorsky HO5S helicopter...



Clipper Seal being installed in the intermediate gear box of the Sikorsky HO5S helicopter to seal oil in, keep abrasives out.



Photograph and cross section of Type LPD Clipper Seal. This is just one of numerous styles available to solve tough sealing problems.

...seal oil in, keep abrasives out, at critical locations

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PRODUCTS for the AVIATION INDUSTRY

Domestic

USAF's experimental Convair XF-92A and two Northrop X-4s have completed highspeed research work at Edwards AFB, Calif., and are being retired for use as static displays. The XF-92A and one X-4 will be shipped to the Air Force Technical Museum at Wright-Patterson AFB, Dayton; the second X-4 will go to the Air University at Maxwell AFB, Ala.

Northrop Aircraft has received a \$155-million Air Force contract for production of additional F-89 all-weather interceptors, now rolling out of the plane builder's Hawthorne, Calif., factory. The new contract increases Northrop's backlog to a record \$557 million, schedules deliveries of the rocket-armed Scorpion through August 1956.

American Airlines DC-7s broke the transcontinental speed record for commercial transports twice in less than 24 hr. last week, setting an official Los Angeles-New York mark of 6 hr. 10 min. Mar. 29 and bettering that speed the following day with an unofficial time of 5 hr. 51 min. The official record was timed by National Aeronautic Assn. Previous mark: 6 hr. 17 min. set in 1949 by an Eastern Air Lines Constellation.

Air transportation tax was reduced from 15% to 10% last week when President Eisenhower signed the excise tax bill (AVIATION WEEK Mar. 29, p. 12). The measure also continues the two-cent aviation gas levy, previously scheduled to be cut to one and a half cents Apr. 1.

Mohawk Airlines has purchased a Sikorsky S-55 helicopter, will begin operating the eight-passenger copter on scheduled routes early this summer. Cost of the S-55: more than \$150,000.

Chinese Nationalist government on Formosa will receive assistance from Civil Aeronautics Administration in establishing an airways system. A CAA team, first assigned to the Far East under the Foreign Operations Administration's program, will advise the Chinese on site selection, installation and testing of three VHF omnidirectional radio ranges and on training of personnel to operate traffic control and aeronautical communication along airways routes—still to be established.

United Air Lines has taken delivery on the first of 25 Douglas DC-7s on order, plans to begin operating the



B-47's New Takeoff Power

Trailing clouds of smoke, a Boeing Stratojet medium bomber takes off, using 33 externally fitted rocket units delivering 1,000 lb. of thrust each to supplement the power of its six General Electric J47 turbojets. Power of Stratojet's J47s also has been increased with use of water injection to improve takeoff performance. Earlier B-47s are fitted with 18 1,000-lb.-thrust rocket units inside the fuselage. The new powerplant arrangement, fitted to B-47Es, has permitted an increase of 15,000 lb. in takeoff weight for a maximum gross weight of 200,000 lb. The new rocket assist units are mounted on a "horseshollar" fitting and can be jettisoned after use instead of becoming dead weight as was the case with earlier internal use. The compartment space formerly given over to internal rocket mounting now can be used to carry additional equipment.

Wright Turbo Compound-powered transports June 1 on nonstop transcontinental flights. Cost of UAL's DC-7 fleet: \$58 million.

D. Walter Swan, assistant to the president of United Air Lines, has taken a leave of absence from UAL to accept an appointment as Deputy Assistant Secretary for Public Affairs in the Defense Department.

Air Traffic Digest has been purchased by American Aviation Publications, was incorporated into the Washington, D. C., company's Traffic News Apr. 1.

Financial

Trans World Airlines reports a net income for 1953 of \$5,064,392, a decline of \$2,596,196 from 1952. Gross revenues climbed to a record \$187,220,806. TWA says difference in net incomes principally was caused by an increase in depreciation charges of nearly \$6.5 million on new aircraft.

Continental Air Lines' net income for 1953, boosted by the sales of four Convair 240s, increased 91% to \$1,129,771. Total operating revenues were \$11,079,069, compared with \$10,592,262 for 1952.

Republic Aviation Corp., Farmingdale, N. Y., reports a net income for 1953 of \$8,314,301 from sales totaling \$411,810,885, compared with 1952's \$8,096,001 net and \$412,235,008 in sales. Backlog Dec. 31: more than \$1 billion.

Kaman Aircraft Corp., Bloomfield, Conn., had net earnings of \$246,063 during 1953, a drop of \$39,210 from the previous year's \$246,063. Sales increased to \$11,646,236, compared with 1952's \$7,277,322. Backlog: \$30 million.

Trans Caribbean Airways has declared a five-cent dividend on Class A stock, payable Apr. 15 to shareholders of record Mar. 31.

International

Aeronaves de Mexico DC-3 crashed and burned in the Salinas Mountains Mar. 26, seconds after the transport was waved off from landing in a dust storm at Monterey. All 18 persons aboard were killed.

Fairey Gyrodyne research copter, Britain's first jet driven rotary-wing aircraft, has completed initial flight tests. The Gyrodyne is powered by an Alvis Leonides engine that drives compressors, which force air through twin-rotor blades and out the tips.

Auster A.O.P. Mk. 9, new British liaison aircraft, is scheduled to make its first flight in the near future. The three-place plane is powered by a 180-hp. Blackburn Bombardier engine, already has been ordered in quantity by the British Army.

India's nationalized air transport system has ordered five Lockheed Super Constellations and two de Havilland Comet 3s. First two Super Connie deliveries are expected by June.

New heart for servo systems



Airborne's saturable reactor

This toroid, produced in our plant as part of a magnetic amplifier, was developed by our Control Engineering group. It is typical of the custom design work they do.

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HILLSIDE 5, NEW JERSEY

The Aviation Week

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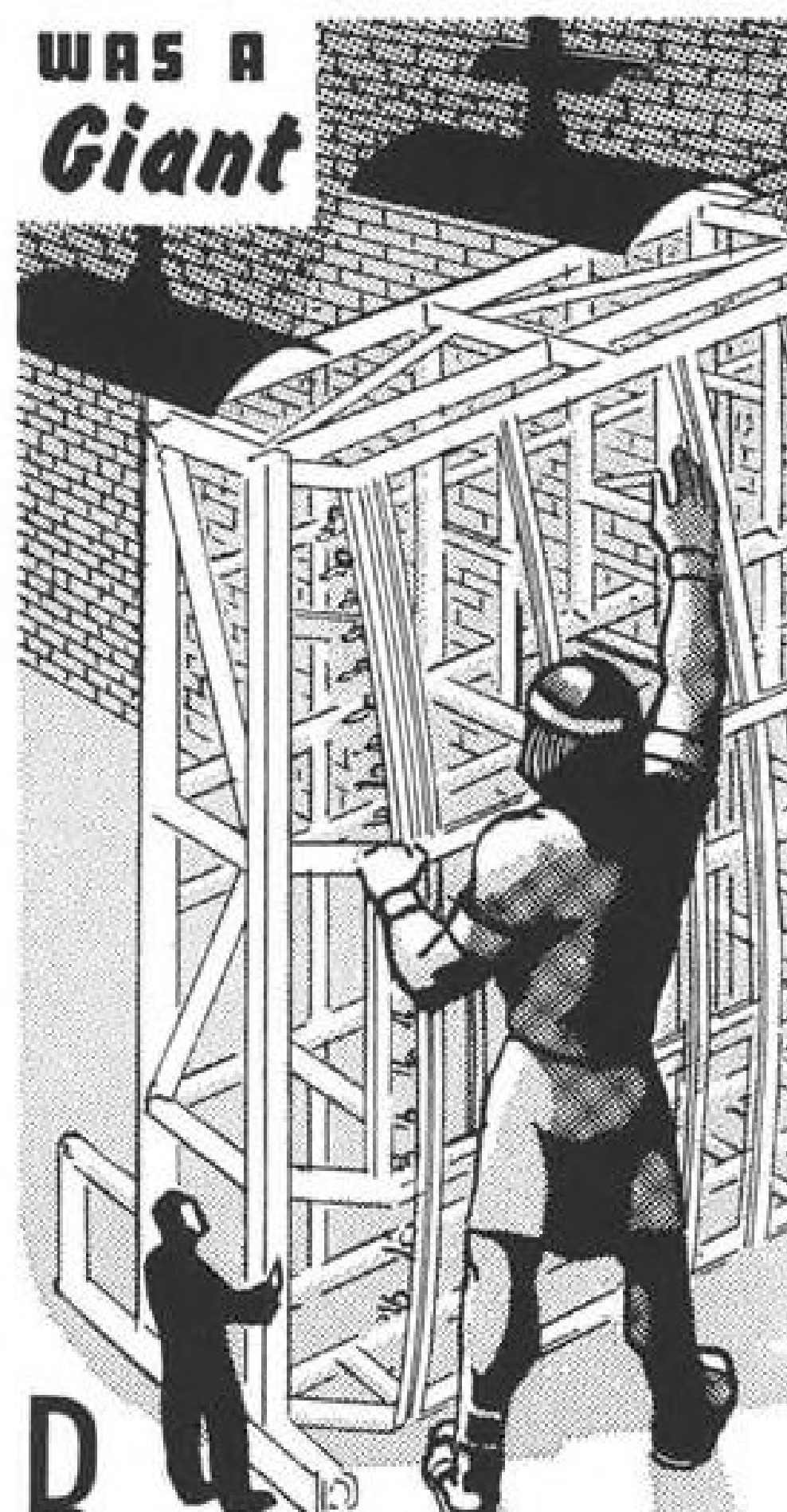
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WHO'S WHERE

In the Front Office

Lawrence M. Limbach is new vice president-manufacturing for Ryan Aeronautical Co., San Diego. Donald S. Perley has become controller.

Elwood K. Harry has been elected executive vice president of Aircraft Supplies, Inc., Nutley, N. J.

Keith Baker has been promoted by Chance Vought Aircraft, Inc., to assistant to the president for public relations. John Innes has been appointed public relations manager for the Dallas aircraft builder.

Changes

Carl L. Sadler is manager of the new Aviation Division set up by Sundstrand Machine Tool Co. at Rockford, Ill., by splitting its former Hydraulic Division into two separate units. The new Aviation Division contracts manager is P. A. Anderson.

T. N. Baker, onetime manager of General Motors Corp.'s Allison-Aeroproducts office in San Diego, has been appointed general sales manager for Consolidated Tool & Products Co., Los Angeles.

Charles J. Burns has been promoted to assistant treasurer of Revere Corporation of America, Wallingford, Conn.

Robert J. Wright has become foreign operations manager for AiResearch Manufacturing Co., Los Angeles, replacing James M. Gillespie, who resigned.

Harold H. Georgens is new eastern regional manager for Avien, Woodside, N. Y.

Richard M. Oliver has been appointed staff representative for Aircraft Industries Assn.'s materials, patent, inspection and preservation and packaging committees.

Arthur A. Conrad, Jr., has joined the Detroit technical section of International Nickel's Development & Research Division.

Robert L. Watts has joined Bell Aircraft Corp., Buffalo, N. Y., as a test pilot for the flight research department. Gifford Bull, department engineer, has been assigned as part time engineering test pilot.

Frank A. Buerkle has been appointed aeronautical engineer for hydraulic actuators and devices produced by Jacobs Aircraft Engine Co., Pottstown, Pa.

Honors and Elections

Dr. R. M. Soria, director of research at American Phenolic Corp., has been elected president of the 1954 National Electronics Conference, to be held Oct. 4-6 in Chicago.

Lynn Bollinger, board chairman and chief executive of Helio Aircraft Corp., has been appointed a consultant to the Small Business Administration.

G. S. Kitchen, public relations manager for Frontier Airlines, has been elected chairman of the Air Express Traffic Committee. Richard Gilbert of Eastern Air Lines is new vice chairman.

Raymond O. Fredette, aeronautical engineer for Cook Research Laboratories, has won a meritorious civilian award for scientific accomplishments in ballistics and aerodynamics in the Bureau of Ordnance's Research Division.

INDUSTRY OBSERVER

► Boeing has developed a new approach to atomic power for aircraft aimed at combining high speed with long range. USAF is extremely interested.

► English Electric F-23 supersonic delta interceptor will be powered by two later versions of the Armstrong Siddeley Sapphire turbojet equipped with afterburners. Company hopes to get Mach 1.3 from the current airframe-engine combination.

► Aircraft and engine technical committees of the Aircraft Industries Assn. are making a critical evaluation for USAF of the increased airframe and engine performance possible from the use of more titanium.

► Glenn L. Martin Co. has developed an electronic warning system for the Army Signal Corps and now is putting the system into production.

► Cornell Aeronautical Laboratory at Buffalo received \$2.5 million in new research contracts during the past four months, bringing total value of its current contracts to \$34 million.

► Piasecki Helicopter Corp. is incorporating 27 minor modifications in its H-21, grounded last month by USAF. Tests of the modified aircraft will start about May 1 at Wright Air Development Center in Dayton, Ohio.

► Two metal helicopter blades of new design have been developed and successfully tested by Piasecki Helicopter Corp. One blade, with an 82-ft. diameter, is fabricated of aluminum using honeycomb construction technique. Other blade, with a 42-ft. diameter, has a steel D-spar with the remainder constructed of aluminum. It has passed its 100-hr. test.

► Navy is considering a switch in color scheme for its combat aircraft from their present dark blue hue to gray. Flying boats and patrol planes would remain blue and trainers, transports and utility aircraft would be marked according to their mission. Navy officials have been discussing the proposed changes with paint manufacturers.

► Douglas Aircraft is trying to interest USAF in a turboprop-powered tanker version of the C-124 to meet the growing military requirement for a high-altitude, highspeed, large-capacity aerial tanker.

► Convair is investigating the possibility of using British Napier Eland turboprops rated at 3,000 eshp. on its commercial version of the gas-turbine-powered Convair 340.

► Lockheed Aircraft Corp. is now using 11,570,000 sq. ft. of plant and office area. This is more than the entire airframe industry used prior to World War II.

► Curtiss Propellor Division is manufacturing arresting gear hooks for Navy carrier-based aircraft, gear boxes for jet engines and rotor hubs for helicopters, in addition to its standard line of propellers for piston and turboprop engines.

► Aircraft Industries Assn. has asked both NACA and Defense Department to operate the unitary windtunnels on a fee basis for industry on the ground that such a system will encourage economy and efficiency and provide for a proper accounting of development costs.

► Observers who have seen the mockup of Republic's upcoming radical F-103 say the new fighter's configuration will be an "eye-opener" when it is revealed. The aircraft has an incredibly long fuselage and "tiny" delta wings, they report. To be constructed mostly of titanium, the F-103 will be light for its size, it is said.

► Republic Aviation Corp. has rolled out its turboprop-powered F-84H sweptwing fighter. Industry observers say the plane probably will be taken to Edwards AFB, Calif., for flight testing. Craft features a "T"-tail with horizontal stabilizer mounted atop the vertical fin.

Critics Urge More Money for Airpower

- **Democrats charge proposed budget cramps Air Force, puts economy first and defense needs second.**
- **Symington questions possibility of reaching 137-wing goal with \$11.2 billion requested by Administration.**

By Katherine Johnsen

A vigorous drive to increase Air Force funds above the \$11.2 billion proposed in the Administration's fiscal 1955 budget is developing on Capitol Hill, as top Administration spokesmen hedge on the original claim that the "new look" puts all-out emphasis on air-atomic power.

The President's January budget statement, declaring the "new look" means "the full exploitation of modern airpower," and Secretary of State John Foster Dulles' elaboration that it relies "primarily" on air-atomic offensive power set off a surge of Democratic criticism against reducing the size of the Army.

But recent statements by President Eisenhower and the chairman of the Joint Chiefs of Staff, Adm. Arthur Radford, have spurred Air Force advocates to denounce the Administration's program for 137 USAF wings by 1957 as too little, too late.

► **Debate Showdown**—Democrats are attacking the defense budget on the grounds that it puts economy first and defense second and fails to provide adequately for either airpower or ground forces. The first major public showdown will be in three weeks when the budget is scheduled for debate on the House floor. The House Appropriations Committee is scheduled to report it out on Apr. 26.

Chief critics of the defense budget include:

- **Former USAF Secretary** Sen. Stuart Symington, who cites former Defense Secretary Robert Lovett's estimate of \$16 billion annually required to maintain a 143-wing USAF.

Symington says: "Even assuming that a reduction from 143 to 137 wings calls for some trimming of the \$16-billion figure, the gap between that budget level and the \$11.2-billion figure in the budget request now coming before us is far too great for any one to feel comfortable."

- **Rep. George Mahon**, ranking Democrat on the House Military Appropriations Subcommittee, who publicly op-

posed the Administration's plan to cut back the level of USAF research and development effort from \$532 million this year to \$431 million in fiscal 1955.

- **Rep. Samuel Yorty**, who declares: "Why don't they admit that while talking about emphasis on airpower, they are cutting Air Force funds for aircraft procurement from \$3.5 billion for this year to \$2.7 billion for fiscal 1955."

Press statements by Sen. Leverett Saltonstall, chairman of the Senate Armed Services Committee, on the adequacy of the continental defense program were challenged by Symington, a member of the committee.

Saltonstall said, after a committee briefing by Robert Sprague, Massachusetts electronics manufacturer appointed to make an air defense survey, that "the specific programs now underway combine to constitute a sound overall continental defense program" and that "the measures now underway and planned for the future should, together with our offensive forces, provide an effective defense for the U. S. commensurate with the threat."

Symington says he does not consider "the statements justified by the facts and opinions presented at the briefing."

► **Figures vs. Forces**—Demands for a new look at the "new look" are mounting. Symington urges that the Armed Services Committee promptly start a thorough evaluation. He points out that in the Appropriations Committee, which handles the defense budget, "there is much opportunity to consider figures, less opportunity to consider forces."

Symington also recommends consideration of establishment of an executive commission, such as the 1947 President's Air Policy Commission headed by Thomas Finletter, and a congressional commission, similar to the 1947 Aviation Policy Board headed by former Sen. Owen Brewster.

"I understand there has been . . . failure . . . to set up an overall airpower policy in this Administration through the current Air Coordinating Committee," he says.

For membership on the executive group, he suggests: Finletter; John McCone, vice chairman of the Finletter Commission; Robert Sprague, president of Sprague Electric Co.; Roger Kyes, deputy Defense Secretary; elder statesman Bernard Baruch, who has backed a strong mobilization program; and Robert Lovett, former Secretary of Defense.

Rep. Carl Hinshaw, second-ranking Republican on House Commerce Committee and vice chairman of the old Aviation Policy Board, supports re-establishment of such a board to evaluate the status of airpower. Hinshaw will not urge it this year in view of the adjournment of Congress in a few months and the fall elections.

"It would take six months to get legislation authorizing the board enacted," Hinshaw says. "There isn't time this year, but I think we should set up such a board next year."

► **Obligation Rate**—Symington criticizes the Administration for failing to obligate USAF aircraft procurement funds and stretching out the attainment of a 137-wing force to 1957. With \$6 billion available for new aircraft procurement between July of last year and this July, he points out "only one-tenth of one billion has been obligated."

"To hear the Department of Defense talk about it," he says, "one would think a carryover was a very good thing. They refer to carryover funds as though they were money that has been 'saved' and therefore 'still in the bank' . . . But what is so commendable about a defense agency not doing what we of the Congress were previously told by the same agency must be done, in a certain time period, for the security of our nation. . . ."

"The simple answer to the abnormally large carryovers lies in the two year postponement of our airpower buildup, from 1955 to 1957, that has taken place under the so-called 'new look'. . . . By thus putting off the target date for two years, it has been possible to stretch out the process of obligating the procurement funds appropriated by Congress in 1952 over a three-year period, 1953 through 1955, instead of one year, 1953, contemplated by Congress at the time of the appropriation."

► **Red Threat**—Symington, Yorty, Rep. Mel Price, and other congressmen criticize the Administration for failing to take account of the threat of growing

Russian air strength, particularly in long-range bombers.

Pointing to USAF Chief of Staff Gen. Nathan Twining's report that the Soviet air force "is now more than one-half jet-equipped," Symington forecasts that "under the Administration's new airpower program, our own air units—Air Force, Navy, and Marine—will not be 50% jet-powered until 1957, three years from now."

Yorty, Democratic candidate for the Senate from California this year, says: "Secretary Wilson last year ignored our own intelligence reports and said that we gave the Soviets credit for many aircraft they didn't have. Furthermore, he urged, the Soviet air force was primarily defensive. . . . A few weeks ago, AVIATION WEEK carried pictures of two new Soviet modern long-range bombers which they were reported to have in the hundreds."

Yorty claims the Administration looks at the enemy's capabilities "through the wrong end of a telescope" and then looks at U. S. capabilities "with a pair of unfocused binoculars so that they see double."

PAL Quits Long-Range International Routes

Philippine Air Lines has dropped all of its long-range international routes, including flights to San Francisco and Honolulu, in accordance with a new governmental aviation policy geared to improvement of domestic services (AVIATION WEEK Mar. 1, p. 64).

The carrier will continue operations to Hong Kong, Bangkok and Taipei and plans expansion of regional services in southeast Asia.

All DC-6 and DC-6B equipment will be sold, along with spares. Convair 340s will be kept for domestic and regional service. PAL plans expansion of local service with both Convair 340 and DC-3 aircraft. Domestic airports will be improved.

The airline will continue maintenance of USAF aircraft under contract and will seek to develop maintenance contracts with commercial carriers serving the Philippines.

PAL officials indicate that they will continue to study the potential of the helicopter closely with a view to eventual short-haul service in the Philippines.

PAL has been operating international routes since 1946.

Jet Teams to Compete

USAF's first all-jet gunnery and weapons meet will be held June 7-13 at Nellis AFB, Nev. Teams from seven major Air Force commands will compete, flying F-86s, F-84s, F-80s and possibly F-94s.

Policy Review Outlook:

Fewer Federal Dollars for Air Aid

Air Coordinating Committee will ask strict control of airline subsidies and aircraft progress payments.

By G. J. McAllister

Air Coordinating Committee will recommend stringent economies in federal financial aid to aviation in its national air policy review for President Eisenhower, observers forecast last week.

The report, covering about 50 subjects, probably will be submitted to the President in mid-May.

Subjects of main interest to the air transport industry:

- **Domestic and international airline subsidies.** ACC will urge a judicious policy in determining the amount of federal aid in relationship to the industry's present stage of development and the overall fiscal policies of the Administration. Any changes in present subsidy policy would require legislative action since the existing policy is, in effect, a contract between the government and airlines carriers.

- **Role of U. S. domestic and international air transportation system.** Review will emphasize the economical development of air routes without compromising U. S. foreign policy and

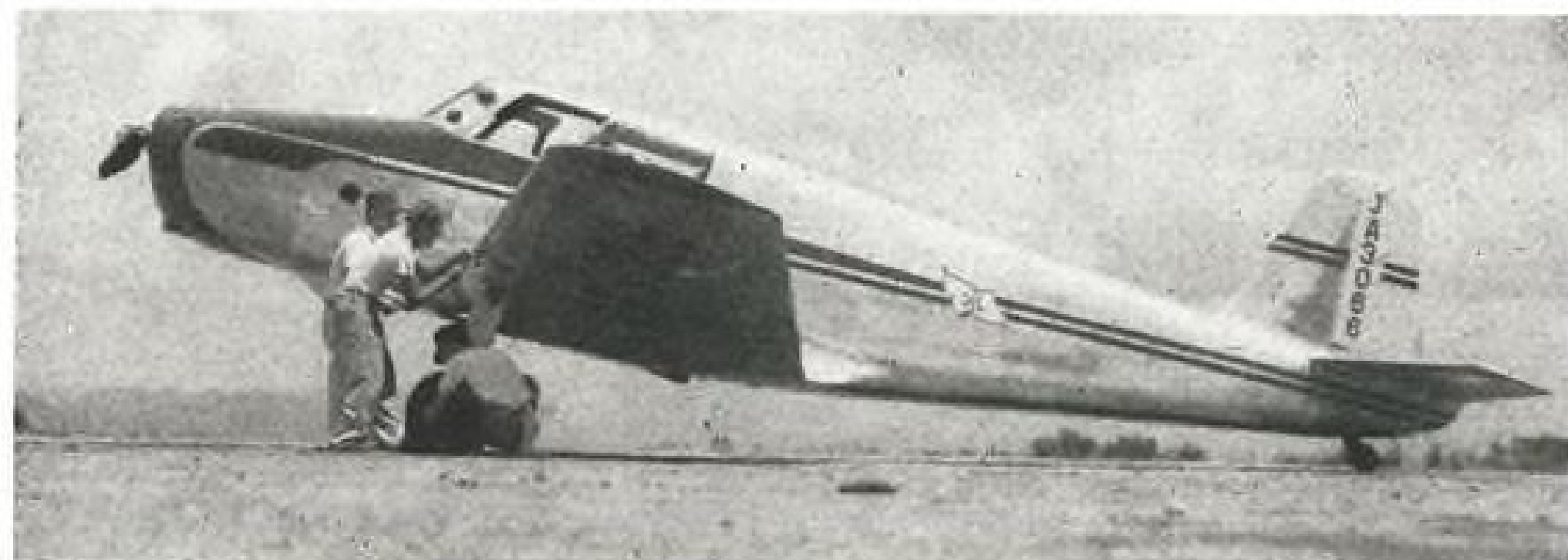
national defense value of the system.

- **Policies and standards to be utilized in establishing domestic and international air route patterns.** ACC will call for a "get tough" policy in the granting of new routes and route renewals to certificated airlines and route exemptions for nonscheduled operators. This policy already is apparent in recent decisions by Civil Aeronautics Board in refusing new route requests.

- **Role of federal government in development of new transport aircraft.** Present thinking is that ACC will recommend against federal aid in the testing of new transport aircraft.

- **Policy on aid for airport construction.** Undersecretary of Commerce for Transportation Robert Murray, chairman of ACC, says Commerce will request \$33 million for airport aid but funds will be restricted to projects in the strict interest of national defense or airways safety (AVIATION WEEK Mar. 22, p. 67).

- **Clear-Cut Policy**—Point of major interest to the aircraft manufacturing industry will be formation of a clear-cut



Japs Test New Lightplanes

Evidence that the Japanese are again active in design and construction of domestic planes is given in these photos of the new Kawasaki KAL-1 (top) and the Toyo TT-10, both of which now are undergoing flight tests. The all-metal KAL-1 seats four persons and is powered by a 260-hp. Lycoming. Landing gear is retractable. Top speed is

given as approximately 175 mph. The firm has another all-metal craft in flight test, the two-place KAT-1 with tricycle landing gear. Few details of the Toyo TT-10 have been released. Plane is a two-seater trainer with fixed landing gear and is powered by a 135-hp. Lycoming fitted with a Fletcher jet exhaust system.

policy with regard to progress payments.

Progress payments in the past have been used for such purposes as forcing rigid inventory controls. Review will state that the payments will be determined strictly on the basis of manufacturer's financing requirements.

ACC also will develop a policy on a common navigation system, working closely with the Air Navigation Development Board. This is a technical report that will be separate from the overall policy review.

► **Review Expanded**—The committee has expanded its study to include an analysis of U.S. policies toward the aircraft manufacturing industry.

However, ACC will limit recommendations to the field where both civil and military aircraft development, production and sales are affected. Purely defense aspects will be transferred to the Department of Defense.

► **Airpower Study Need**—Sen. Stuart Symington recently urged establishment of an air policy commission and a joint congressional aviation policy board. Two such bodies were formed in 1947. Sen. Symington stated: "I have always believed that if the recommendations of the two commissions had been followed, we would not have had the Korean war."

Symington pointed out that one of the reasons for forming the two commissions would be to develop an airpower policy. ACC's review does not extend into military airpower requirements.

In an interim report on Mar. 15 to Sherman Adams, Assistant to the President, ACC Chairman Murray stated: "By about Apr. 1, the committee expects to have on hand 50 or more separate preliminary papers which then will be combined. These have been prepared by some 40 separate inter-departmental subcommittees in accordance with ACC procedure. These were prepared after analysis of recommendations from interested segments of the aviation industry and public."

► **Working Group**—In detail, the ACC's development of the review works in this manner: A working group from each interested federal agency is appointed to deal with a specific subject. It produces a policy paper draft, which is considered by federal agency appointed to deal with a specific subject.

The group draws up a policy paper draft and turns it over to federal agency members at the next highest echelon above the working group. The paper then is forwarded for consideration by a special liaison group which is composed of top aides to the members of the committee.

► **Liaison Group**—Members of the special liaison group are: Fred B. Lee, Civil Aeronautics Administrator, chairman; Emory T. Nunneley, general counsel,

Knots Win

Knots and nautical miles will replace the statute-mile system throughout the air transport industry Oct. 1.

Civil Aeronautics Board has ruled on an issue which began in April 1950 and boiled into a major controversy. Although the military operates on nautical units, various civilian groups have battled the switchover on commercial airline service.

Private pilots have the option of using either statute or nautical units under the Board's order.

Speed and distance information normally will be transmitted in nautical units in ground-to-air communication, but upon specific request also will be transmitted in statute units, CAB said.

Changes will not be required in units currently associated with visibilities, approach charts, radio facility charts, airway widths, control zone dimensions and non-air carrier aircraft instruments.

Civil Aeronautics Board, vice chairman; Bradley D. Nash, Deputy for Civil Aviation, USAF; Robert D. King, Deputy Assistant Secretary of the Army; J. T. Pyle, special assistant to the Assistant



LeMay Flies YB-52

Strategic Air Command's Gen. Curtis LeMay (second from left) stands near the YB-52 Stratofortress eight-jet heavy bomber he piloted during a recent trip to Boeing's Seattle, Wash., plant. At far right is Wellwood E. Beall, Boeing senior vice president. Also shown are the three crew members who accompanied LeMay aloft (left to right): Richards Loesch, Lt. Col. Guy M. Townsend and Capt. John Elrod.

Secretary of the Navy for Air; Earl B. Wadsworth, director, Division of Air Service, Post Office Department; J. Paul Berringer, director, Office of Transport and Communications Policy, Department of State; Capt. A. J. Hesford, chief, Liaison Division, U. S. Coast Guard, Treasury Department.

Following approval by the liaison group, the paper is given to Colin McIntosh, a special consultant, who prepares the policy recommendations for submission to aviation industry groups, such as Aircraft Industries Assn. and Air Transport Assn. Industry organizations will be permitted ten days in which to comment on the policy papers. The papers, with industry comments, will be considered at sessions of ACC.

► **Implementation**—After approval by the full committee, the report is forwarded to the President.

Murray notes: "This procedure is cumbersome, but it is a necessary forerunner of inter-departmental agreement and executive decision in so many fields of United States and international air policy."

"While this process of inter-departmental revision takes time, it will produce for the President's consideration a report that can be ready for immediate implementation except, of course, where legislation is recommended."

The "immediate implementation" is a major point in the review. Along with each recommendation, ACC will assign a specific agency responsibility for directing its accomplishment.

Presidential approval of recommendations and assignments will have the effect of an executive order. This is one principal difference between the ACC review and the Finletter Commission report of 1948, which proposed recommendations and did not specifically assign agency responsibility.

► **\$15,000 Cost**—ACC plans to file a confidential supplementary report outlining status of subjects not definitely settled at the time of the submission of the review. An example of this is the problem of mail rates between Post Office Department and CAB.

Cost of the review is approximately \$15,000, which goes for salaries to two full-time special consultants and one part-time consultant.

Full-time consultants are Colin McIntosh, a Washington aviation consultant who will edit the final report, and Roger Murray, vice president and economist of Bankers Trust Co., New York, who is handling the manufacturing aspects of the review. Part-time consultant is Charles Cary, former executive secretary of ACC and now an official with Curtiss-Wright Corp. Cary is concentrating on aircraft export policies and will look into present export financing regulations of the Export-Import Bank.

Air-Rail Fight

• **Airlines ask fair chance to win federal business.**

• **ATA and nonskeds join to battle undercutting.**

Three competitive airline associations—Air Transport Assn., Air Coach Transport Assn. and Independent Military Air Transport Assn.—have joined forces in an effort to end undercutting by railroads for military and other government business.

Here is the crux of the matter:

• The 1940 Interstate Commerce Act permits railroads to transport government personnel free or at reduced rates. The provision, carried over from the mid-Nineteenth Century when the government encouraged transcontinental rail service through land grants, provides for special rail rates to the government as a measure of return.

• Both scheduled and nonscheduled air carriers have their hands tied in quoting low fares for government business. The 1938 Civil Aeronautics Act provides that all airline tariffs are subject to Civil Aeronautics Board approval and will be published in advance.

► **Air Traffic Losses**—The result of this situation is that railroads are free to make deals with the Defense Department for military personnel transport business at lower amounts than airline bids.

There is no requirement that rail bids be published and made known to airline competition, or be approved by ICC. Airlines, however, cannot bid below tariffs filed and approved by CAB.

From a survival point of view, IMATA and ACTA are most deeply concerned, because military traffic represents a major portion of their income. These independent carriers report drops of 20% to 40% in military business due largely to underbidding by rails. They say the rails have bid low on business they were competing for and set standard tariffs for non-competitive military business.

► **Policy Principle**—ATA is concerned not only about the loss of defense business, which represents a comparatively small part of scheduled airline income, to the rails but also on the policy principle involved. If this principle is adhered to and uniformly applied:

• The 1938 CAA Act would be amended to permit airlines and railroads to bid for free or reduced-rate service to the government.

• This would mean all-out war among the airlines, scheduled and nonscheduled, for Post Office mail contracts as well as military business.

Atomic Engine

Atomic Energy Commission plans to sponsor a \$14.2-million program for continuing development of two aircraft propulsion reactor projects in fiscal 1955.

Of the total, \$8.6 million is earmarked for a contract with Pratt & Whitney Aircraft and \$5.6 million for a contract with General Electric Co. Each company will take a different approach.

The program is below fiscal 1954's level of \$15 million and the 1953 level of \$17.3 million.

► **NAA Contract**—AEC also plans a \$2.5-million contract with North American Aviation next year for continuing development of a sodium-graphite reactor, one of five power-generating reactor projects sponsored by the commission. The project involves development, construction, and test operation of a reactor designed to produce 20,000 kilowatts of heat.

North American has agreed to contribute \$2.5 million of the total \$10-million cost of the project, scheduled to be completed in 1958.

In meeting the rails' strategy to capture defense business, the three airline associations are using three divergent approaches:

• IMATA is seeking correction of the situation at ICC. The association has filed a case, naming 112 railroads as defendants and charging they are en-

gaging in "vicious, nefarious, unfair and discriminatory competition" that is not in agreement with the policy of the 1940 Transportation Act for sound development of transportation under fair competition. A deadline of Apr. 13 has been set for the filing of rebuttals by the railroad interests, after which the case will be set for hearings.

• ACTA is aiming to obtain action by Defense Department and has presented a brief pointing to the net savings—largely through the saving of the paid time of military personnel—through the use of air, rather than rail transportation.

ACTA did not join in the IMATA suit with ICC because the association felt this proceeding would be lengthy and, in the meantime, Defense Department would continue granting low-bid contracts to the rails pending outcome of the case.

IMATA, on the other hand, said statements from key defense officials that the department had no alternative but to accept low bids convinced the association there would be no relief from Defense Department and that it should take recourse to ICC.

• ATA primarily is interested in legislation, introduced by Rep. Carl Hinshaw, that would cancel out the ICC Act provision giving the rails a free hand to bid low on government business. In addition to eliminating railroad undercutting for defense business, this also would set a precedent against direct Post Office Department contracting with nonscheduled airlines for mail business at rates below the scheduled rates. Postmaster General Arthur Summerfield is seeking this authority.



UAL Receives Its First DC-7

United Air Lines' flight crew examines the first of 25 Douglas DC-7s ordered by the carrier shortly after it left the manufacturer's Santa Monica, Calif., plant Mar. 29. UAL plans to inaugurate nonstop transcon-

tal DC-7 service June 1. The 58-passenger planes have forward and aft seat compartments and a five-place lounge at the rear. Cost of the 25-plane DC-7 fleet: \$58-million. Powerplants are Turbo Compounds.



CONVAIR C-131A SAMARITAN aeromedical transport is produced by the San Diego Division for Military Air Transport Service.



ELECTRIC LIFT can hoist two litters or 500 lb. of cargo smoothly through wide door.



SEAT-LITTER COMBINATION inside C-131A. Quickly detachable seats face rearward.

Mercy Plane

- Convair delivers first of 26 C-131As to MATS.
- Each Samaritan carries up to 27 litter cases.

Military Air Transport Service has added another mercy ship to its domestic aeromedical evacuation fleet with the recent delivery of the first of 26 Convair C-131A Samaritans.

The C-131A is a version of Convair's commercial 240 transport. It is a 235-mph. airplane capable of handling various combinations of up to 37 seats, or 27 litters and seven seats. Seats face backward.

► **Crew of Three**—Each Samaritan carries one flight nurse and two medical attendants and a crew of three. Chief mission of the aircraft is to deliver patients from ports of entry to hospitals of destination throughout the U. S.

On the delivery flight, the first C-131A, flew nonstop from San Diego, Calif., where it is being built, to Washington in 8 hr. 10 min. The 2,530-mi. flight averaged 309 mph. without extra fuel. Payload was 14,000 lb. or the equivalent of 15 litter patients.

The C-131A is the first pressurized twin-engine air evacuation transport ordered by MATS. Its commercial cousin, the Convair 240, already has logged approximately 10 billion passenger-miles throughout the world.

► **Loading Apparatus**—Gross weight of the C-131A is 43,575 lb. It is powered by two Pratt & Whitney R2800-99 engines. Service ceiling is more than 24,000 ft. It can take off in less than 3,300 ft.

Feature of the airplane is its large, hydraulically operated door, hinged at the top and installed on the left side

of the fuselage aft of the wing for loading litter patients. A standard Convair-Liner integral stairway, folding into the airplane, is located on the right side forward of the wing.

There are provisions for carrying iron lungs and special oxygen equipment. A nurse's table is equipped with medical supplies and food.

► **Mortality Rate Lowered**—MATS officials pointed out during delivery ceremonies at Washington's National Airport last week that during the Korean action more than 95% of combat casualties were airlifted to the U. S. for specialized treatment. The mortality rate of American wounded was less than one-half that of World War II.

Only two out of every 100 injured fighting men in Korea died as a result of their wounds. In World War I, the number was eight out of every 100. MATS planes brought back more than 67,000 patients from the Far East during the Korean campaign. Since MATS was formed in June 1948, its planes have logged more than 750 million patient-miles.

B-26s Give French Edge in Indo-China

U. S. aircraft, furnished to the French under the Mutual Defense Assistance Pact, are playing a decisive role in the crucial battle for Indo-China.

This is evidenced by the recent trip to Washington by Gen. Paul Ely, French chief of staff, to request additional aid, particularly aircraft. Following his visit, Defense Department announced that 25 additional B-26 light bombers would be furnished to the French.

► **Major factor**—Airpower has been the major factor in keeping strategic Dienbienphu in French hands. More than two French divisions there are surrounded by Red Vietminh forces estimated at four divisions. The siege of Dienbienphu has focused sharp attention on the ability of aircraft to supply beleaguered forces and provide the balance against Red numerical superiority.

One fact is paramount: U. S. will furnish whatever equipment is needed, especially aircraft, to keep Indo-China from falling to Red forces.

President Eisenhower described the Southeast Asia area as one of "transcendent importance." Secretary of State John Foster Dulles, in a major policy speech last week, said: "Southeast Asia is the so-called 'Rice Bowl' which helps to feed the densely populated region that extends from India to Japan. It is rich in many raw materials, such as tin, oil, rubber and iron ore. It offers industrial Japan potentially important markets and sources of raw materials."

U. S. determination to furnish aid necessary to keep Indo-China in the Western orbit is clearly evident. Dulles says: "Under the conditions today, the imposition on Southeast Asia of the political system of Communist Russia and its Chinese Communist ally, by whatever means, would be a grave threat to the whole free community. The United States feels that that possibility should not be passively accepted, but should be met by united action. This might involve serious risks. But these risks are far less than those that will face us a few years from now, if we dare not be resolute today."

► **Weyland Visit**—Aid under the Mutual Defense Assistance Pact was augmented recently.

Gen. O. P. Weyland, Far East Air Forces commander, visited Indo-China last month, was briefed on the situation by the military assistance advisory group and covered the area by air.

Fast action was to send 12 B-26 light bombers to the French forces there, and to furnish 200 mechanics and technicians plus the necessary supervisory and administrative personnel. Later, 10 B-26s were furnished. The mechanics and technicians came from FEAF units, and are based at two air bases in coastal areas.

"In both cases," Gen. Weyland said, "they are for the specific purpose of giving training and assistance to French air force personnel in the maintenance of B-26 and C-47 aircraft, and are not in or near a major combat area." This group is scheduled to return in June.

► **Transport Support**—"Obviously, it is necessary to give logistic support to our Air Force personnel in Indo-China," Weyland added. "As a result, the 315th Air Division has extended its regular courier service to include Indo-China. This extension of the courier service consists of two Skymaster (C-54) flights daily from Clark AFB in the Philippines to Indo-China. . . . In the augmentation of the MAAG in Indo-China Clark AFB has been designated the primary support point for resupply functions."

MDAP officials in Washington declined to reveal the number of aircraft that had been sent to Indo-China prior to the shipment of the first 12 B-26s. However, C-119s and C-47s are being used in the supply of French divisions surrounded at Dienbienphu by Communist ground forces.

USAF Takes Action On Airline Fuel Bills

Air Force is taking quick action on collections of fuel sales to airlines, spurred by a Senate Armed Services Subcommittee charge that USAF is not fully aware which carriers owe AF money and how much. Delinquent bills

have been kept "in channels" and gone uncollected.

"We made an effort to find out what happened to air carriers when they became delinquent in payments," Sen. Ralph Flanders, chairman of the subcommittee declared, "and we found out. Nothing happened to them. Although they had not paid for gasoline consumed, the Air Force permitted them to continue to purchase gasoline and other materials on credit."

Hearings disclosed:

- USAF estimates its know delinquent accounts for fuel purchases by airlines at \$600,000.

- There is doubt that USAF will be able to ascertain payments due for purchases prior to July 1, 1953.

- Airlines operating under transport contracts with the Air Force are permitted to purchase aviation gasoline at any of USAF's air bases throughout the world.

► **Airline Honesty**—H. Lee White, Assistant Secretary of the Air Force for Management, says a directive is being issued to the office of the Auditor General "to see if we cannot find any records there or any other place in the chain on which to get leads to money that may be owed us."

"I am also going to have a check of the contractors who were under contract during the period before July, and we may have to rely to some extent on their honesty to find out whether or not they admit, as Pan American World Airways did, that they owe us money."

Pan American, desiring to close its outstanding debts, requested USAF to bill it for its fuel purchases. USAF did not know the airline owed it any money and was unable to locate its records. Apparently they had been destroyed in the belief that the account had been paid and audited.

► **Problems**—White reports that USAF has solved one of the two problems involved in the situation: It now knows what airlines owe money.

Fuel purchasing and selling formerly was financed by the Air Materiel Command at Dayton. Improved accounting procedures were introduced when fuel was set up on a stock fund basis last July, administered by the Middletown, Pa., Air Materiel Area.

The task now, White says, is stepping up the procedure for making collections.

If an avgas account is delinquent, Middletown AMA gives the airline a 30-day notice. If payment is not made by the 30 days, a more stringent notice demanding payment in 15 days is made. Then the account is forwarded to Air Materiel Command; from there to the USAF Finance Center at Denver, and finally to the General Accounting Office and the Department of Justice in Washington, D. C.

Light Fighter Stirs Design Controversy

- U. S. and British views on lightness differ.
- But so do our ideas on aircraft's mission.

By David A. Anderton

One of the hottest airplane design controversies of recent years has centered around one simple question:

What do you mean by lightweight?

To American designers enveloped in drawings for fighters which tip the scale at the 30,000-lb. mark, anything under 15,000 lb. is feather-light.

To AF's Lt. Gen. Lauris Norstad, NATO air deputy, a lightweight fighter should weigh in at about 5,000 lb. empty. That is the specification figure he has approved for a new ground-support plane to bolster NATO air-power.

The nearest contemporary approach is Lockheed's new F-104, listed in the USAF book as a day-superiority fighter. Among other firms, Grumman has announced that they have a lightweight fighter in the works, and North American and Northrop are reported to have projects under way.

The basic idea is simple: Build the minimum fighter that can outfly as well as outfight anything the enemy can put in the air.

► **First Sparks**—The real clamor started a year ago, with a group of returned MiG-Alley aces beating the light-fighter drum through the long corridors of the Pentagon.

Strip off the useless equipment, they demanded, and give us a fighter that can outfly the MiG.

Take all that extra weight out of the Sabre, they asked, and we'll tackle the Reds at 50,000 feet.

The Pentagon view was that maybe these pilots couldn't see the forest for the trees. They were intensely concerned with their war near the Yalu, and perhaps forgetting that they might not always be fighting under Korean ground rules.

Then the improved Sabre came along—with more thrust and the 6-3 wing—as part of the answer. The war ended a while later, and the final box-score worked out at about eight-to-one in favor of the USAF.

So the light-fighter controversy simmered down.

► **Rekindled in Europe**—Today the argument has popped up again, but in

Questionnaire on Day-Superiority Fighter

This is the questionnaire AVIATION WEEK sent to leading U.S. aircraft firms, to determine thinking of engineers on the requirements for a day-superiority fighter. The number of engineers or teams favoring each approach is given after the individual items.

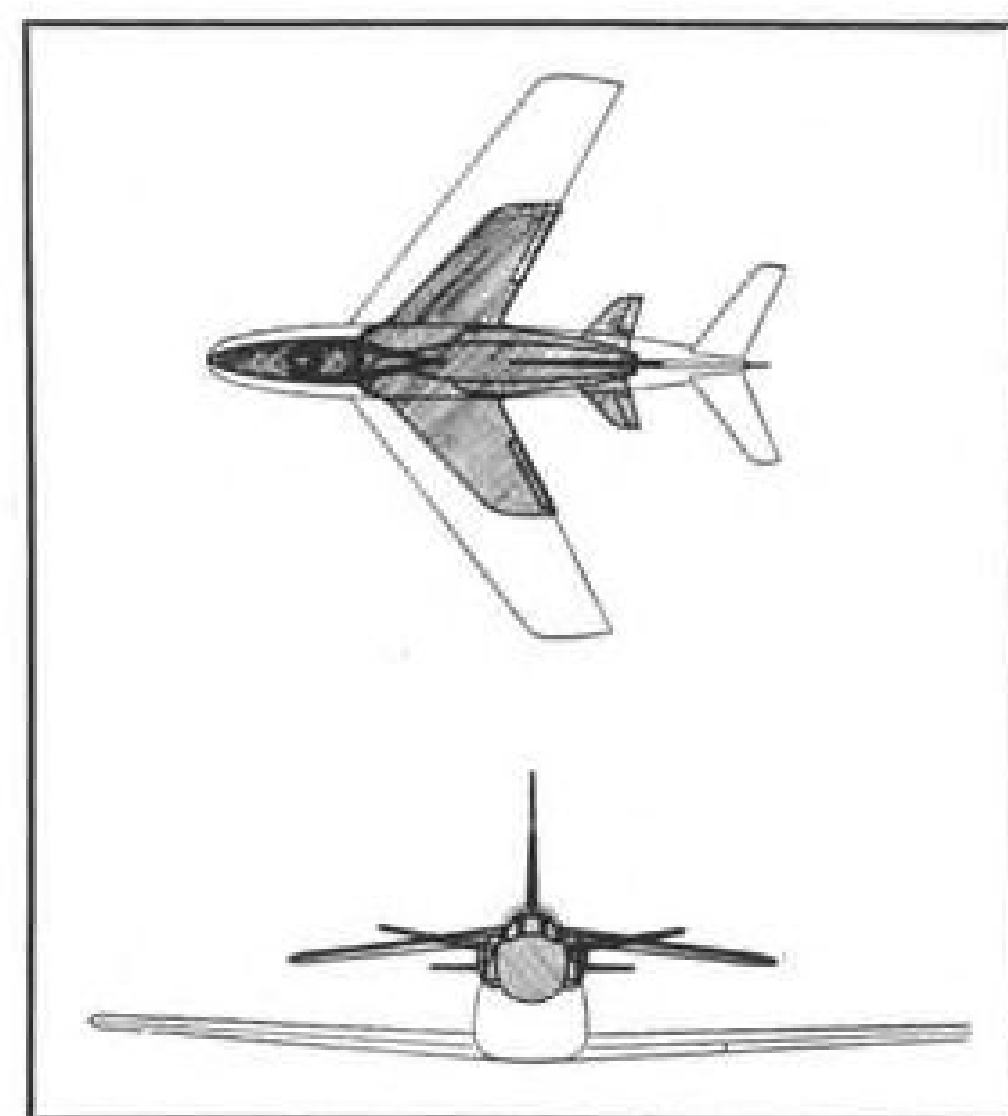
Assume the need for a day-superiority fighter. There are no design restrictions on powerplant, weapons or configuration. Top speed is to be Mach 1.2 to 1.5. Plane should be capable of maneuvering at 60,000 to 70,000 ft. Vertical climb after takeoff is desirable. Endurance is one hour. The fighter should be equally effective against enemy fighters and bombers. Quantity production is assumed.

With these crude requirements as a guide please check the proper items.

Reasonable gross weight would be:		Surface-mounted with fairing....	0
Under 10,000 lb.....	0	Other	1
10-15,000 lb.....	8	Weapons would be:	
Over 15,000 lb.....	10	Machine guns.....	3
General aerodynamic layout would be:		Cannon	9
Straight wing, with tail.....	2	Unguided rockets.....	10
Swept wing and tail.....	10	Guided rockets.....	9
Swept wing, tailless.....	1	These "extras" would be included:	
Delta with tail.....	7	Ejection seat.....	10
Delta, tailless.....	4	Escape capsule.....	7
Powerplant would be:		Radar gunsight.....	14
Turbojet plus afterburner.....	11	Forward armor.....	1
Ramjet only, with Rato.....	0	Rear armor.....	2
Rocket only.....	0	Self-sealing tanks.....	1
Turbojet, afterburner, rockets.....	4	Duplicate systems (of any kind).....	7
Ramjet plus rocket.....	1	Power-driven canopy.....	2
Other	2	General construction would be:	
Power installation would be:		Designed for heavy forgings and	
Buried	12	extrusions (heavy press program).....	5
Podded	3	Conventional current practice.....	12
		Other	2

a new guise. Now it is fostering a ground-support aircraft designed to a specification approved by Gen. Norstad.

Two British companies and one French firm are hot on the trail of a possible contract worth about \$10 mil-



GNAT VS. SABRE. Sizes are compared in sketch of the two fighters.

lion drawn from a Special Weapons Development Fund appropriated by Congress last year.

Folland Aircraft, with W. E. W. Petter's Gnat design, and A. V. Roe & Co. with a new delta design based on their 707 research series, are the British pair. In France, Sncase offers Le Baroudeur, a dolly-launched ground-attack plane of considerable promise and flight-tested performance.

► **Light-Fighter Spec**—Here's what Norstad's spec asks for:

• **Performance:** Mach 0.95 for about one-third of mission, 350 knots for the remainder; rate of roll of 100 deg./sec. at Mach 0.9 at sea level; takeoff from a grass strip to clear a 50-ft. obstacle within 3,000 ft.

• **Armament:** Paired 20-mm. cannon with 200 rounds or paired 30-mm. cannon with 120 rounds, or 12 three-in. rockets plus two 500-lb. bombs plus two napalm bombs.

• **Equipment:** Pressurization and anti-G suit, radar homing beacon; UHF, DME and IFF; gyro gunsight and rocket sight; airbrakes.

• **Weight:** Not to exceed 5,000 lb. empty.

Norstad wants the plane to be simple and rugged with easy maintenance so it can operate at high utilization from second-class airfields.

► **Differences in Kind**—Most engineers agree that "light fighter" is not the correct term.

To some advocates of the type, it connotes a stripped-down version of a contemporary airplane. (Incidentally, perhaps one of the reasons North American frowned on stripping a Sabre was because they had tried it with the Mustang in World War II, to produce the P-51H. The plane grossed under 9,000 lb., but it meant a lot of redesign to get to that figure. There was a lot more involved than the simple removal of extras.)

To others, a light fighter is a small fighter, produced and used by the hundreds to harass the enemy, like a cloud of insects.

Majority agreement seems to favor a definition based on the mission. That's why the term "day-superiority" fighter seems to fill the bill. By implication, the mass of avionic gear necessary for all-weather operation is left out, and the structure is lightened by the amount that would have to carry that extra equipment.

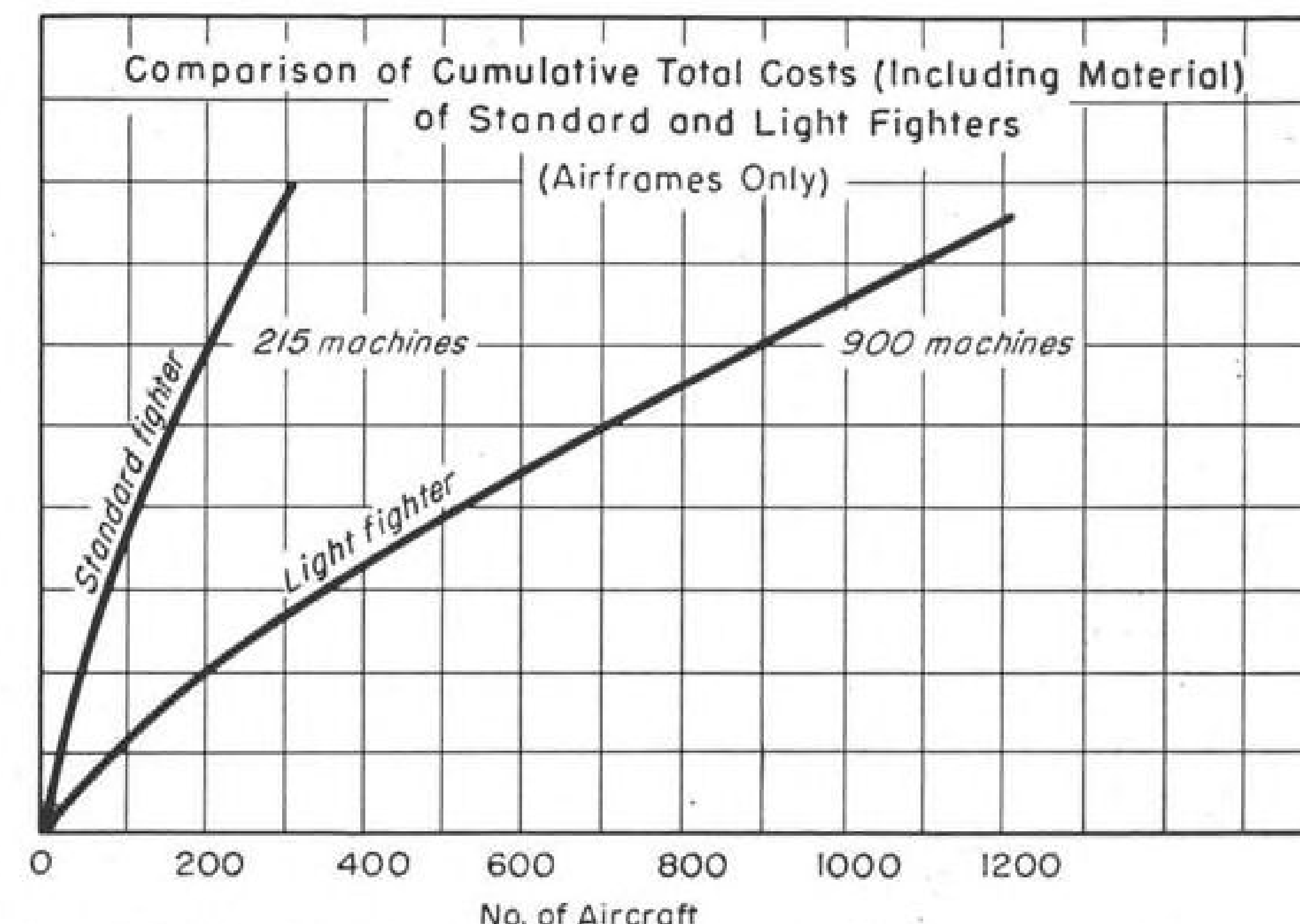
► **Typical Design**—Most considerations of the day-superiority fighter have used the Folland Gnat as a typical example. This is due primarily to Petter's dogged determination to be heard and believed. The Gnat represents an outstanding and unique design approach, say American engineers who have had a chance to study Petter's preliminary data for the plane.

In this country, most of the technical backing for a light fighter has come from the pleas of Douglas Aircraft's Ed Heinemann for simplified design, which in another facet of the many-sided design question. His philosophies are reported to be approaching tangible form in the Douglas A4D, informally christened "Heinemann's Hot-Rod."

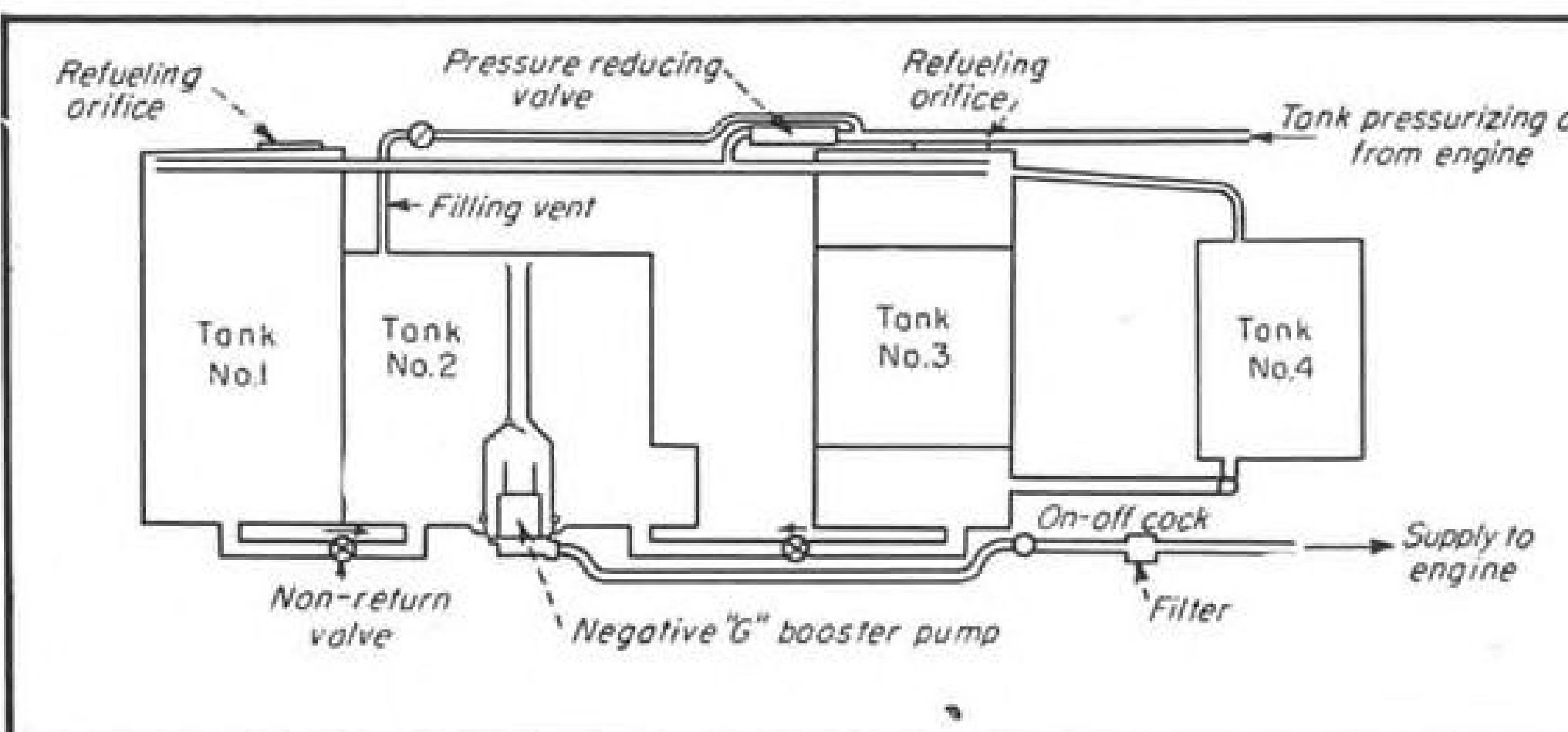
But other than Heinemann, there has been no real spokesman for the light-fighter type on this side of the Atlantic.

► **Survey Conducted**—Several months back, AVIATION WEEK made a survey of design engineers in 16 leading U. S. aircraft firms. The purpose: to find if there was any agreement among designers about the characteristics of a day-superiority fighter.

The questionnaire said this: "Assume the need for a day-superiority fighter. There are no design restrictions on powerplant, weapons or configuration. Top speed is to be Mach 1.2 to 1.5. Plane should be capable of maneuvering at 60,000 to 70,000 ft. Vertical climb after takeoff is desirable. En-



PRICE TAG for 900 light fighters would be same as for 215 conventional fighters.



FUEL SYSTEM for proposed light fighter illustrates possible simplification.

durance is one hour. The fighter should be equally effective against enemy fighters and bombers. Quantity production is assumed."

Twelve design teams replied to the questionnaire; in several cases, more than one designer marked the queries, so that the maximum number of answers to any single-answer question was about 24.

One company stated that top-level engineering opinion believed such a fighter to be unlikely because there was no USAF requirement; for that reason, they did not return the questionnaire.

Specifications were arguable in three cases, according to the returns. One designer stated that it was impossible for a fighter to be equally effective against fighters and bombers. Two agreed that vertical climb after takeoff was not optimum; one of the two felt that a seven-degree flight path would be the better answer.

► **Composite Plane**—Here is the composite of day-superiority fighter characteristics as visualized by this country's top design engineers:

• **Aerodynamic layout** would be a swept wing and tail.

• **Powerplant** would be a turbojet plus afterburner, buried in the fuselage.

• **Armament** would be unguided rockets, with cannon and guided missiles a very close second choice.

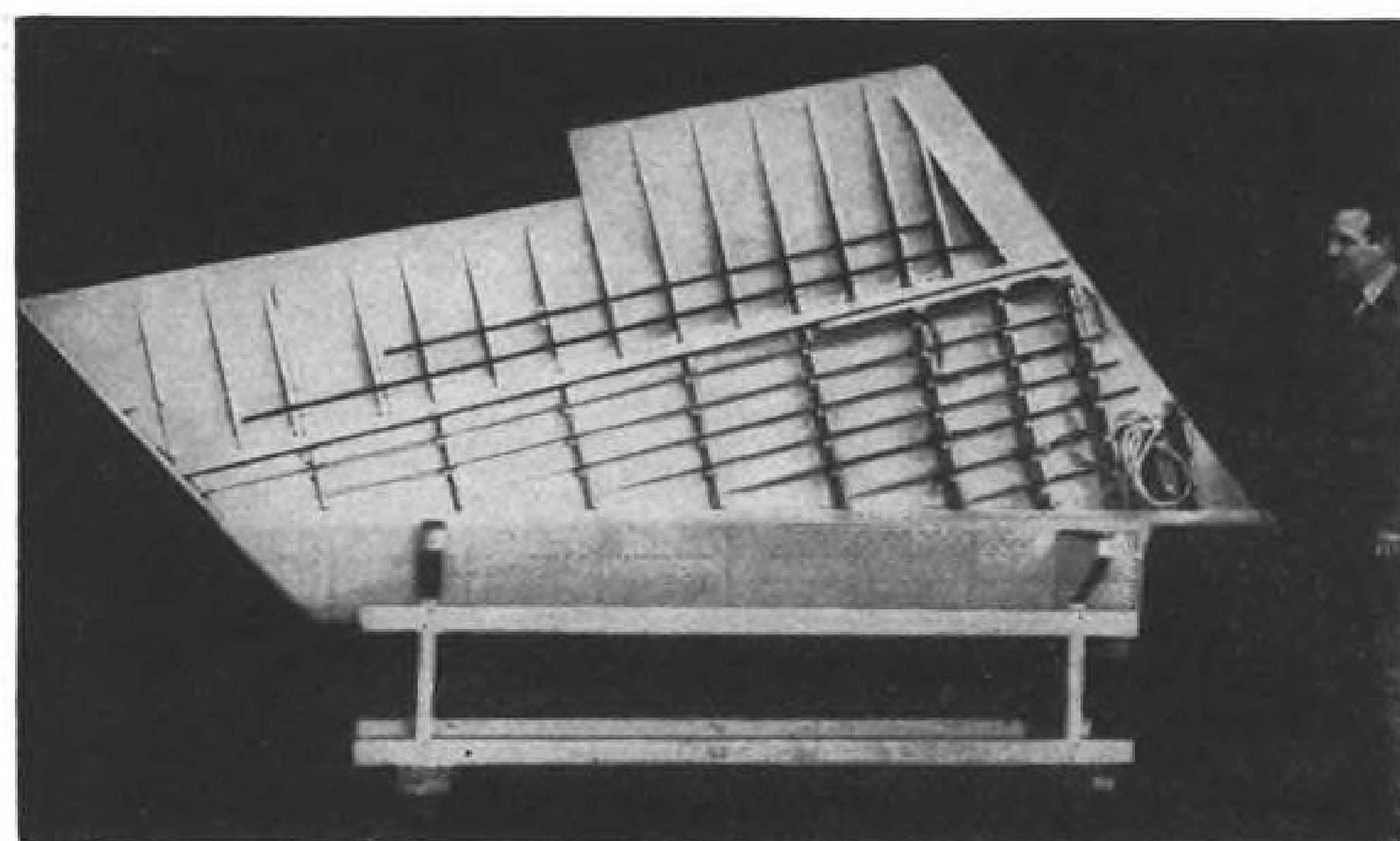
• **Reasonable gross weight** would be over 15,000 lb., said the majority, but almost half of the designers felt that the gross could be kept between 10,000 lb. and 15,000 lb.

• **Construction** would be by conventional contemporary methods; only a few favored designing into the heavy press program.

• **Equipment** would include a radar gunsight and an ejection seat. Seven felt that an escape capsule would be necessary, and the same number felt that duplicate systems would be needed in the aircraft.

This description sounds like many fighters in service today. The big difference lies in the performance. Apparently the designers plan to step up performance by weight reduction and thrust increase.

It is interesting that the majority



PROTOTYPE GNAT WING shows skin and stiffener construction advocated as being easier to produce than the integral structure now being designed into many aircraft.

favors conventional ideas; there were no radical design approaches. About the farthest any of the answers deviated from expected choices was in the naming of a ram keel as a weapon by one engineer, and the choosing of a combined powerplant of turbojet plus ramjet by two designers.

► **Petter's Gnat**—On the other side of the Atlantic, work is progressing rapidly on the Folland Gnat an ultra-light type of fighter, first offered as an interceptor and now being touted for ground-support duties.

Designed by W. E. W. Petter, who laid out the Canberra for English Electric, the Gnat is nearing completion and first flight. Specifications have appeared in this magazine (AVIATION WEEK Mar. 1, p. 22 is the most recent listing).

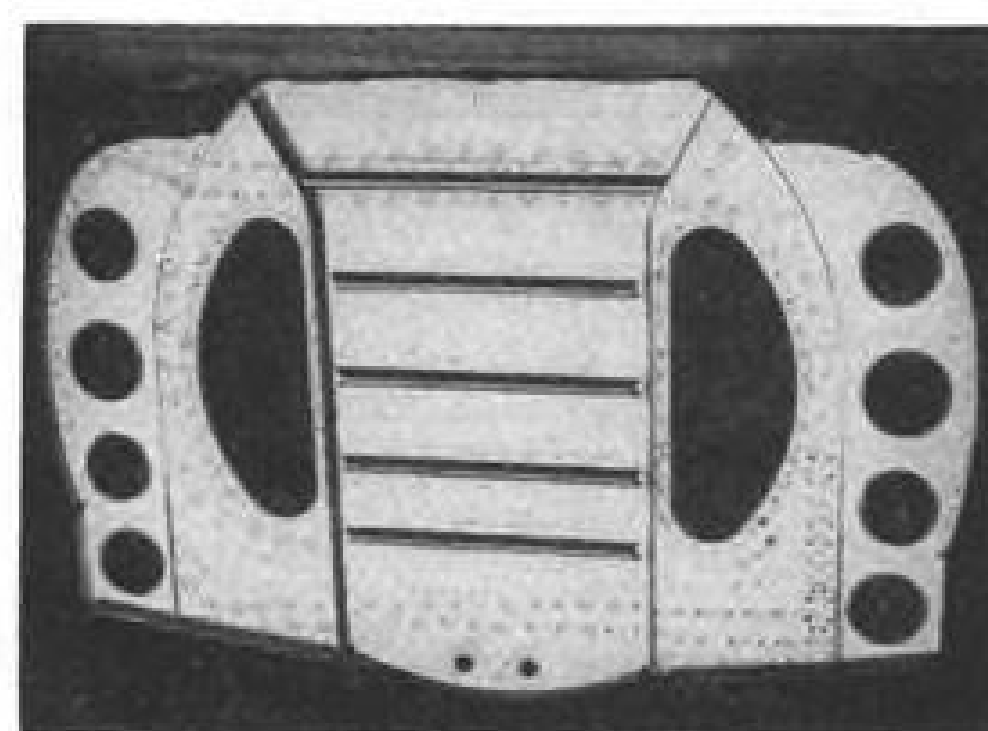
Petter's design data and ideas were stated in great detail in a lecture he gave before the French Association of Aeronautical Engineers and Technicians last June. That lecture stands as a high-water mark in presentation of the techniques that make light and fast airplanes.

Petter concludes that a fixed amount of money buys four or five times as many light fighters as it does heavy ones.

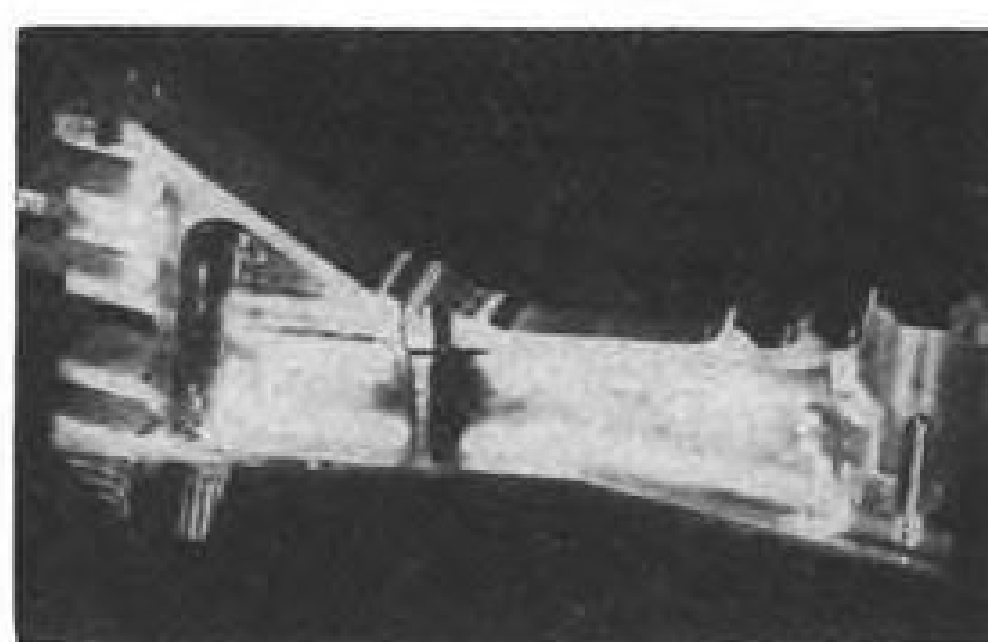
His basic argument assumed two fighters to be compared. The small fighter weighs 5,500 lb. and the "contemporary" design weighs about 16,500 lb.

Both are assumed to carry a military load of about 1,100 lb. The weights apply to the basic airplane without afterburner or taking into account auxiliary fuel.

► **Production Cost**—Petter assumed that about \$17 million was to be earmarked for production of either type, and solved for the number of each that could be built for that fixed amount.



FUSELAGE BULKHEAD for Folland Gnat is built up from pressed sheet parts. No forgings or castings are used in this subassembly.



FORGED FITTING for Gnat combines wing-fuselage connection, landing gear attachment point and rear attachment support in single piece, in contrast to the several fittings usually required for those jobs.

Experience with quantity production of aircraft parts is the key to graphs of man-hours and dollar cost of the two types. Petter concluded that although the contemporary fighter is three times the weight of the light fighter, the same investment in man-hours will produce five times as many small planes. In terms of total cost, the ratio is somewhat better than four to one.

For \$17 million, Petter says that 900 small fighters could be built; the same money would only buy 215 larger planes.

► **Structural Design**—Petter claims that structural weight of the light fighter would be about 30% of the gross weight instead of the more common value near 35%.

One way to achieve this low figure he says, is to design the wing as a skin and stiffener combination, cheaper and easier to produce than the integral types of structures that is now being advocated.

Another way suggested by Petter was to combine what is usually a group of sub-assemblies into a single part. The item chosen to illustrate this philosophy is a one-piece forging which forms the wing-fuselage connection, carries the landing gear and provides the rear gun attachment.

A typical fuselage bulkhead designed with lightness in mind would be made largely of pressed sheet parts, instead of built-up assemblies with forgings and castings.

► **Equipment Savings**—Petter also argues convincingly that the systems of airplanes can be designed considerably simpler. He uses examples of hydraulic, fuel and pressurization systems.

The ejector seat was subjected to the critical Petter eye, and weight was reduced by three approaches: "good engineering design"; using a reasonable ejection velocity suitable for fighters, rather than a general purpose high velocity necessary for larger airplanes; and finally the elimination of what Petter called "frills," such as the provision for ground adjustment for changing the height of the seat instead of using the gear system for raising the level of the seat in flight.

► **Summing Up**—These are two schools of thought on the approach to a light fighter design. The reason they are different is the same reason that British and American fighter designs have always been different.

Our philosophy has been to design a long-range airplane; this leads to questions of pilot comfort, and the plane gets big.

The British have always stuck to short ranges. A pilot gets less uncomfortable in 15 minutes than he does in an hour, and so creature comforts can be a little more sparse in the British designs.

But this doesn't explain all the differences.

Designers in this country have had to consider all-purpose airplanes, ready to fly and fight in tropic or arctic conditions. U. S. airplanes have been required to intercept on one day and bomb a freight yard the next day.

Try as they may, designers cannot make an all-purpose package weigh as little as a single-duty airplane.

That seems to be the crux of the "light-fighter" controversy.



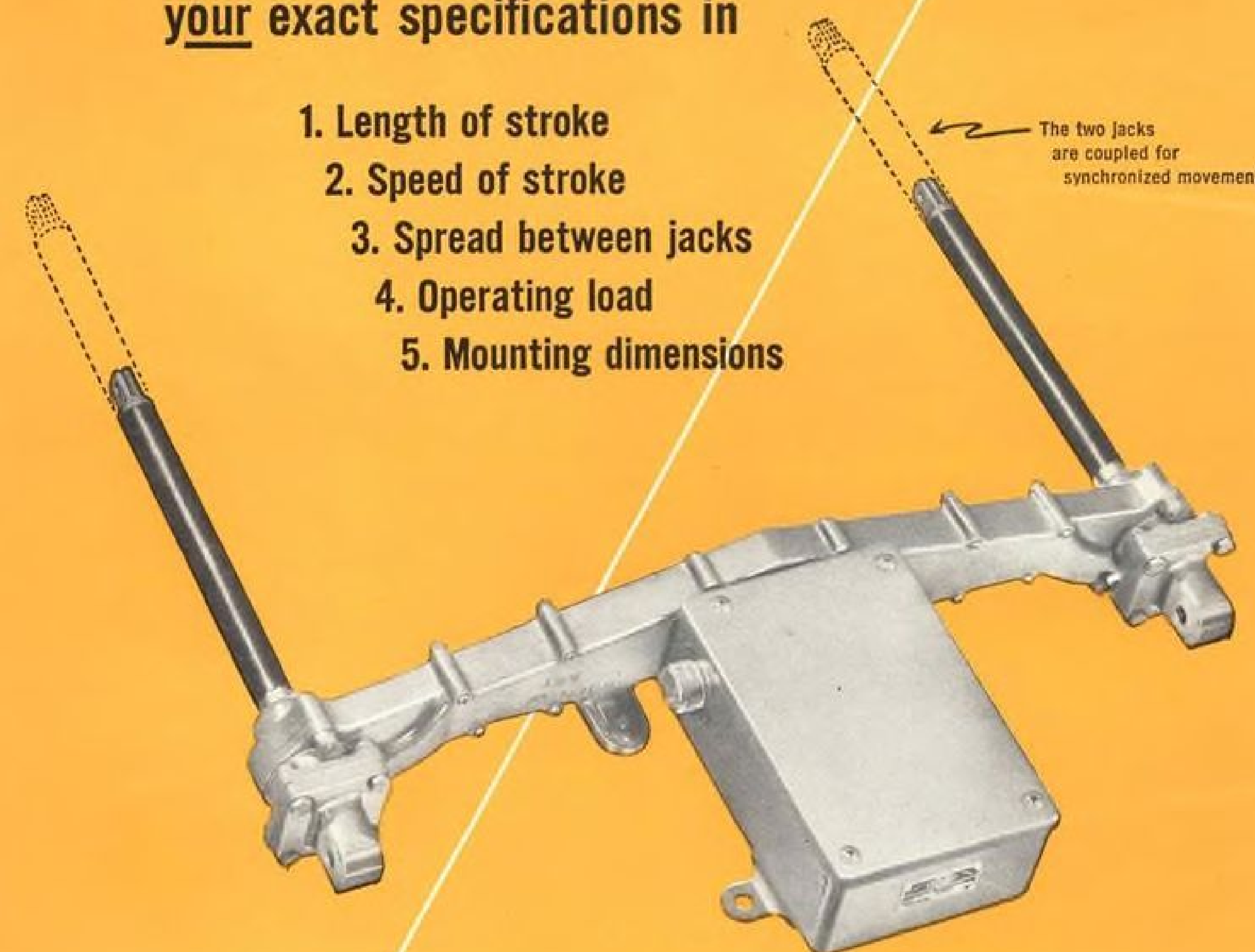
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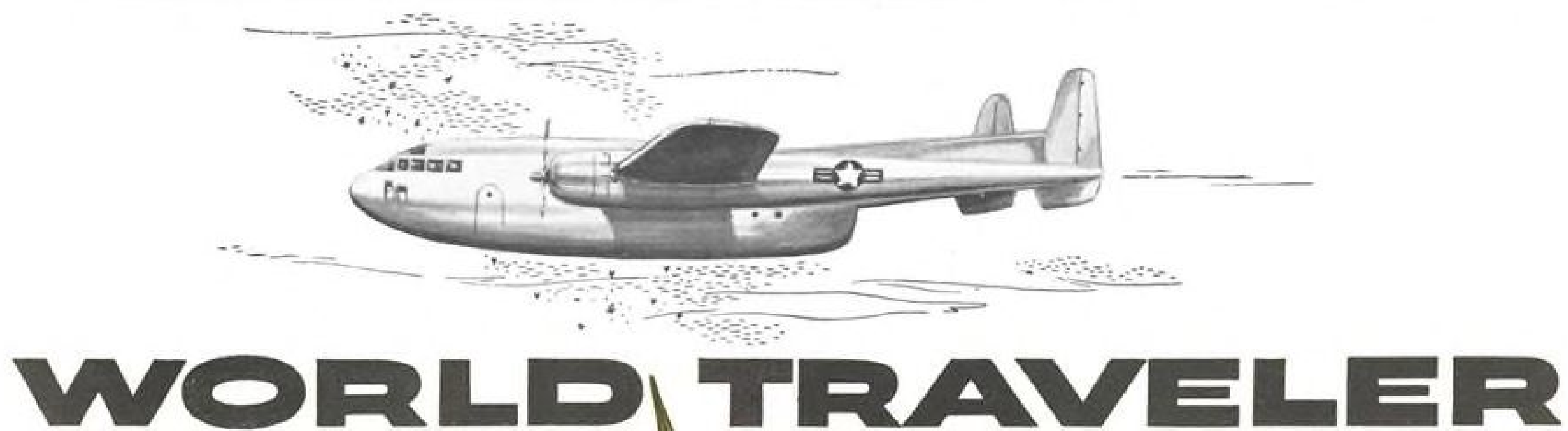
Electrical Engineering and Manufacturing Corp.

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Another new product from the design department at EEMCO is this pilot seat adjustment actuator that can be made to your exact specifications as listed above. With a weight of only 7 pounds, it will handle an operational load of 350 pounds and more. The compact control box, only 2 3/4" x 4 3/4" x 6 1/4" in size, contains the small and powerful EEMCO motor for driving the two jacks, as well as the clutch, brake, limit travel switches and radio noise filter. The two jacks are coupled for synchronized movement. The actuator illustrated has the following specifications:

Operating load: 350 pounds
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AA Stresses Rigid Cost Control

Biggest U. S. domestic airline credits postwar growth to close economy, forceful sales, modern equipment.

By Frank Shea, Jr.

Modern equipment and forceful sales promotion built around a program of rigid cost control is the formula used by American Airlines to maintain its position as biggest of the "Big Four" domestic trunklines.

Last year this formula paid big dividends, as American recorded the biggest earning year in its history (AVIATION WEEK Mar. 1, p. 7). Here are the year-end figures:

- Total revenues set a new high of \$208.3 million, an increase of \$21 million over 1952.
- Net income hit \$13,413,051 after taxes, compared with \$12,514,405 for 1952. This is equivalent, after preferred dividends, to \$1.85 per share of common stock, compared with \$1.72 for 1952.
- Passenger load factor dipped to 67.7% from 72.5% for the previous year.
- Operating expenses increased \$19.9 million to \$180.8 million.
- Cost per revenue ton-mile was 44.8 cents, a fraction lower than 1952's 45 cents.

New records were set in all categories of traffic:

- Passenger miles went over the 3.25 billion mark for a 13% jump.
- Aircoach passenger-miles topped the 1952 figure by almost 50%.
- Cargo ton-miles rose to a total of 64,941,000, including 54,659,000 ton-miles of freight and 10,282,000 ton-miles of express.

► Cost Control—Greatest single factor

contributing to the company's success is the rigid cost control program, American officials say. Last year, cost of available ton-miles declined from 30 to 27.6 cents, and indications are that more of a reduction will be effected this year.

"We believe in getting the most for our money," W. J. Hogan, senior vice president for finance and planning, told AVIATION WEEK "and that means controlling every dollar to see that its applied where it will do the most good."

Economy of operation is stressed throughout the airline's system. Until recently, budget and cost control officials were found only at top management level, but now AA maintains such men at all regional sales and operations offices.

"The best way to effect economy," says Hogan, "is to get right down to the very roots of the spending—making every member of the organization cost-conscious."

► Close Contact—American top management maintains a constant close working relationship with personnel throughout its vast route network.

"Frequently during the year," says president C. R. Smith, "several of the officers and myself visit principal points in the system—analyzing operations and discussing mutual problems."

"The only way to make intelligent management and policy decisions is to keep close contact with the operational level. This has paid off for American in increased operating efficiency throughout the company."

► Equipment—American always has stressed the design and purchase of new improved equipment. It was the first airline to place the Douglas DC-3 in service and also was the first to replace this fleet with DC-6s and Convairs.

Another AA first was introduction of the DC-6B. In addition, it is the only trunkline operating the DC-6A cargo plane.

Most recent and one of American's most significant fleet implementation is the introduction of Douglas DC-7s, placed in operation several months before any competitor.

American has purchased an initial fleet of 25 DC-7s for delivery by mid-1954. The 21st of this group was delivered recently. The investment in 25 aircraft, including required spares, is \$53 million. In dollar amount, says Hogan, it is the largest single fleet order the airline ever has placed.

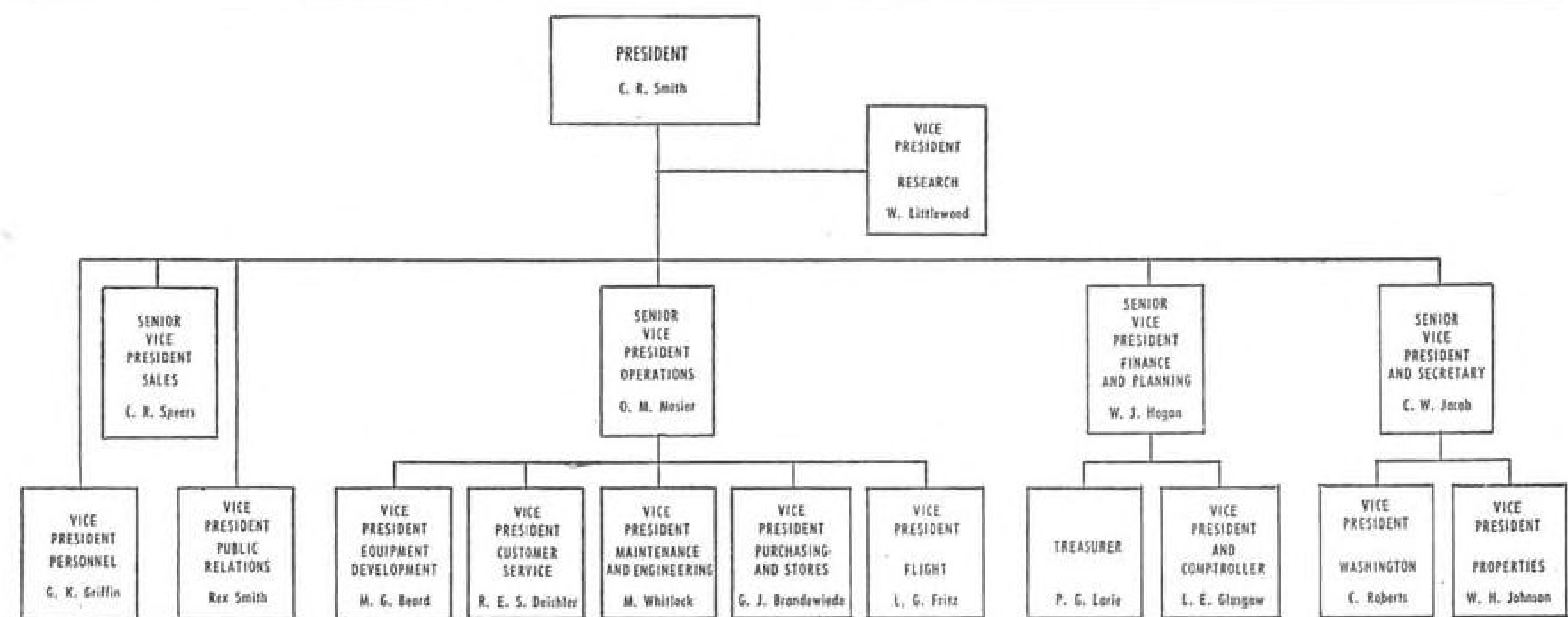
The carrier predicates need for such a fleet on the belief that the airline industry still has a long way to go to reach its full potential. Officials feel that performance characteristics of the DC-7—its 365-mph. speed and its quiet, comfortable ride—should help substantially in furthering the growth of the industry as well as the expansion of American's traffic.

With this airplane, the company looks for expansion of standard services used largely by businessmen, permitting conversion of additional four-engine equipment for expanded coach service.

► Coach Travel—American admits there has been some diversion of traffic from standard services to lower-priced air-coach service, but officials say the introduction of tourist travel has enabled them to tap additional markets.

"We are becoming more and more a means of travel for the general public," notes Hogan.

He points out that whereas standard-



AMERICAN AIRLINES' new organizational setup realigns top management into four administrative units, decentralizes responsibility.

AVIATION WEEK, April 5, 1954

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fare traffic largely is comprised of businessmen, coach travel is largely personal, with a very high percentage of pleasure.

Women comprise only 20% of American's standard-fare customers, but make up 40% of coach customers. The carrier says these new coach passengers are, on the whole, drawn from lower income groups than standard-fare passengers, the majority having family incomes of less than \$7,000.

Coach travelers are younger and include many more manual, clerical and service industry workers—a large number making their first flight, American reports.

While coach traffic has had its salutary effect in stimulating traffic, it is not without its pitfalls, Hogan emphasizes. Because it is comprised of a large percentage of pleasure traffic, it peaks greatly in the summer months, making it difficult to sustain a satisfactory load factor on flights.

Since it is largely personal travel, it will likely fluctuate more with changes in general business activity, says Hogan. ▶ **Optimistic Outlook**—President Smith is quite optimistic concerning growth of American and the airline industry on the whole over the next decade.

This optimism is based on continued increases in population, a more air-minded younger generation coming into the travel market, continued decentralization of U.S. industry, shifts in population and shorter working hours permitting more leisure time. All of these, says Smith, should stimulate air travel greatly.

▶ **'House in Order'**—American prides itself on "keeping its house in order" financially. This has been the chief factor in the carrier's extensive equipment program and is the main reason the company was ready and able to finance DC-7s when the transports went into production.

"We made provisions to have DC-7 delivery integrated with that of one of our competitors," says Hogan, "but they were not immediately financially able to accept them. That's why we got the competitive jump on everyone," he points out.

▶ **\$150-Million Climb**—Flight equipment owned by American at the end of the war had an original cost value of about \$13 million. By the middle of 1954, officials estimate that it will be 165 million—an increase of more than \$150 million in nine years.

At the beginning of this period, depreciation charges were small, less than \$2 million in 1945. This presented AA with a tremendous task of financing.

Starting with a net worth of \$26 million, the airline secured \$80 million from the sale of debentures and preferred stock. Depreciation runoff began to increase rapidly, and today the company finds itself in a much different position.

Plans call for the present equipment program to be completed within a few months. Hogan says provision for depreciation will be at an annual rate in excess of \$20 million. He estimates that "with continuation of reasonable earnings," AA will be able to keep itself in a position to handle any equipment program that might develop.

▶ **Jet Expenditures**—If jet transports are purchased within the next few years, American feels that first orders will not be for fleet replacements but merely will add planes to the conventional stable. The original jet program may not represent any greater expenditure than that of 1953 and 1954, which totaled about \$70 million, says the company.

Officials indicate they are keeping close watch on Boeing's 707 jet transport, with evaluating teams paying frequent visits to the plane-builder's Seattle plant.

Before widespread introduction of



New Allison Jet Gets Aerial Workout

Allison's flying testbed for its new J71 turbojet engine buzzes the runway at Edwards AFB, Calif., where the engine is being tested prior to use in the Douglas B-66 bomber and McDonnell F3H Demon

fighter. This flying testbed is a modified North American B-45C Tornado four-jet bomber carrying the J71 under its belly. The J71 is retractable into the plane's bomb-bay. The powerplant has 9,500 lb. thrust.

"O. K. To Jettison!"

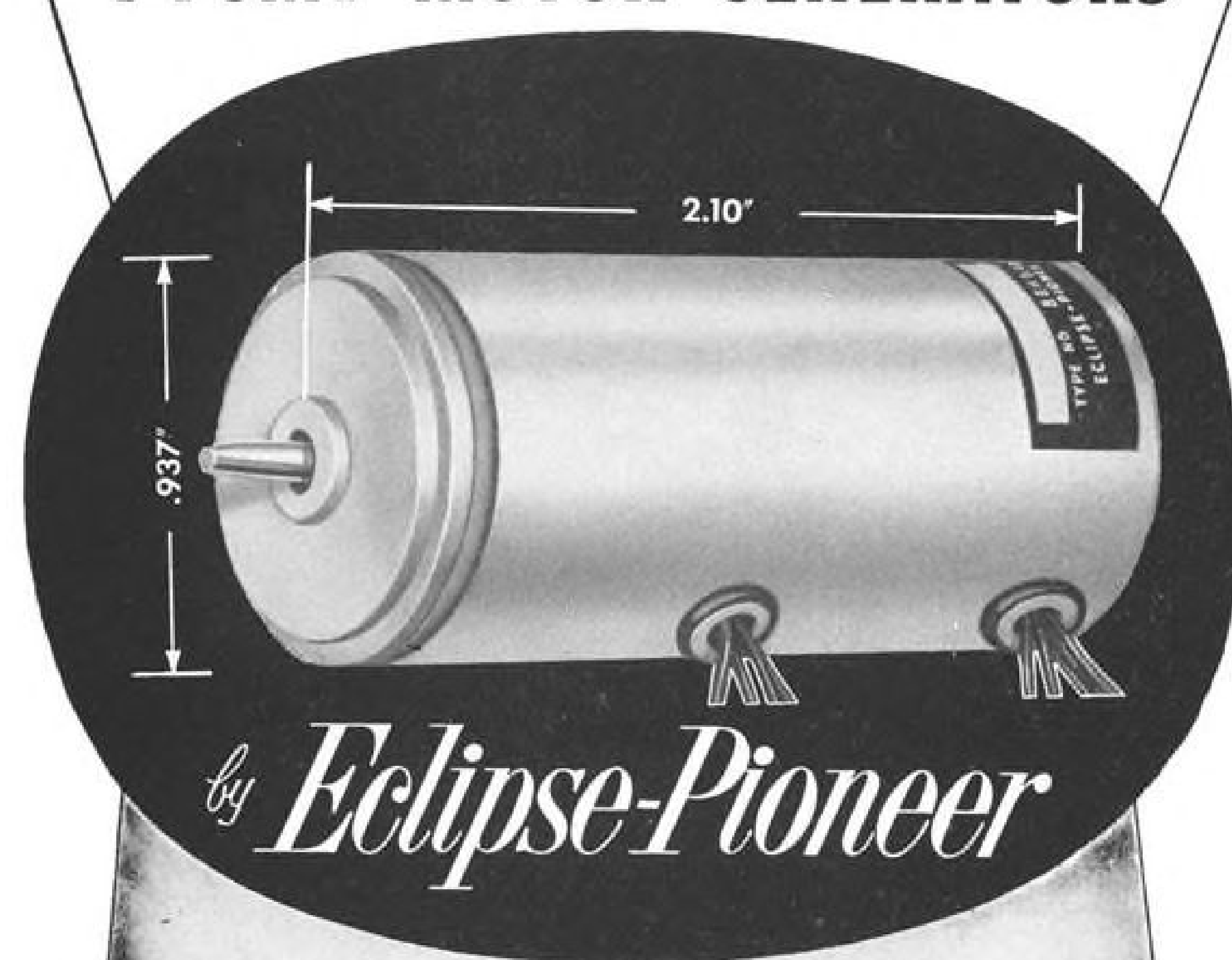
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jets on American's routes, however, certain problems must be resolved. Big question in the minds of AA's management: "Can we operate a jet economically within the present fare structure?"

Other weighty problems from the airline's point of view:

- Increased noise that jet transports will introduce, possibly forcing operations from some municipal airports.

- Traffic control in high-density areas.

Also, says Hogan, "Will the airlines be able to afford the cost?"

He points out that a \$4-million expenditure for jet aircraft would require an additional \$1.5 million for spare parts. "Quite a chunk of money," he observes.

► **Current Finances**—American's net worth has increased from \$57 million at the end of 1948 to \$92.6 million in September of last year. Earned surplus went from \$4.5 million to \$39.8 million in the same period.

Long-term debt was about 40% of invested capital. Today it stands at about 24%. During each of the last five years, AA has converted more than 6% of its revenues into profit after tax. The average has been 6.9%.

American currently is urging a new approach to rate-making whereby revenue and expense are calculated so as to yield a reasonable operating ratio, holding a 10% margin after taxes to be reasonable. Then, says the company, minor fluctuations in revenue and expense will not have such disastrous effects on resulting profit.

"This approach," says Hogan, "has the additional advantage of eliminating endless controversy and litigation as to what the allowable investment should be in arriving at a rate base.

"So far, tight load factors and high levels of equipment utilization . . . plus tighter controls have enabled us to absorb increased operating costs and show an improved profit each year.

"Currently, load factors and rates of equipment utilization are returning to peacetime levels. Whether the current low fares can be continued will depend on our growth in 1954, the degree of further rises in expense and general effectiveness of cost controls."

► **Realignment**—American hopes to implement its future growth through the recently effected realignment of its administrative setup, whereby authority is decentralized and increased responsibility is given officers in the field (AVIATION WEEK Mar. 15, p. 328).

Increased operating efficiency is anticipated through a regrouping of inter-related departments into one unit under a senior vice president (see chart) and realigning duties of officials for better coordination.

Biggest change is the organization of a customer relations department to handle passenger and cargo services

under vice president R. E. S. Deichler.

"This will be a staff department which will establish the policy and standards by which American will provide services to its customers," president Smith says. AA is believed to be the only airline with a department devoted exclusively to such activity.

Only department not changed under the reorganization is public relations. Rex Smith, vice president for public relations, continues to report directly to the president.

Hughes Files Damage Suit for Flying Boat

Long Beach, Calif.—A claim against the city for \$12 million damage to the Hughes flying boat and other property was filed by the Aircraft Division of Hughes Tool Co. here last week.

The flying boat was damaged last September when an earth dike, erected by a dredging company employed by the city of Long Beach, broke (AVIATION WEEK Sept. 28, p. 14). Heavy mud, silt, sand and water crushed the plane against adjacent structure and hangar.

The statement of claim cited five grounds of liability, including "negligence and carelessness . . . in the construction, maintenance, supervision, operation, and design and guarding" of the Long Beach harbor dredging and construction work.

The company said it is continuing to spend approximately \$3 million a year on the aeronautical research project.

Boeing Awards Five B-52 Subcontracts

Subcontracts for second-source B-52 production at Boeing Airplane Co.'s Wichita, Kan., plant have been awarded.

Successful bidders and the sub-assemblies they will manufacture: Cessna Aircraft Co., Wichita, horizontal stabilizers; Bell Aircraft Corp., Buffalo, N. Y., jet engine nacelles; Consolidated Vultee Aircraft Corp., Ft. Worth, Tex., outboard wing panels and vertical fins; Temco Aircraft Corp., Dallas, Tex., fuselage sections; Aeronca Aircraft Corp., Middletown, Ohio, rudders and elevators.

Assemblies involved in the first contracts represent 25% of the gross airframe weight, according to Wayne W. Perkins, outside production manager at Boeing-Wichita. The contracts are exclusive of orders placed by Boeing-Seattle.

Contracts are for tooling, production assemblies and a small number of production machine tools. Funds will be required for building construction by the five firms, Perkins says. Boeing plans to award additional B-52 subcontracts in the near future.



LAUNCHING PLATFORM for B-61 Matador is positioned for loading aboard C-124.

Missile Dons Seven-League Boots

Air transportable capabilities of major units of the Martin B-61 Matador missile points up USAF's ability to place the pilotless radar-controlled bomber in operation anywhere in the world in relatively few hours.

These photos show a Douglas C-124 Globemaster transport being loaded with a Matador mobile launcher at the missile maker's Baltimore, Md., plant prior to being flown to its destination. The B-61 also is air transportable.

Recently USAF Tactical Air Command received two Matador-equipped squadrons and has sent one of them to Germany; the first overseas deployment of a guided missiles unit.

The turbojet-powered Matador cruises at approximately Mach 0.9, dives onto its target at supersonic speed.



MATADOR on launcher, ready to fire.



DOUGLAS C-124 swallows Matador's mobile launching platform with room to spare.

Is 32 the 'Witching' Age? A Hostess Says 'No!'

By William J. Coughlin

Los Angeles—We have just had a look at a document with a higher security classification than the Hanford atomic energy plant. It is a list composed of American Airlines stewardesses who are more than 30 years of age.

As you know, American decided to ground all its stewardesses as they reached 32. After a large howl of protest and much publicity, the airline now comes up with the half-hearted announcement that those of 32 and thereabouts already flying can continue to do so while a "joint study" is made (AVIATION WEEK Mar. 29, p. 62). We predict they will find some shapely joints. But the company warns that the young maidens it hires from now on will be grounded when they become old ladies of 32. All this resulted in a great fuss. Most of the fuss is coming from women who are 30 years old and up.

Our wife insisted that we join this protest—for some reason which we do not understand since she tells us she is 29—an age which she has been for several years.

► **Dimensions**—Nevertheless, we arranged an interview the other day with one of the few women we have ever met willing to discuss her age, an American Airlines stewardess fast approaching the deadline. She turned out to be Miss Anelya Sembroski, a very determined young lady who objects to the idea that she soon will be fit to fly on nothing but a broom.

Miss Sembroski is five-foot-two, eyes of blue. And officially she is master chairman for American Airlines stewardesses, who are members of the Air Line Stewards and Stewardesses Assn.

The first thing Miss Sembroski wanted to make clear is that she is not 32. She will not be 32 until May 11. Now this may seem like splitting hairs to you but when you

are employed by American Airlines it is a very critical distinction. As to other vital statistics, she weighs 114, wears a 7AA shoe and a size 10 dress. Bust, waist and hips are classified.

► **Witches and Chicks**—Miss Sembroski, who commutes between Los Angeles and New York on one of C. R. Smith's nonstop DC-7s, stated her opinion that American Airlines should judge its girls on merit and personal appearance, not on age. A stewardess over 30, she points out, often is better looking than her younger cohorts and undoubtedly keeps her head better in an emergency.

"We have some girls who look like witches," she admits, "and we also have some cute young chicks who don't give two hoots about what they are doing for the passenger."

We know some American Airlines publicity men who won't give two hoots about Anelya Sembroski after that statement.

"If American insists on setting an age limit," she says, "then let them put stewardesses on probation at 32 just as they are when they first start to fly. If they don't come up to American standards, the company can ground them. But it is unfair for American to imply that when we reach 32, we all become unattractive, surly and anti-social. It's up to the individual."

► **Proposal**—If the number of gentlemen who turned to stare at Miss Sembroski in the Hotel Statler bar during our interview is any indication, she is one individual who would pass such a test.

As a matter of fact, she received a proposal of marriage from Florida after her photograph appeared in the newspapers as among the 69 American stewardesses affected by the over-age ruling.

We feel that her reply was somewhat of a romantic classic in rejecting a proposal and herewith quote

it in full for any other young ladies with similar problems:

"Dear Mr. Blank:

"Thank you for your letter of Feb. 23, showing an interest in our problem of the American Airlines' stewardess being released from her job when she has reached the age of 32.

"As spokesman for the Air Line Stewards and Stewardesses Assn., international, and master chairman of American Airlines, I know that we have a lot of work to do before we come to a solution. Public opinion has been in sympathy with the stewardesses, so we may yet establish our viewpoint. Truly yours, Anelya T. Sembroski, Master Chairman, AA."

We think it takes a very bold airline to cross a girl who answers proposals in such a manner.

► **A Warning**—And we wish to warn the gentleman responsible for American's decision: The girls know who you are, and we would not care to be in your shoes. For hell hath no fury like a woman superannuated.

We are glad to see you have bowed to public demand and reinstated—temporarily at least—the girls over 32 who meet the other standards, picking up a few more headlines enroute. For American always gives the public the service it deserves.

As Stanton Delaplane of the San Francisco Chronicle puts it: "I do not want any young fibbertigibbets taking part in the complicated maneuvers of flight. I want a handsome lady with a little maturity. It is my opinion that ladies improve a great deal with a little mileage on them."

► **Starting to Live**—Miss Sembroski, who has her own ideas about the advantages of being over 30, agrees most heartily:

"A woman just really starts to understand about life, living and the male sex when she reaches age 30," she says, sipping her Manhattan thoughtfully.

And we cannot help wondering what the French think of all this.

Japan to Open First Postwar Air College

(McGraw-Hill World News)

Tokyo—Aeronautics Bureau of Japan's Transportation Ministry will open this country's first postwar aviation college in July, training pilots, engineers

and navigators under a \$400,000 budget appropriated for fiscal 1954.

One Beechcraft D-18-S and one Piper Super Cub will be used the first year. The ministry will appoint 18 Japanese instructors.

The school will be located at a former Navy airfield in the suburb of Miyazaki City, Kyushu. The pilot

course will have two classes, one for wartime pilots and the other for tyros.

The experienced class will train 10 pupils for three months, giving each 240 flying hours. The inexperienced class will take 10 for two years.

Engineer and navigator courses will take 15 each of wartime veterans for nine months.

AVIATION WEEK, April 5, 1954

THOMPSON RETREADS SAVE MONEY FOR AIRLINES THE WORLD OVER



Thompson retreads reduce your tire maintenance and replacement costs. You get more landings per tread and more treads per casing. Wheel changes are fewer and your stock of replacement tires smaller.

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LOW LEVEL



Revere INSTRUMENTS SEE WHERE YOU CAN'T

See Revere . . . if you need to know — **HOW MUCH LIQUID — HOW LITTLE — AT WHAT LEVEL.** Revere's precision made instruments are your unfailing eyes that see into sealed tanks, tubes or complex fuel lines. They can provide you with accurate measurement of liquid level regardless of pressure or temperature changes, vibration or rapid acceleration forces, AND they will automatically transmit a warning signal whenever liquid flow or level maintenance varies from a pre-determined value.

These hermetically sealed, magnetically actuated instruments employ balanced float assemblies to minimize false

alarms. Compact and light, Revere instruments meet government specifications. They are available in many different configurations, some of which include relays to handle heavy electrical loads. Others are designed for complete submersion in fluids.

Submit your control problem to our Field Engineering Department today. Revere will provide the instruments to tell you — **HOW MUCH — HOW LITTLE — AT WHAT LEVEL.** Shown below are some instruments that are the seeing-eyes of aircraft and industry.



FLOAT SWITCH

Specially designed with single or dual float systems to provide automatic cut-off control for single point high pressure refueling.



FLOW SWITCH

Provides instantaneous warning signal whenever liquid flow falls below a pre-determined value. It can be mounted in any direction.



INDICATING SWITCH

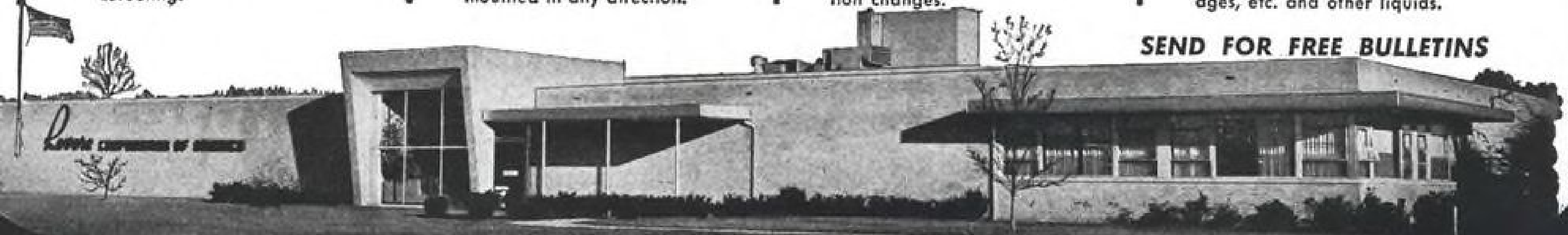
Records the presence of fluid in a line whether stationary or flowing and transmits a warning signal if fluid condition changes.



FLUID LEVEL SWITCH

Used to maintain accurate high level, low level or constant level control of fuels, water-alcohol mixtures, beverages, etc. and other liquids.

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REVERE CORPORATION OF AMERICA
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precision instruments for aircraft and industry

'Navarho' Net

- ACC asks single system of long-distance nav aids.
- AF device offers greatest promise, report says.

Air Coordinating Committee has approved major revisions in U. S. policy regarding worldwide long-distance navigation systems.

New policy is based on three principles:

- To promote the development of a single system of long-distance aids to navigation for U. S. and worldwide standardization.
 - To provide U. S. aircraft with a solution to the present air navigation problem with the most readily available and economical system until implementation of the standardized system is obtained.
 - To support the development and evaluation of all navigation systems that will best meet the operational requirements for long-distance flight operations.
- **Greatest Promise**—The USAF-developed "Navarho" system appears to offer the greatest promise as a long-distance navigation aid, ACC says. Air Force is holding a preliminary demonstration of "Navarho" before the International Civil Aviation Organization's Communications Division meeting in Montreal, Canada.

"Navarho" is designed to provide navigation information to aircraft for transocean and transcontinental flights up to 2,000 miles. It is a low-frequency system operating in the international band set aside for long-range navigation aids and does not interfere with the present program for VHF (very high frequency) short distance navigation systems such as VOR (visual omnirange) and DME (distance measuring equipment).

► **Evaluation Planned**—U. S. will complete the development of the "Navarho" system and carry out extensive evaluations on both the Atlantic and Pacific coasts.

Participation of domestic and international air carrier and marine operators will be invited, ACC says. Results of the evaluation will be made available to ICAO members to promote the standardization of "Navarho" for long-distance navigation.

U. S. will observe for the present the following principles for navigation aids:

- Continued operation and expansion, as required, of the Loran system will be supported for U. S. air and marine use until a new national standard long-distance system is adopted.
- Installation and operation of non-

directional radio beacons will be continued where needed and where the beacon facility is adequate.

- The U. S. will provide acceptance and support of limited Consol installations based on operational requirements.
- Engineering of new additional Consol station installations will be directed toward practical future integration into the standardized system.
- Duplication of long-range aids will be avoided to the maximum extent possible.

House Group Fights Seven-Cent Airmail

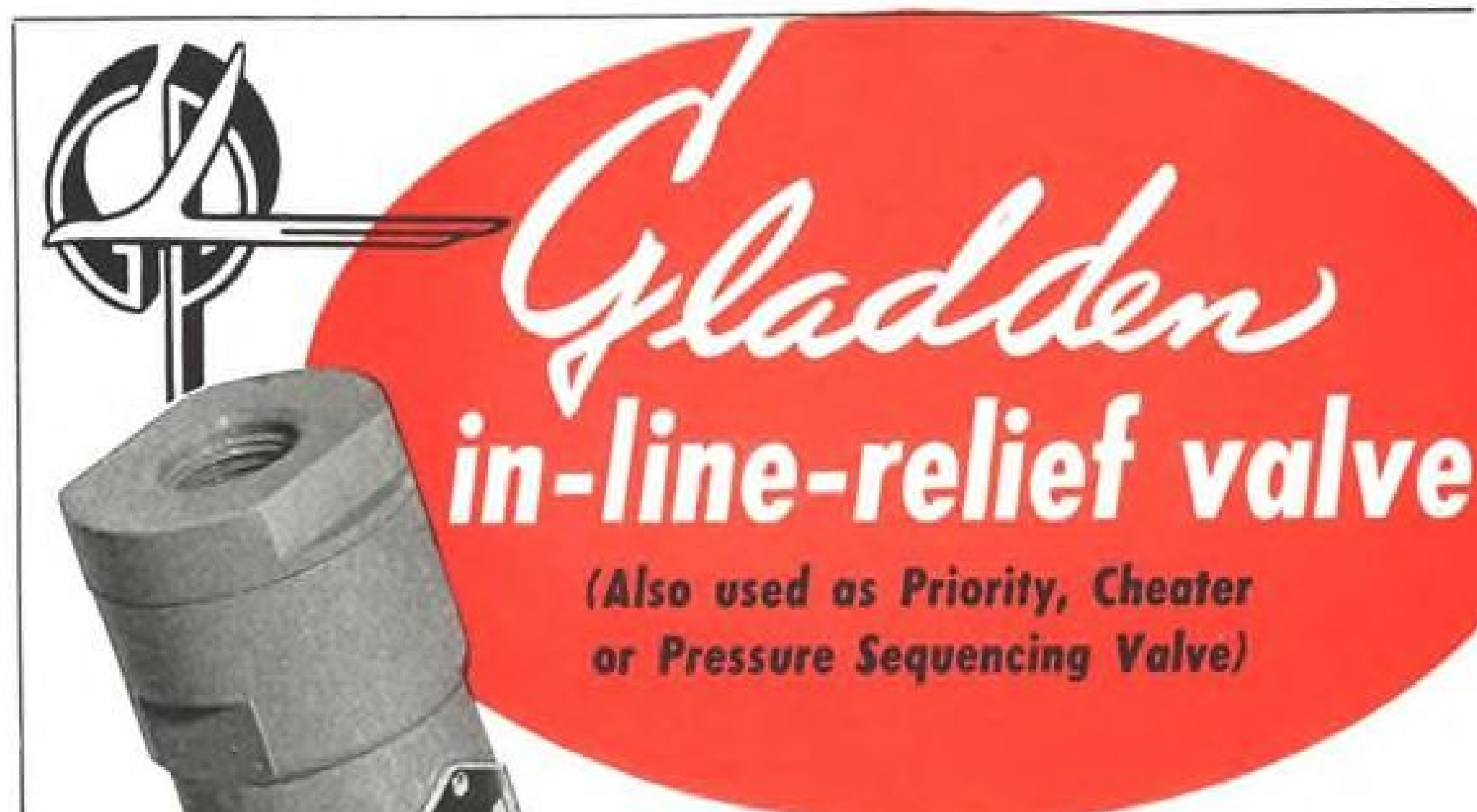
Nine committeemen have challenged

a majority vote of the House Post Office and Civil Service Committee increasing the airmail postage rate from six to seven cents an ounce.

The 14 members—11 Republicans and four Democrats—who supported the increase estimate it would yield the Post Office \$15 million additional revenue annually.

The minority, in objecting to the increase, declare:

"There is no certainty that the expected increase in revenue will materialize . . . with regard to airmail. It is said that today it is unnecessary to airmail a letter from Washington or New York to Chicago and pay seven cents, because the letter probably would move



Now in production

Design features

- Weighs ounces NOT pounds
- Fully qualified and accepted
- Single internal relief pressure adjustment
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5.50 inches

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NEW DUAL PURPOSE R-F NOISE FILTER

Handles Equipment Susceptibility and
R-F Noise Problems in a Single Package



Is the equipment which you are designing susceptible to malfunctioning caused by r-f currents conducted through power lines? Will your equipment interfere with other equipments operated off the same power line?

A prominent electronics manufacturer facing these problems called on Sprague for help with r-f test equipment which was already in production. Specifications for a single filter to do both jobs were established by the manufacturer's engineers working closely with Sprague Field Engineers. The required insertion loss characteristics were set at more than 60 db from 14 to 40 kc and more than 80 db from 40 kc to 200 mc; line voltage drop was limited to one volt max. at 1.5 amperes at 400 cycles.

Sprague engineers designed this "impossible" dual circuit line filter in a case only 3 1/4" x 2 7/8" x 2 1/4"! This filter not only outperforms units previously designed by others in efforts to solve the problem but also occupies only two-thirds the cubic space.

Once a custom-tailored design such as this has been completed and accepted by a Sprague customer, either production quantities or small runs are readily supplied with equal facility.

Let Sprague help you with your radio interference problems without obligation on your part. Write, wire, or phone the Sprague Electric Company, 11325 Washington Blvd., Culver City, California (TEexas 0-7491) or North Adams, Massachusetts (MOhawk 3-5311).

YOU CAN DEPEND ON

SPRAGUE

The Sprague Electric Company
is the World's Largest
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just as quickly by regular first-class mail which is now being carried by air between these cities. Furthermore, it is planned to extend this air movement of regular first-class mail to other cities. The airmail increase may even defeat itself by driving a large portion of present airmail traffic over to first-class which, even at the proposed rate of four cents, would be far less expensive. This would decrease airmail revenue with no commensurate decrease in costs."

Committee members who plan to carry the fight against the increase to the House floor: Democratic Reps. James Davis, George Rhodes, John Jarman, William Tuck, John E. Moss, John Dowdy and Hugh Alexander; Republican Reps. H. R. Gross and Harold Hagen.

New French Budget Aids Plane Builders

(McGraw-Hill World News)

Paris—France's languishing aircraft industry will get a small \$25-million boost from the 1954 French air force budget, now before the Chamber of Deputies.

The industry, feeling the squeeze over the last three years of lean budgets forced by the financial drain of the Indo-China war, does not have a plane ready for series production to compete with late models of North American Aviation's F-86 Sabre jet or Britain's Hawker Hunter.

► **Little Increase**—The new \$770-million budget is only a little bigger than last year's \$750 million, and the portion going for aircraft development and production remains almost the same (\$305 million).

However, producers of proved models will receive \$230 million this year, against \$185 million in 1953 when a much larger proportion of the total funds went for research and plant development.

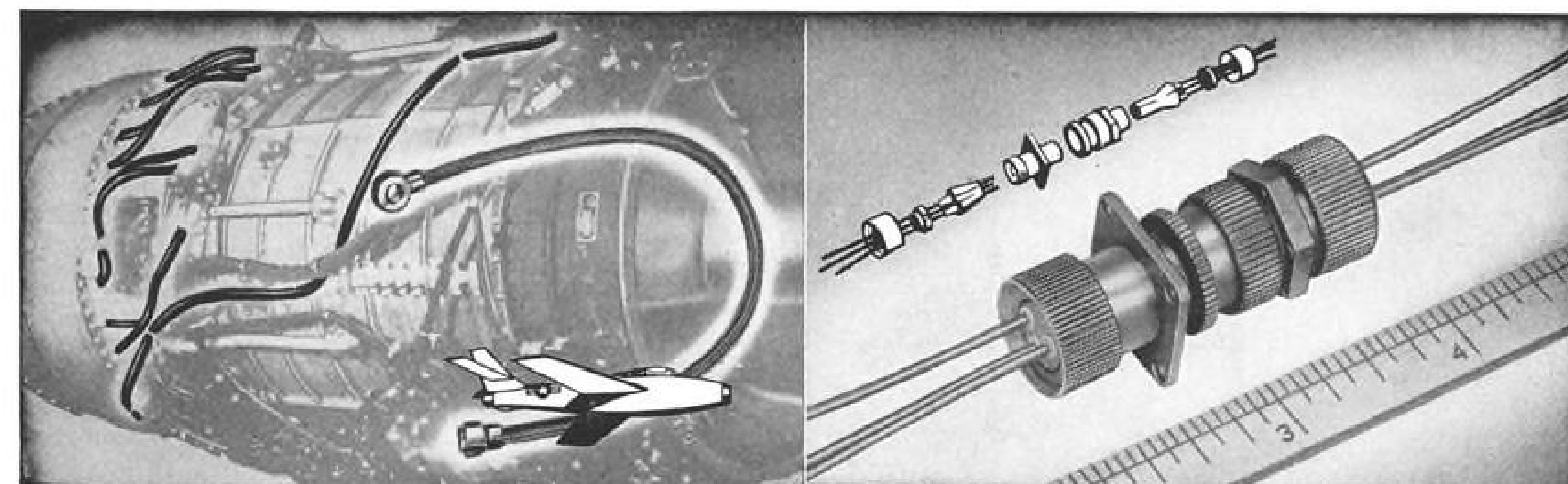
► **Mystere Funds**—The big change this year is the provision of funds for production in 1954 of 150 Mystere 4Bs, Marcel Dassault's much-complimented interceptor.

This plane, normally powered by a Tay engine (6,160 lb. thrust), recently exceeded 800 mph. in horizontal flight (AVIATION WEEK Mar. 15, p. 319) when specially powered by an Avon engine of 9,900 lb. thrust with afterburner, produced by Hispano-Suiza under license.

The 1954 budget also will pay for the delivery of 70 Sncase SO-4050 Vautour attack aircraft, 100 two-engine jet trainers; 40 medium transports; 67 MD-315 transports; and the purchase of 16 Meteor N.F. 11 all-weather fighters from Great Britain.

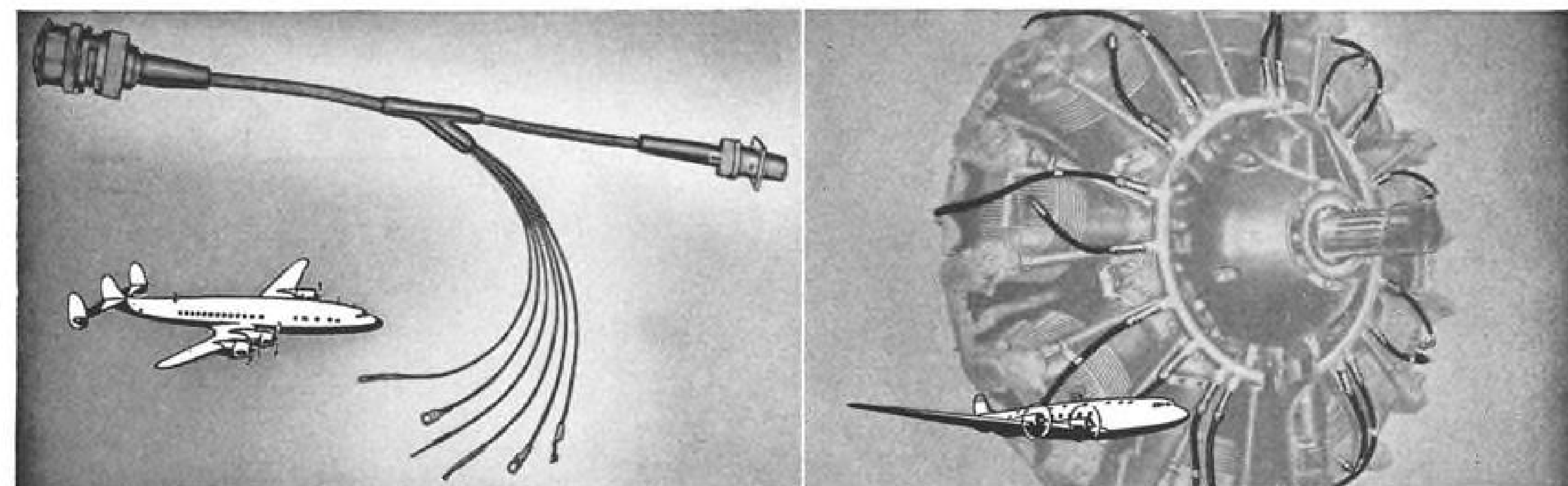
► **Production Data**—Information given

Four design ideas you can use right now...



DEPENDABLE FUEL FEEDING. Fuel for the J65 Turbojet Engine is injected to the burners through Titeflex® flexible metal hose. Tough, lightweight Titeflex—tested for temperatures from -70°F. to +600°F. and for pressures up to 500 psi—reliably conveys fuel to engine nozzles; withstands vibration and rough use; is excellent for complex configurations.

FAILURE-FREE INSTRUMENTATION. Designed primarily for instrumentation service at high altitudes, lightweight Titeflex 07 Connectors are pressure-tight and resistant to moisture and corrosion. Plug and receptacle, mated, weigh only 3/5 of an ounce! Special sizes, meeting AN Specifications, can be made with 2 or 3 pins and AE threads—and adapted to your design.



CUSTOM WIRING SYSTEMS. Titeflex specializes in designing and building special "packaged" wiring systems and component assemblies for today's complex aviation and guided missile installations. These may be jacketed with protective silicone or other compounds—and Titeflex Special Connectors used as integral parts solve complex wiring problems.

RADIO SHIELDING. Titeflex Harness for reciprocating engines is our specialty. Titeflex makes a wide range of standard ignition harnesses meeting rigid aviation specifications—can also supply component parts, such as serviceable leads for military and commercial aircraft. Titeflex application on Wright R 1820 Engine includes harness and leads.

FROM DESIGN TO FINISHED PRODUCTS, Titeflex is especially well qualified to help you with all problems of special metal hose, wiring and connections. Take advantage of the long experience of Titeflex engineers in developing high temperature fuel lines, in designing and fabricating harness and wiring systems. Write us now about your application; our nearest representative will be glad to call and help you. Or send for our new 48-page *Metal Hose Catalog No. 200.*

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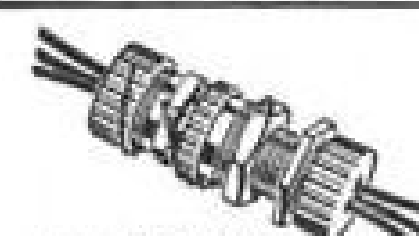
☐ PRECISION BELLOWS



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☐ RIGID AND FLEXIBLE WAVE GUIDES



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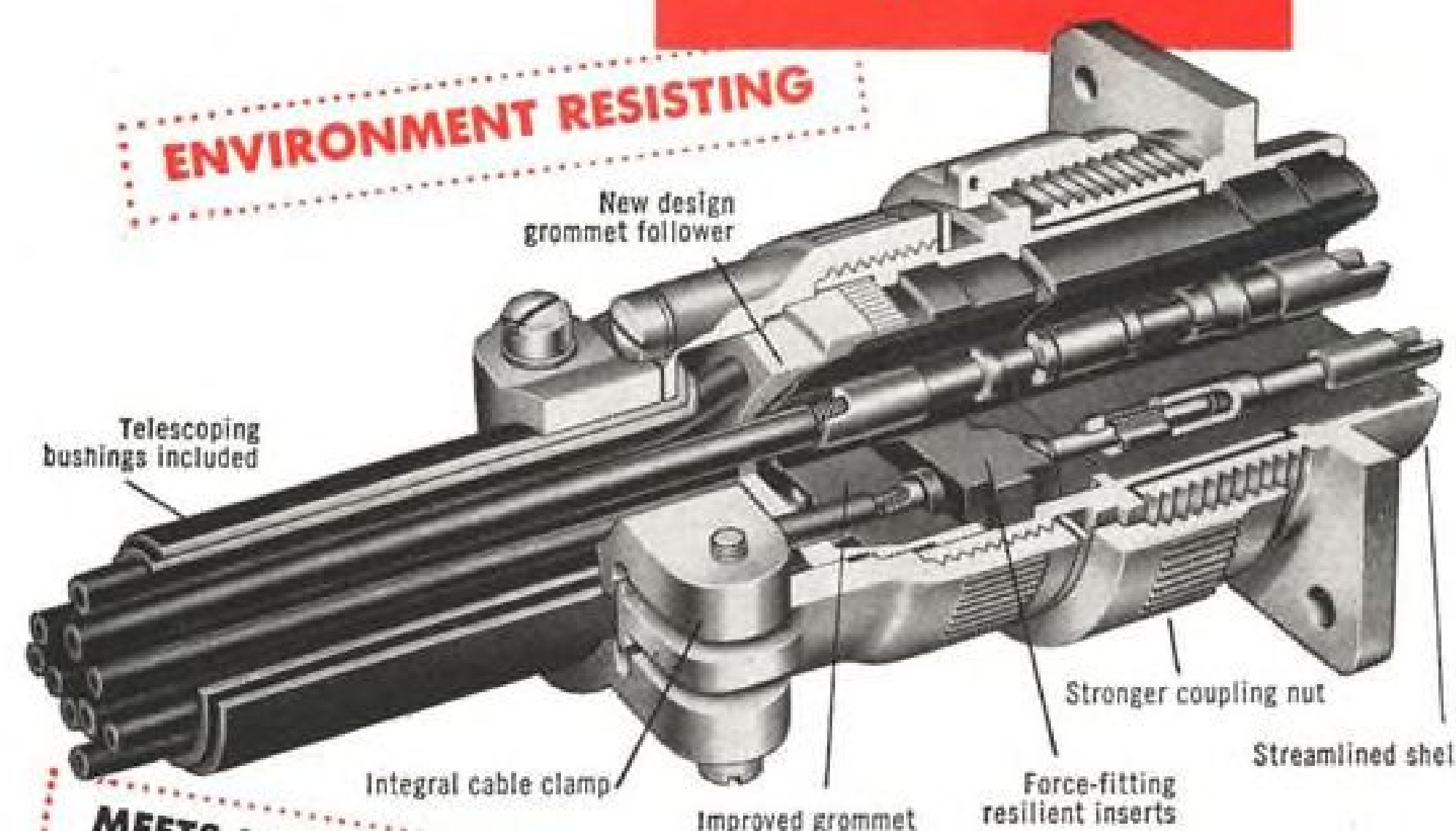
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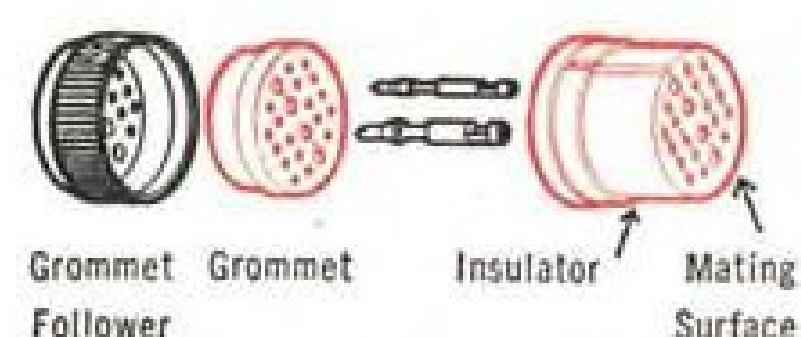
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CANNON AN-"E" PLUGS



MEETS LATEST MILITARY SPECIFICATIONS

- Streamlined Shell**
Approximately 25% lighter than previous design.
- Stronger Coupling Nut**
Improved strength features.
- New Grounding Lugs**
Integral; convenient.
- Integral Cable Clamp**
Space saving, fewer parts.
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Cannon's new exclusive premium Silcan 63, optional, featuring resilience, increased tensile strength, and long-lasting dimensional stability.
- Closed-entry socket contacts**, machined from solid high-conductivity copper alloys, silver-plated; hand tinned solder pots.
- Telescoping Bushings**
Standard Equipment



No moisture condensation trap

The Cannon AN-"E" Connector grommet provides positive seal against the rear of the resilient insulator. Mating surfaces of resilient insulators of connectors are sealed by compressing the insulators 3/32" during mating. AN-"E" Connectors have 3 times the flashover value of similar connectors, sealed. An important feature for high altitude and other applications.



AN3108E
Plug mated with
AN3102E
Receptacle

Moisture-proof!
...Vibration resisting!
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Just what you've been waiting for!

The new high-quality, streamlined, simpler, smaller, and lighter Cannon AN-"E" meets today's military specifications (MIL-C-5015A ASG) with improved connector performance. **Completely sealed from cable to cable.** A multi-service unit designed to meet your moisture condensation, flashover, corona, and vibration problems.

Write for "AN-E" Bulletin...
TODAY!

Refer to Dept. 110

CANNON ELECTRIC COMPANY, 3209 Humboldt St., Los Angeles 31, California. Factories in Los Angeles; East Haven; Toronto, Canada; and London, England. Representatives and distributors in all principal cities.



CANNON ELECTRIC

to the Chamber includes production data for 1953.

The French aircraft industry produced for its government: 160 Vampire fighters under British license, 207 Ouragon jet-powered fighters (which the French government currently is attempting to sell in India and Latin America), 11 Mystere 2s, and 12 Nord-2501 medium transports (a plane unacceptable to United States authorities for offshore procurement contract, but which the French are using and attempting to sell in Latin America).

Production in 1953, together with a purchase of British Meteor fighters, enabled the French air force to retire the last of its propeller-driven combat planes from active service.

► **38 Squadrons**—The 1954 deliveries, together with the purchase of additional Meteors, will provide the French with 38 squadrons comprising 805 planes by the end of 1954.

This number will rise to 51 squadrons totaling 1,032 planes by the end of 1955, according to present plans.

All of these units are assigned to France's NATO forces in Europe, and exclude air units operating in Indo-China.—JOC

RCAF Takes Over \$30-Million Airbase

Edmonton, Alberta—Royal Canadian Air Force is beginning to man its huge new base 130 miles northeast of here at Cold Lake, Canada's \$30-million link in the McGill radar fence and its northernmost bulwark against an over-the-Pole bomber attack.

An advance group occupied the airbase late last month as the field—probably the largest in Canada—neared completion, with one runway completed and a second to be finished this summer.

► **Weapon Evaluation**—The airbase will be mainly for gunnery and bombing training operations and also can be used in connection with the development and evaluation of various forms of weapons, including air-to-air rockets.

It will cover an area approximately 115 by 40 miles and has been carved out of scrub land in an uninhabited section of Alberta province.

Cold Lake will have hangars to house the largest aircraft used by RCAF. It is situated far enough from any settlements to permit gunnery and bombing operations in complete safety.

► **Jet Fuel Line**—The Cold Lake base is located north of the Bonnyville oil field, but no facilities have been planned to pipe oil from the field to the airbase.

Railway spurlines have been built to Cold Lake, and fuel for jet aircraft and other purposes will be sent to the base by rail tankers, RCAF officials say.

Gilfillan has designed, produced and delivered

more ground surveillance radar...

more reliable ground surveillance radar...

more ground surveillance radar on schedule...

more ground surveillance radar to more countries (30)...

than any other major electronics company in the United States.

Gilfillan is at present exclusively engaged in the research, development and production of

**RADAR NAVIGATION AIDS
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for the USAF, US Army, USN, USMC, RCAF, RAAF, SAAF and all NATO countries.

And in addition to present production, Gilfillan basic research groups are conducting primary research in various complex electronics developments.

YOUR ELECTRONICS PROBLEMS

Gilfillan can solve your complex electronics problems quickly, develop equipment of maximum efficiency and deliver on schedule. The proof is in past and present Gilfillan performance. Gilfillan invites your inquiry.

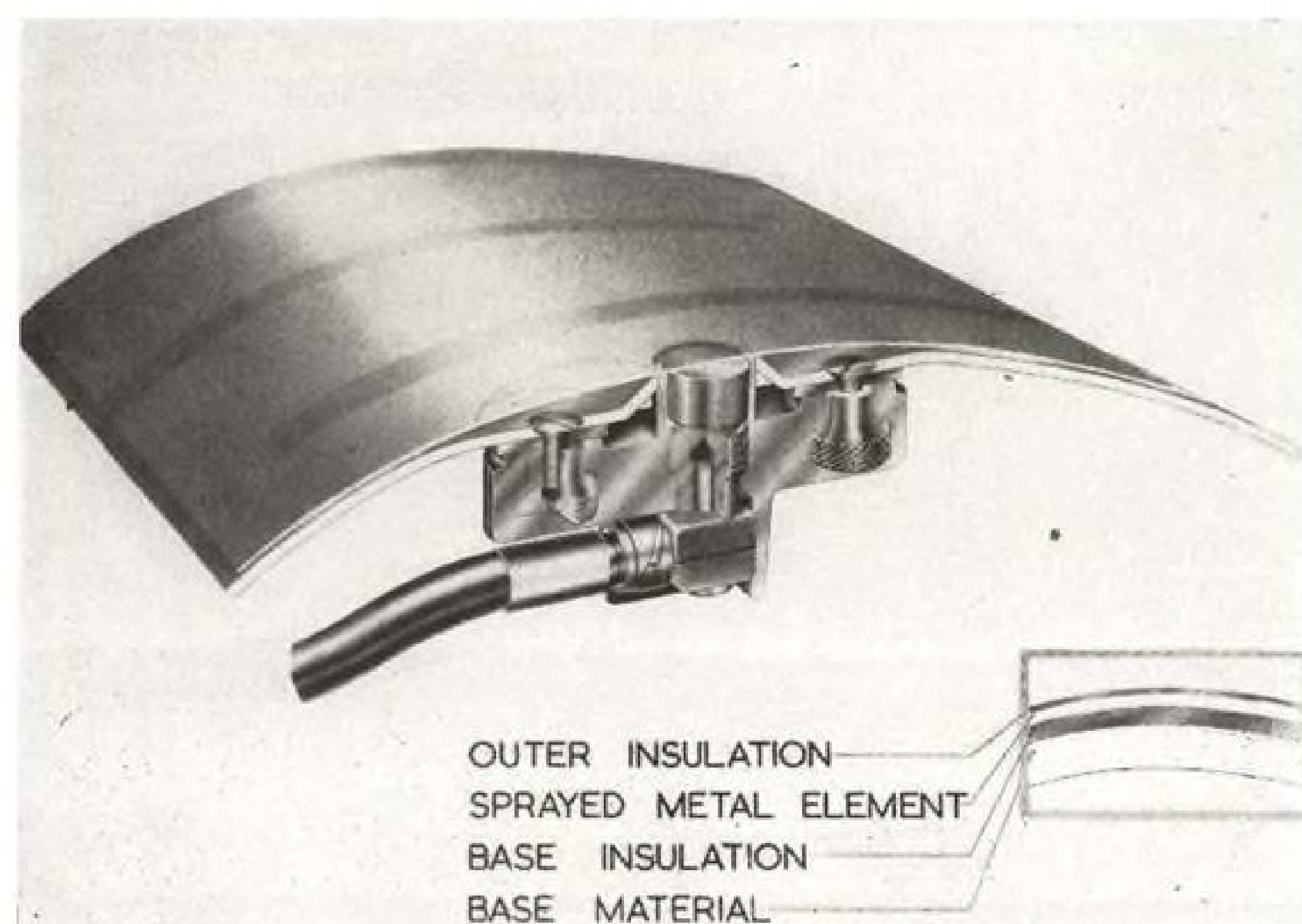


AERONAUTICAL ENGINEERING



HYPOTHETICAL TURBOPROP TRANSPORT of estimated 120,000-lb. gross weight with sprayed-on de-icing system totaling 1,064 lb.

Napier Sprays on Its Electrical De-Icer



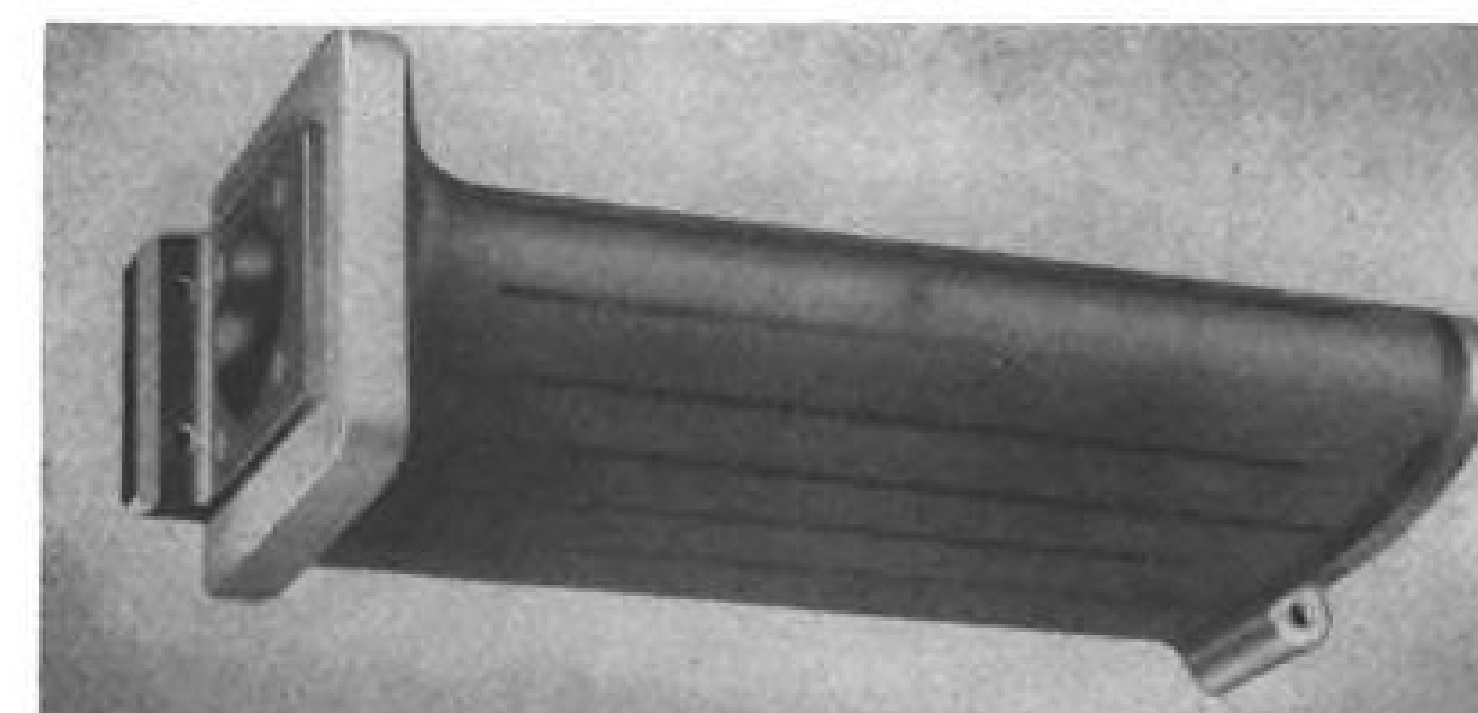
CONSTRUCTION of heater mat, with cross-section view of makeup of sprayed-on unit.

A new electrical aircraft de-icing system is applied with a spray gun. Developed by the British firm of D. Napier & Son, Ltd., the system can be used wherever protection is desired, including compound curves and parts too small or difficult to be fitted with other types of de-icers. Price is said to be competitive with other types of de-icers, and maintenance and operations costs negligible.

Briefly, Napier's surface heater de-icing system consists of a metal heating element sandwiched between two insulating layers. First a coat of thermosetting resin is sprayed onto the surface of the airplane. Then the metal resistance element is applied by spray gun to the pattern desired for required heat distribution. This heater element is fitted with terminals that are connected to the airplane's electrical system. Then a final outer insulating coat of thermosetting plastic is sprayed on and polished to complete the mat.

► Surface Heater Tests—Extensive test-

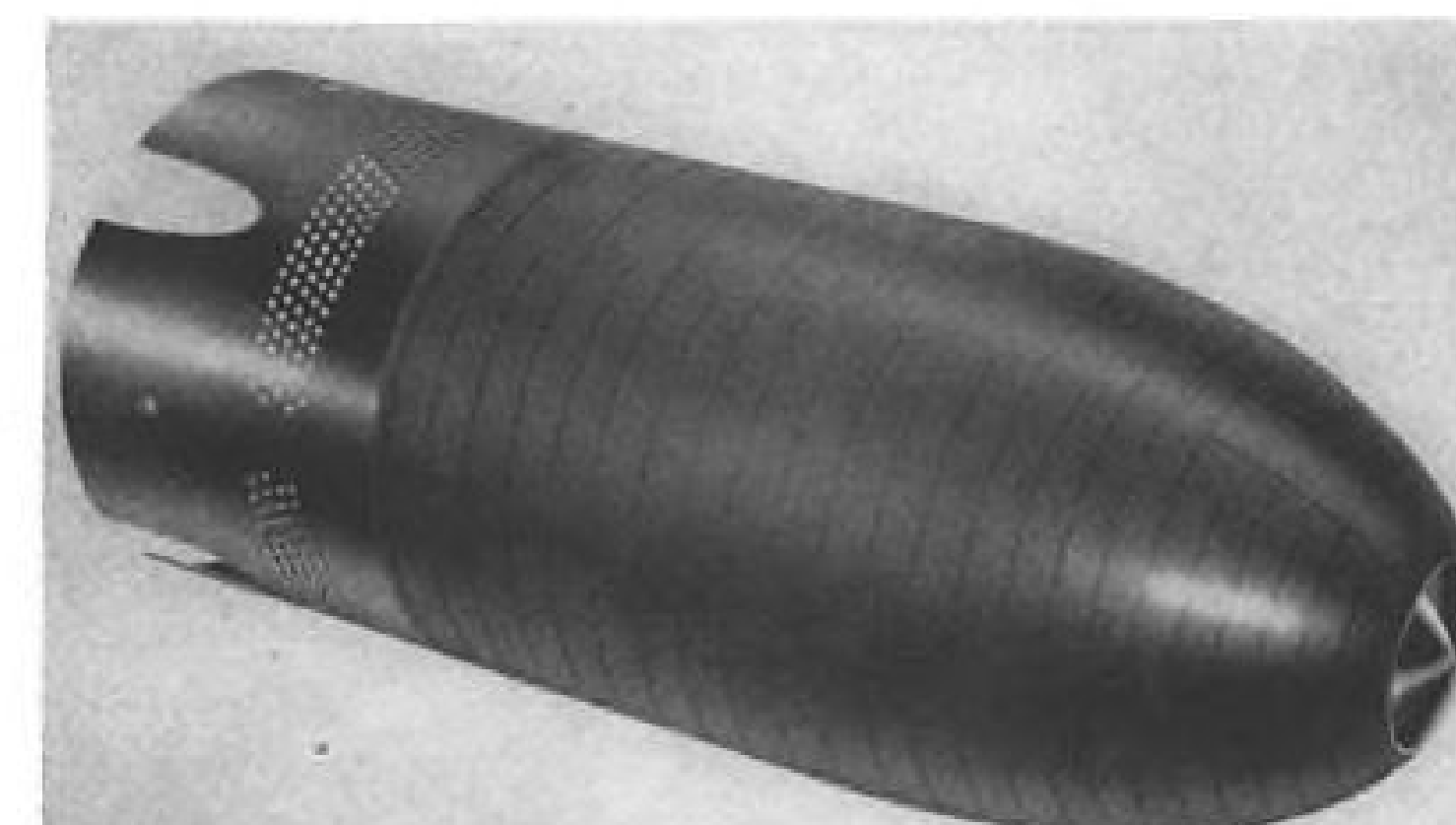
Some Typical Applications for Sprayed-On De-icers . . .



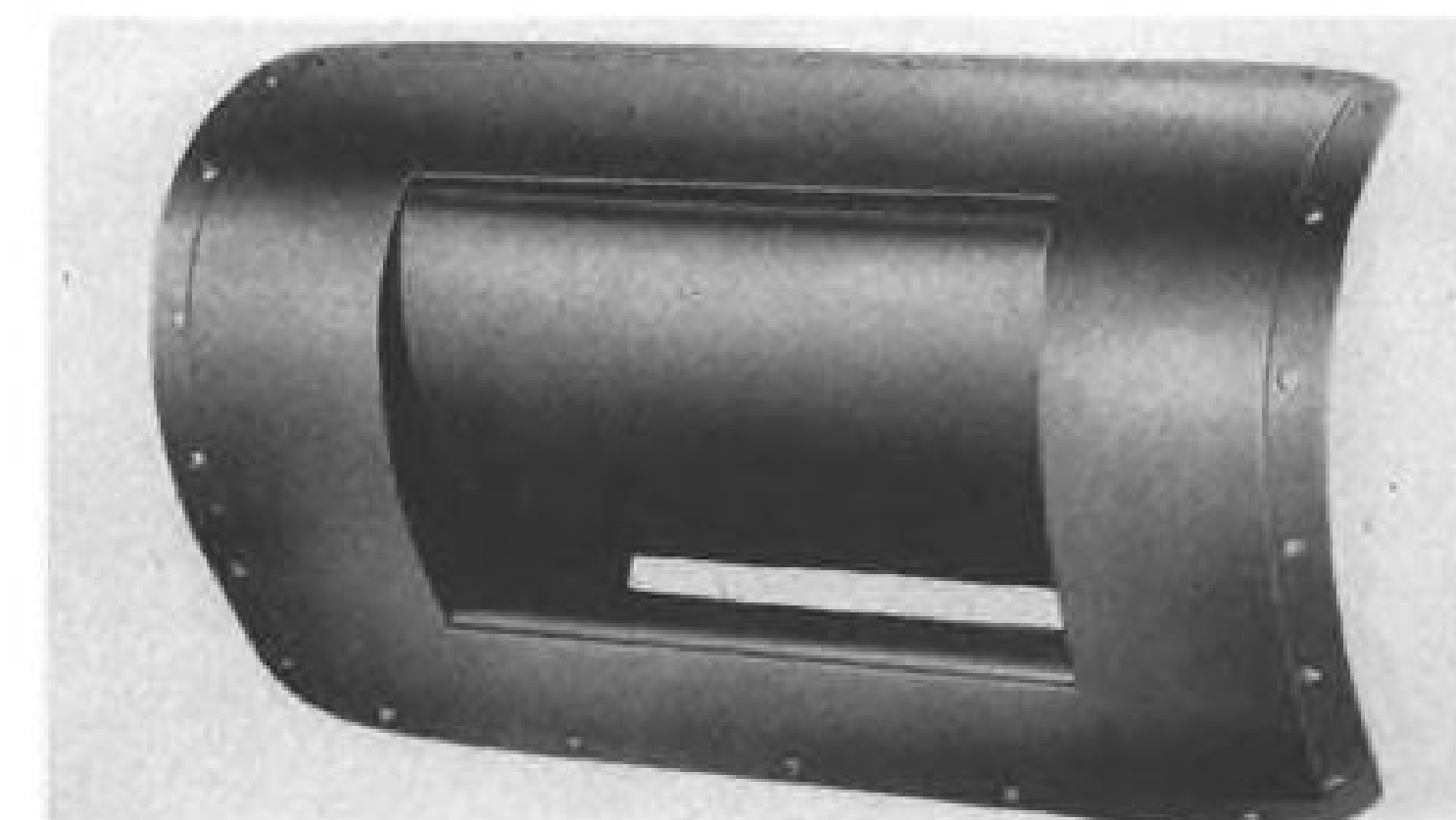
Armstrong Siddeley Sapphire jet support strut.



DH Comet alternator air intake.



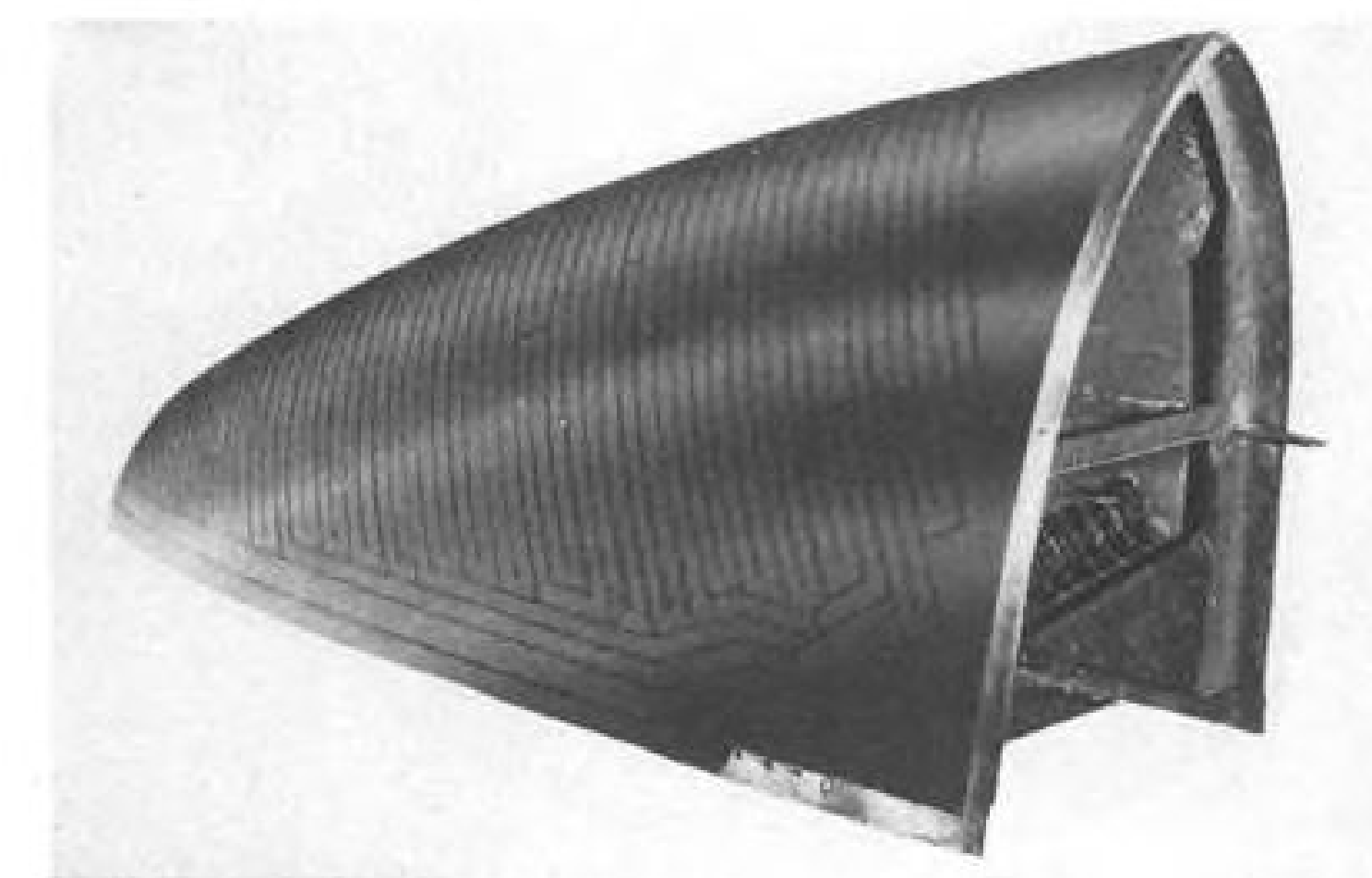
Armstrong Siddeley Sapphire jet nose fairing.



Airspeed Ambassador combustion heater intake.



Fairey Gannet engine intake.

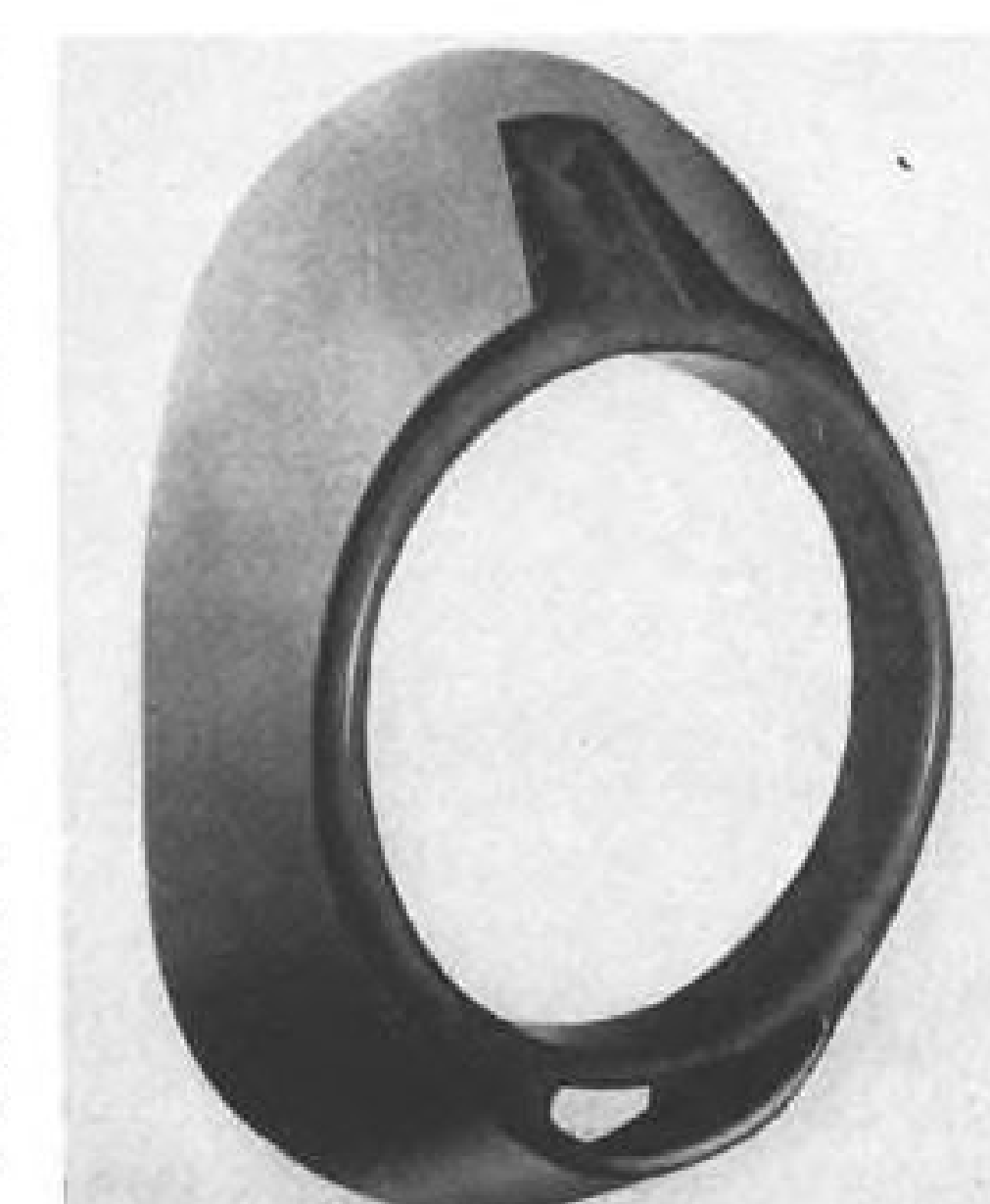


Bristol Britannia elevator horn balance.

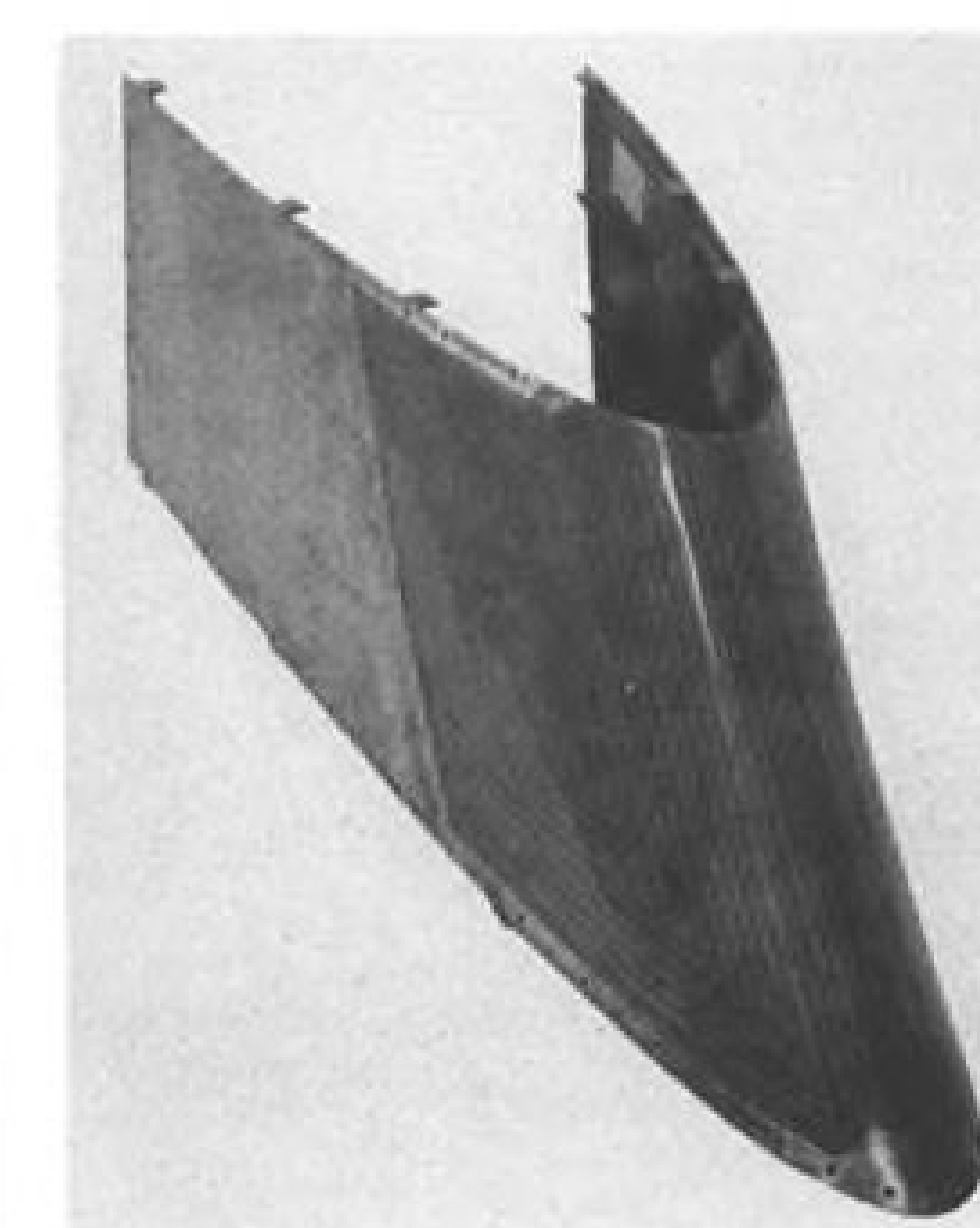
ing, including some 1,500-hr. of flight time, has been made of the sprayed-on de-icing system on a variety of planes, including jet fighters. For much of the tests, a Vickers Viking twin-engine transport was modified to produce its own icing conditions on an extended section on the vertical fin.

The system has also been tried on an English Electric Canberra twin-jet bomber, which made 100 takeoffs and landings at Khartoum, Sudan, to test resistance to abrasion.

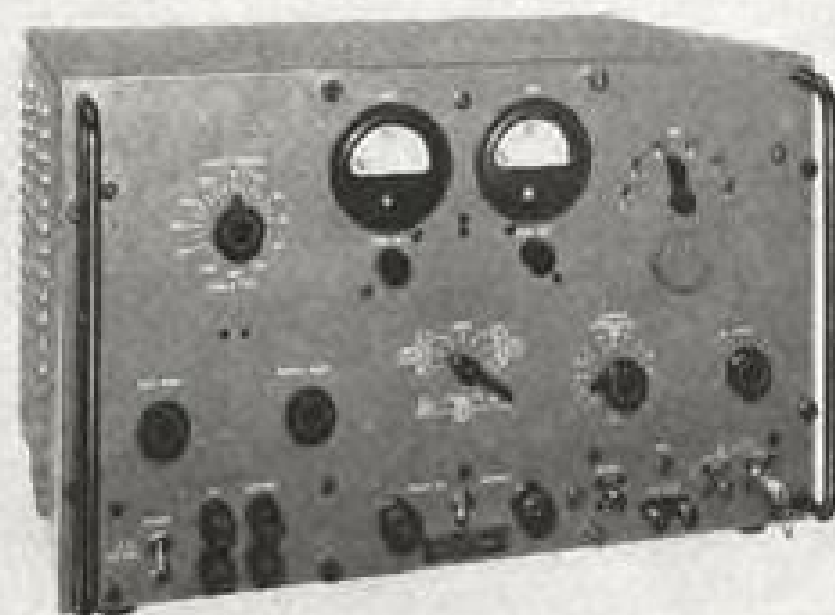
Trials covering 220 hours on a de Havilland Venom jet fighter have proved that the material can stand the effect of rain erosion at high speeds and also that the equipment imposes no stress limits on the wings of planes using it, states Napier. The units also have been used experimentally on small



Short Seamew engine intake.



Britannia lower fin leading edge.



Complete Testing Equipment for

OMNI and LOCALIZER RECEIVERS

A.R.C. Type H-14 Signal Generator



For a quick and accurate check by pilot before take-off, or for maintenance on the bench, this is the favored and dependable instrument. Checks up to 24 omni courses, omni course sensitivity, to-from and flag-alarm operation, and left-center-right on localizer. For ramp check, RF output 1 volt into 52 ohm line; for bench checks, 0-10,000 microvolts.

The H-16 Standard Course Checker is a companion instrument to the H-14.

It makes possible a precise check on the course-accuracy of the H-14 or of any other omni signal generator. Just as a frequency meter is necessary in connection with a variable frequency signal generator, the H-16 Standard Course Checker is required in connection with a VOR signal generator for a precise measurement of phase accuracy.

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GUINEA PIG in tests of new Napier de-icing system is this Vickers Viking.

exposed portions of airliners and aircraft engines.

Other trials have been made to determine the system's suitability under a variety of climatic and vibration conditions. Electrical insulation and inflammability tests were included. The heater has been found to be unaffected by all aircraft fuels, oils and hydraulic fluids. The de-icer mats have passed fatigue trials on resonant bars, Napier says.

The company notes that its de-icing system can be applied to surfaces by mechanical methods, using a spray-gun traversing arm mechanically linked to the work-piece turntable so that the rate of pass of the gun across the work can be controlled. For more complex shapes a combination of mechanical and hand methods can be used.

► **Mat Specs**—Napier has made a light heater mat having a total thickness of .040-.050-in. depending on the conductor thickness, with corresponding weight of 0.27-0.32 lb./ft.² and one miniaturized terminal per square foot.

Maximum operating temperature for the Napier mat currently is fixed at 100C. Although the company finds that this is more than adequate for severely cool icing conditions, it recommends that some form of overheat protection be installed to safeguard the unit in the event of inadvertent operation of the system in non-icing conditions.

► **Maintenance**—Local repairs to the heater units can be undertaken without difficulty, using hand-spray methods and locally available equipment, the firm notes. The damaged portion of the system can be removed down to the base metal, then rebuilt. The company is working on a method of emergency repair that would require only elementary facilities.

The Napier surface heater can be checked visually at minor inspection periods. During major overhaul periods tests can be made of insulation and resistance integrity using normal servicing equipment. If a full ground functioning test seems necessary, a power supply pack putting out reduced voltage is

being made available by Napier.

► **Other Applications**—In addition to its use for the ice protection of aircraft, Napier says the electro-thermal system is readily adaptable to other local surface-heating uses. The company suggests heating of guns and instruments of military vehicles, oil tanks and pumps of piston engines.

Napier says its surface heater element is covered by world-wide patents. The company's address: Acton, London, W. 3.

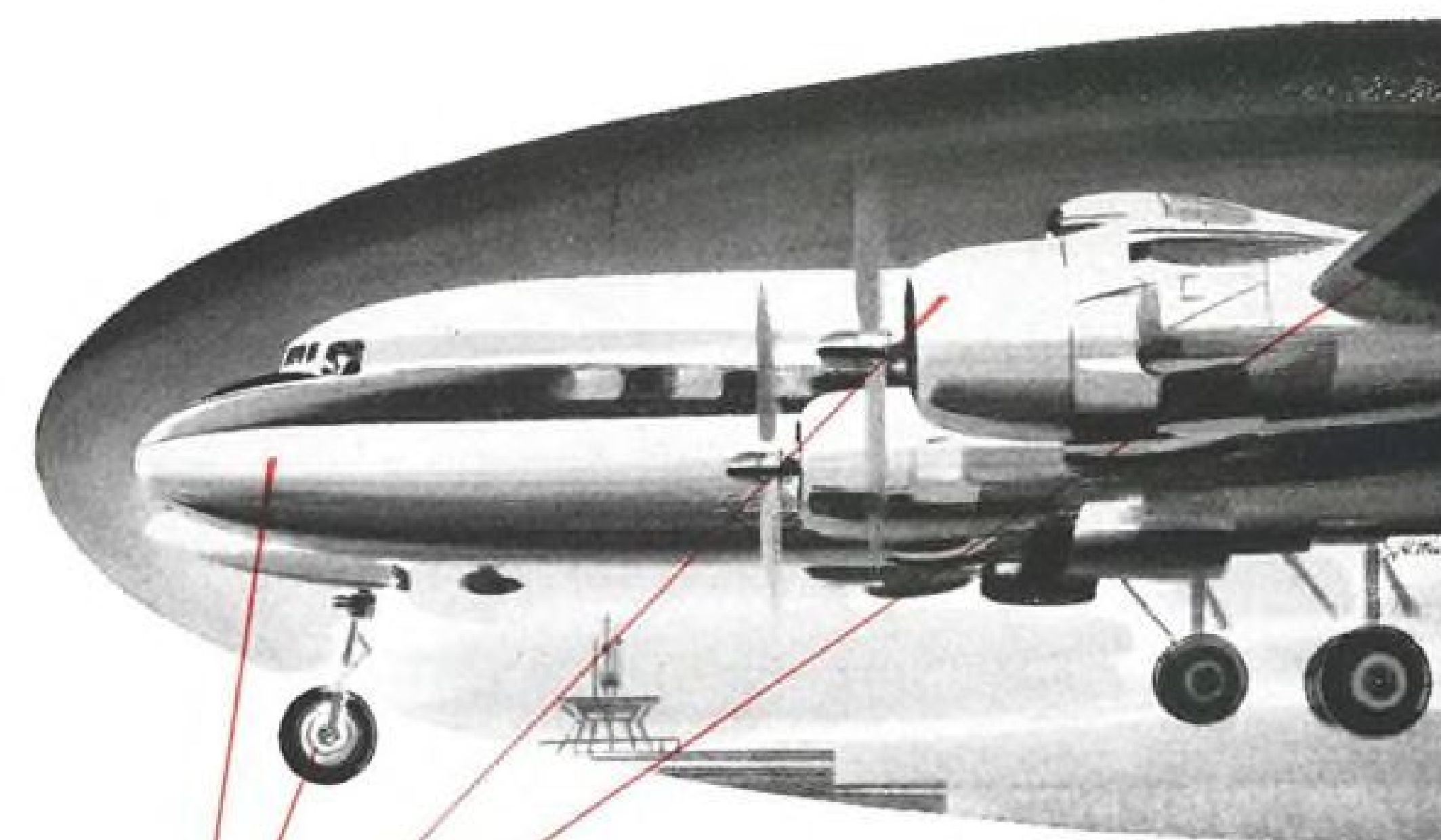
New Material May Raise Plastic Strength

A new raw material combining glass strands and resins has been developed that promises big dividends in strength and labor savings in reinforced plastic applications. Now under evaluation with the Air Force and some airframe companies, the material is in pilot plant production. It is pre-impregnated and ready to mold. It contains about 60% glass strands, 40% resin—either an epoxy or a phenolic, depending on the properties required.

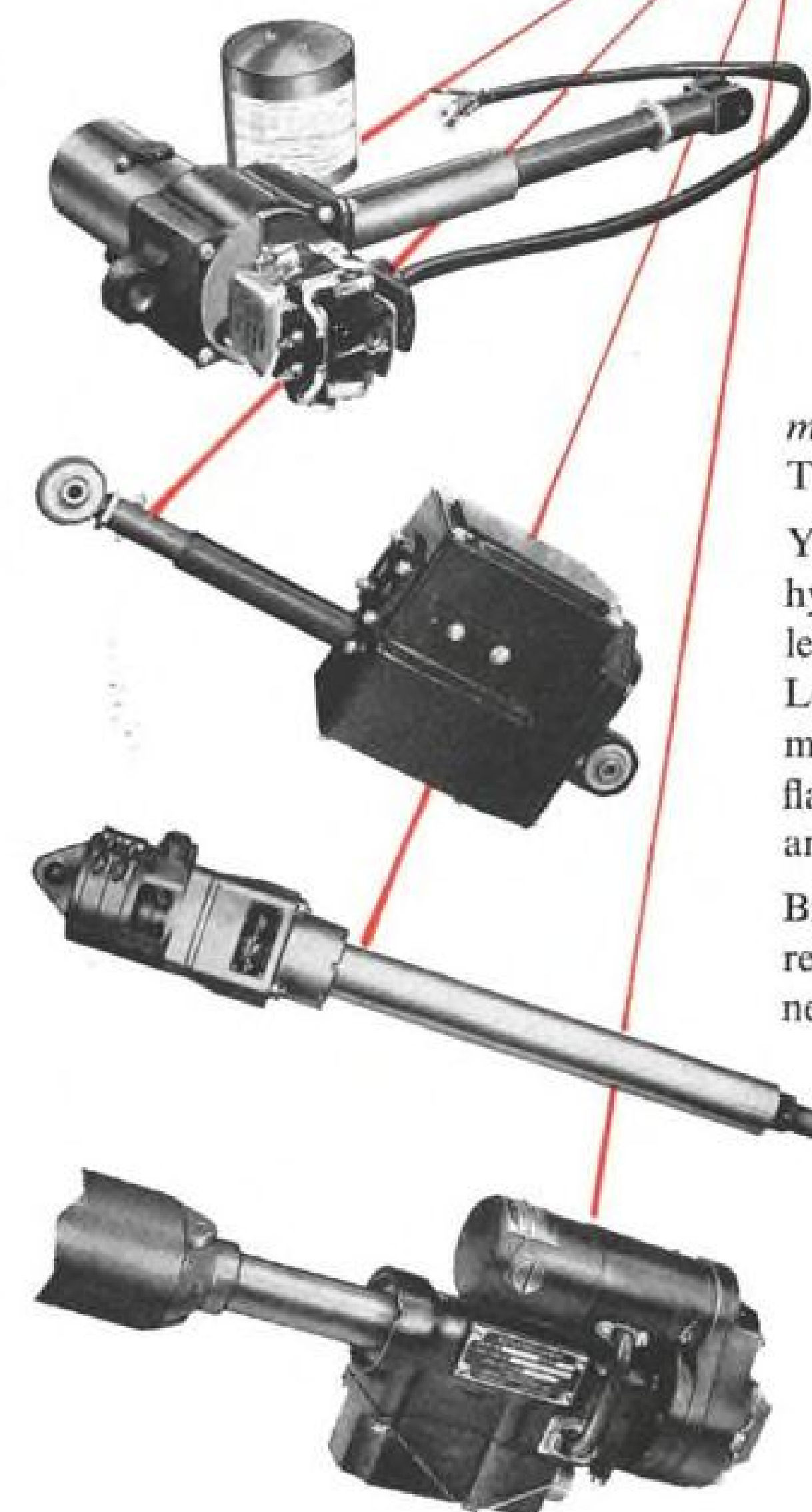
Minnesota Mining & Mfg. Co.'s Tape division, St. Paul, Minn., has been working on the material for about two years. As distinguished from conventional woven material, the new medium is made by superimposing a number of warps in staggered orientation to each other. These warps are held together by the impregnating resin.

Advantages the material offers:

- **Elimination** of the weaving procedure as a cost factor.
- **Ready to mold** as received, thus saving the molder the job of layup and resin impregnation.
- **High tensile strength** because there is no crimp, slack or twist in the strands. Overall strength obtained by molding this material is said to be higher than with conventional fabrics used for reinforced plastics, with the exception of 143-type cloth when laid up in a similar staggered pattern.
- **Ability to assume contour** readily of surfaces involving double curvature.



BREEZE ACTUATORS REALLY ACT!



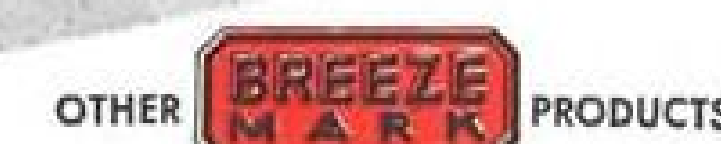
If it's for today's high performance aircraft, it *must* work with positive action . . . with precision. That's the whole story of actuators by BREEZE.

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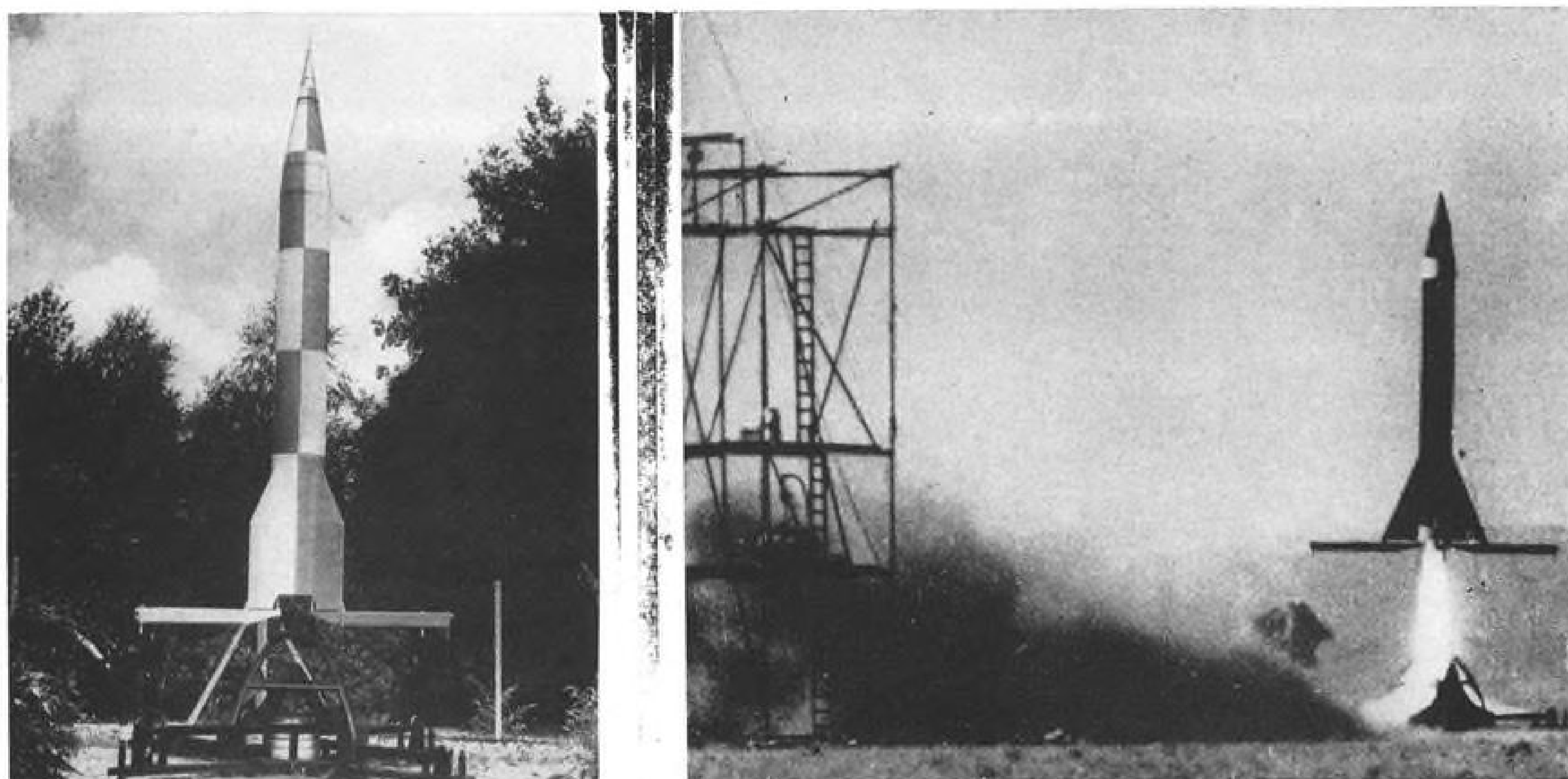
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OTHER PRODUCTS
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RADIO IGNITION SHIELDING • FLEXIBLE METAL TUBING



VERONIQUE missile takes off from launching platform, guided by four cables from single drum, which is protected by jet deflectors.



CORRECT ANGLE is insured by drum set up which shortens two inner cables. Cable cross is jettisoned at end of guidance period.

Tether Stabilizes Missile's Launching

Tethered launching is a unique feature of the French high-altitude research rocket called "Veronique."

Developed at the Vernon laboratories for aeronautical and ballistic research, the rocket has a design altitude of 400,000 ft.

Powerplant is a nitric acid and gasoline engine which develops 8,800 lb. thrust at sea level. Duration of burning is 35 seconds. Combustion chamber pressure is reported at 285 psi., and exhaust gas velocity as 6,600 fps.

Initial stabilization for the launch is handled by an unusual system of cables which unwind from a drum directly under the firing platform. Cables from

the drum lead out along four arms at the base of the firing table and attach to four similar arms connected to the base of the rocket.

From the rocket-mounted arms there are four connecting cables to the break-away connections near the instrument section of the rocket.

During the first few seconds of firing, the missile rises off the stand and drags out the cables. Since they all come off the same drum, there need be no compensation for uneven cable tension.

Jet deflectors protect the drum parts from the effects of rocket blast during missile launching.

At the end of the guidance period,

the cross to which the cables are attached is jettisoned by means of explosive bolts controlled by clockwork.

To make sure that Veronique takes off at the desired angle at the end of the guidance period, two of the four parts of the drum are profiled so that the two inner cables are shorter than the outer ones.

This system—believed to be the first use of such a scheme anywhere—has proven successful in flight tests made by the French laboratory.

Veronique is 21.6 in. diameter and 19.68 ft. long. Takeoff weight is 2,200 lb. Velocity at burnout of the engine is about 3,100 mph.

THRUST & DRAG

"Holy Mach!" swore the engineer "Where've you been?"

"Busy," I said. "And you?"

"I've been down in Texas, getting the lowdown on the guided missile business from a cattleman. I figured there was so much bull in the program that Texas was the place to go."

"What's the connection, other than the bad joke?" I asked.

"Well, this character compared a good guided missile to a Miura bull that they raise for bullfights only. When that beast gets going on Sunday afternoons, there's nothing can stop him. He blasts out of the toril door with one thought: Smear that silly looking two-legged thing across the ring. He's not pretty, but he's a born killer."

"Very neat analogy," I admitted. "Any more?"

"Sure," said the engineer. "This Texan said that the trouble with us is that we've treated the guided missile like a prize Hereford bull at a stock show. They pamper him, handle him with loving care, and bed him down in the finest surroundings. He might kill somebody if they acted real mean and he felt that he had to, but about the only damned thing he's good for its producing more of his own kind."

"And that," concluded the engineer, "is one of the most sensible things I've ever heard about the guided missile program."

* * *

Speaking of missiles, I wonder if the Vought people looked at the unabridged version of a good dictionary before they let somebody fasten the name of Regulus on their missile?

Sure, it's named after a star. But the dictionary says that Regulus is also "... a petty king, a ruler of little power or consequence, the more or less impure ... mass of metal ... in smelting and reducing ores."

* * *

With remarkable consistency, the national engineering honor society, Tau Beta Pi, has again defeated a proposal to admit women to membership. We took up the cudgels once before on this score, and the club is still at hand.

This decision is faulty, men. Think of your wives and daughters who might hear about this discrimination against their sex. Was all the fuss about woman suffrage for nought?

May as well face it, men, the women are here to stay. Some of them will be engineers. And some of them will be better engineers than you are now.

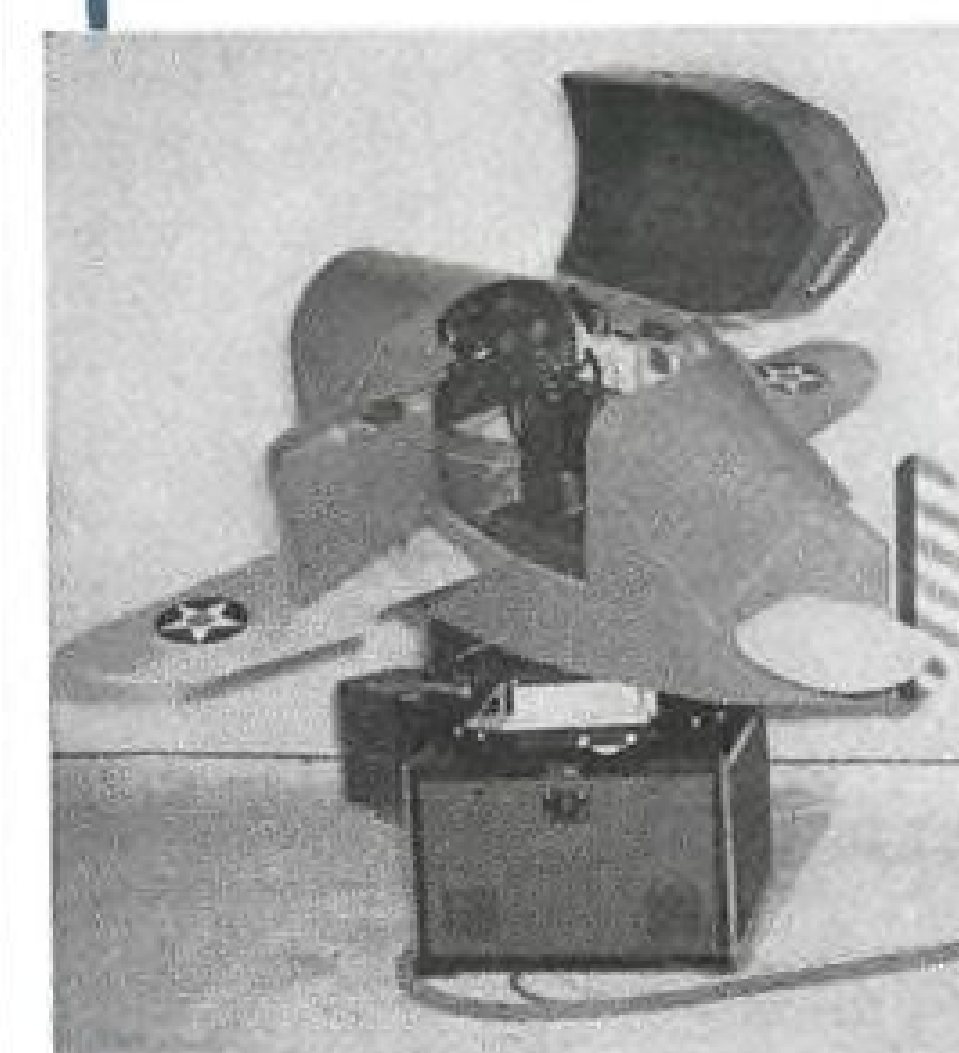
Most of them are prettier, too.—DAA

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Pilot training gained a new ally when the first Link Trainers made their bow a quarter of a century ago. Instrument Flying Trainers such as the C-3 Link above, gave basic and refresher instruction to more than half a million pilots in World War II.

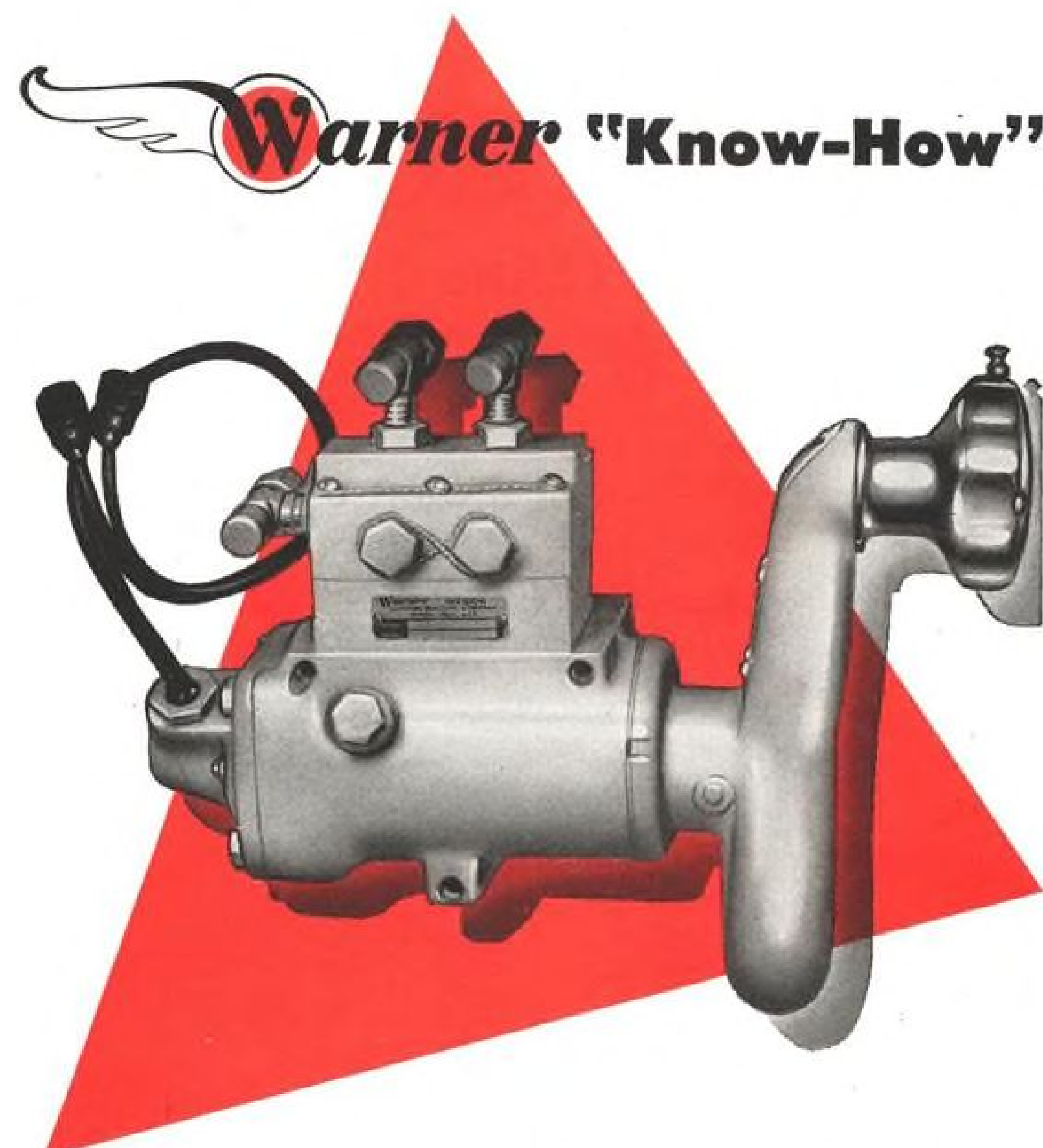


Like their predecessors, modern Links help to provide this nation with the world's most proficient pilots. New electronic giants such as the Link B-47B Flight Simulator are aiding Air Force pilots to master the instrument techniques of modern jet aircraft.

AND YET TO COME...

The research and development staff of Link is currently at work on new projects that will fill the needs of future high speed flying...and flying men...importantly as in the past and present.





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New Inventions

Government Offers Patents for License

New patents issued recently on inventions assigned to the U.S. in the field of aircraft and parts have been reported to AVIATION WEEK by the Government Patents Board.

They are listed below in a new reader service that will appear as the Board provides the abstracts.

These inventions are available for license, ordinarily on a non-exclusive, royalty-free basis, on application to the agency indicated in the abstract. Printed copies of letters patent may be obtained from the Commissioner of Patents, Washington 25, D. C., at 25 cents a copy, payable by check or money order.

►GROUND RELEASE FOR CARGO PARACHUTES. Patent No. 2,665,163, issued Jan. 5, 1954.

A latch for cargo parachutes which automatically releases the load after it touches the ground comprises a load retaining lever pivoted at one end and seated at the other end in the notch of a spring loaded lever having an inverted U-shape. A time-actuated holding means is used to hold the spring loaded latch in locking position for a predetermined time after the parachute opens. Inventor: Reinhold Gross. Administered by the Office of the Judge Advocate General, Department of the Air Force, Washington 25, D. C.

►DE-ICER BOOT APPLYING TOOL. Patent No. 2,665,884, issued Jan. 12, 1954.

A tool applying a rubber de-icing boot to the leading edge of an airplane wing or elevator comprises a lever-actuated anchoring device having a heavy weight connected to the side opposite the boot. The other side of the anchoring device is provided with a number of hooks adapted to engage cords extending from an edge of the boot. When the lever is moved, the edge of the boot may be drawn into alignment with a fastening strip on the wing or elevator. Inventor: Raymond F. Martin. Administered by the Office of the Judge Advocate General, Department of the Air Force, Washington 25, D. C.

►RADIO COURSE INDICATING SYSTEM. Patent No. 2,666,914, issued Jan. 19, 1954.

A navigation system for use in aircraft comprises a radar system having a rotatable antenna, an indicator and means for presenting on the indicator a marker which is normal to the ground track of the aircraft. The marker also gives a continuous indication of whether or not the aircraft is flying a circular course around the radio beacon. The system includes means for increasing the number of nodes obtained from the signal for each revolution of the antenna and means for adjusting the phase angle between the antenna and the signal means. Inventors: Britton Chance and Ivan A. Greenwood, Jr. Administered by the Office

of the Judge Advocate General, Department of the Army, Washington 25, D. C.

►AIRCRAFT FUEL AND PROPELLER PITCH CONTROL. Patent No. 2,667,228, issued Jan. 26, 1954.

In an aircraft powerplant having a gas turbine driving a variable pitch propeller through gearing, an electric circuit has means responsive to the operating characteristics of the turbine and propeller, such as torque, temperature and speed. The response of the circuit is used to control the flow of fuel to the turbine and the pitch of the propeller to prevent overloading of the gearing. Inventors: Cyrus F. Wood and Carl L. Sadler, Jr. Administered by Patent Counsel, Department of the Navy, Washington 25, D. C.

►PLURAL MOTOR CONTROL SYSTEM FOR USE WITH TRANSLATION DEVICES. Patent No. 2,667,610, issued Jan. 26, 1954.

A double motor control system for use in bridge type crane apparatus with a motion translation device for testing model airplanes comprises a unitary control means for varying the operation of both of the drive motors to move the model along any desired path. The system includes a mechanism for continuously resolving a quantity proportional to the velocity of the body into quantities proportional to component velocities parallel to the two perpendicular axes and means for controlling the drive motors to produce component velocities of the body parallel to each of the axes. Inventors: Otto H. Schmitt and William B. Greenlee. Administered by Patent Counsel, Department of the Navy, Washington 25, D. C.

How Ought We Train Rocket Engineers?

The best way to train rocket engineers is under the present engineering programs rather than in specialized courses.

This advice comes from Prof. Frederick K. Teichmann, chairman of the department of aeronautical engineering and assistant dean of New York University's College of Engineering.

Prof. Teichmann, speaking to a student panel at a meeting of the American Rocket Society, said that a firm grounding in basic engineering sciences combined with either experience or graduate study or both will prepare the engineer more thoroughly for rocket research and development.

According to Teichmann, these personnel are most in demand for rocket work: Mechanical engineers specializing in thermodynamics and heat transfer; chemical engineers concentrating on fuels and metallurgy, and aeronautical engineers with extensive training in aerodynamics and structures.

Panel chairman was Dr. Martin Summerfield, Princeton. The meeting was held at the American Museum of Natural History.



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SERVICE: Compact, rugged, lightweight, heavy duty, dual-purpose relays designed specially to operate AC or DC electrical systems in aircraft such as 3 phase 400 cycle power systems on motors, NESA electrically heated windshields, etc. Meet high shock, acceleration, vibration and temperature requirements.

CHARACTERISTICS

APPROVAL: Approved as AN-3339-1 per Spec MIL-R-6742.

CONTACTS: Arrangement—Three pole single throw AC, Single pole single throw DC, Normally open. Rating—Rated load per pole 120 V dc or 200 V ac 400 cycles. Resistive (AC 400 cy. 200 volts) 25 amps. Resistive, inductive and motor load 25 amps at 29 V dc. (All poles connected in series).

COIL: 100 ohms, 24 V dc continuous duty. Pick-up—18 V dc max. Drop-out—7 V dc ± 0 , -5.5 .

WEIGHT: .92 lb.

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part of
your business

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Each advertiser is obviously doing his level best to give you helpful information. By showing, through the advertising pages, how his product or service can benefit you and your company, he is taking his most efficient way toward a sale.

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You, too, have a big stake in the advertising pages. Read them regularly, carefully to keep job-informed on the "with what" part of your business.

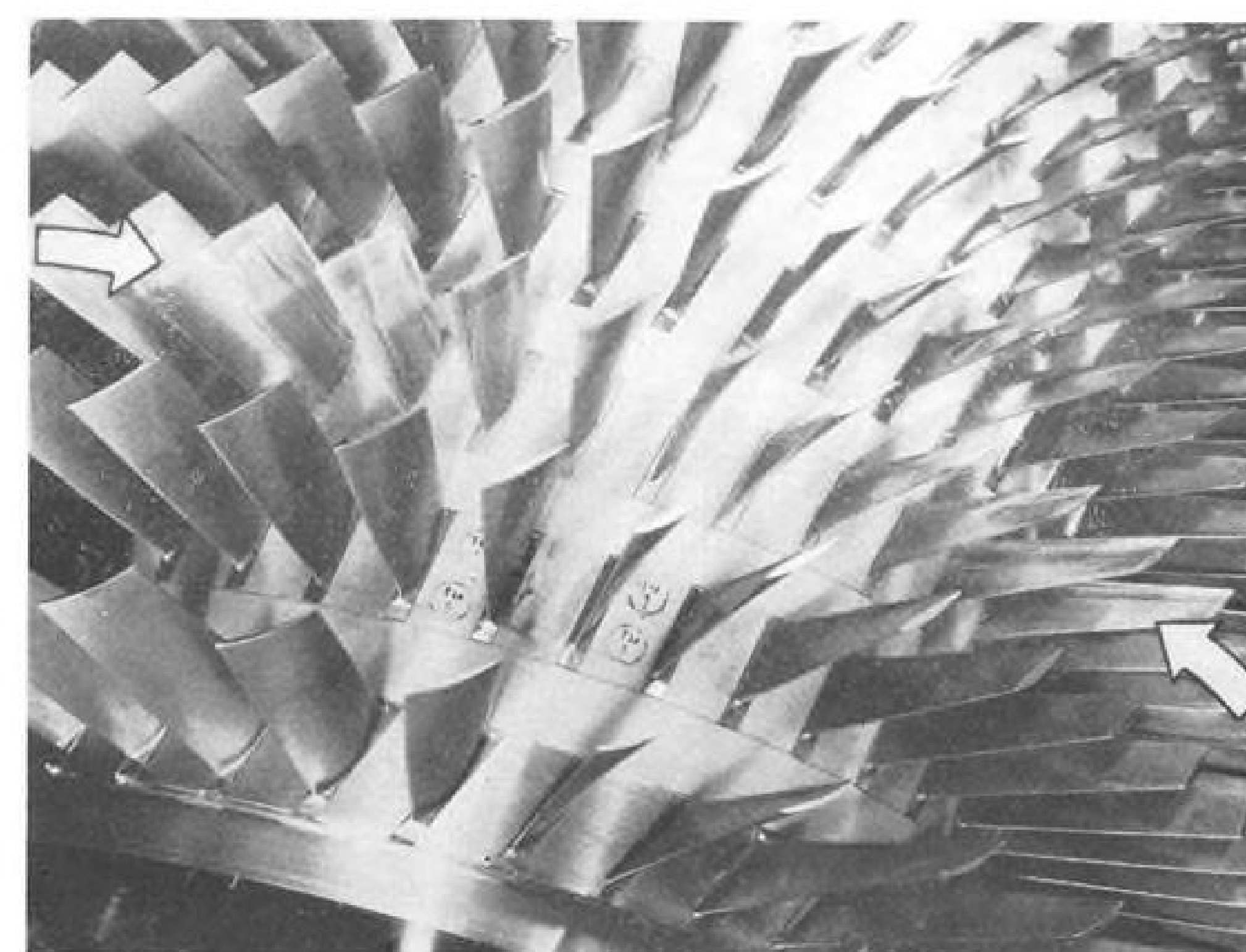
**McGRAW-HILL
PUBLICATIONS**



PRODUCTION



GLASS-PLASTIC BLADE has fine surface finish, metal dovetail root.



TEST COMPRESSOR CLOSEUP shows fibrous glass-reinforced plastic blades in third rotor stage (arrows). Blade length is about 4½ in., chord about 1½ in.

Glass-Plastic Blade Passes 100-Hr. Test

By Irving Stone

A 100-hr. run at rated engine speed has been completed successfully by fibrous glass-reinforced plastic rotor blades in a military turbojet compressor.

This is reported to be the first time so high a total of operating hours has been racked up for the material in an

application of this kind.

► **Results**—The blades which completed the 100-hr. run were developed by Thompson Products, Inc.'s Jet Division. The blade installation comprised the complete third rotor stage of the test turbojet.

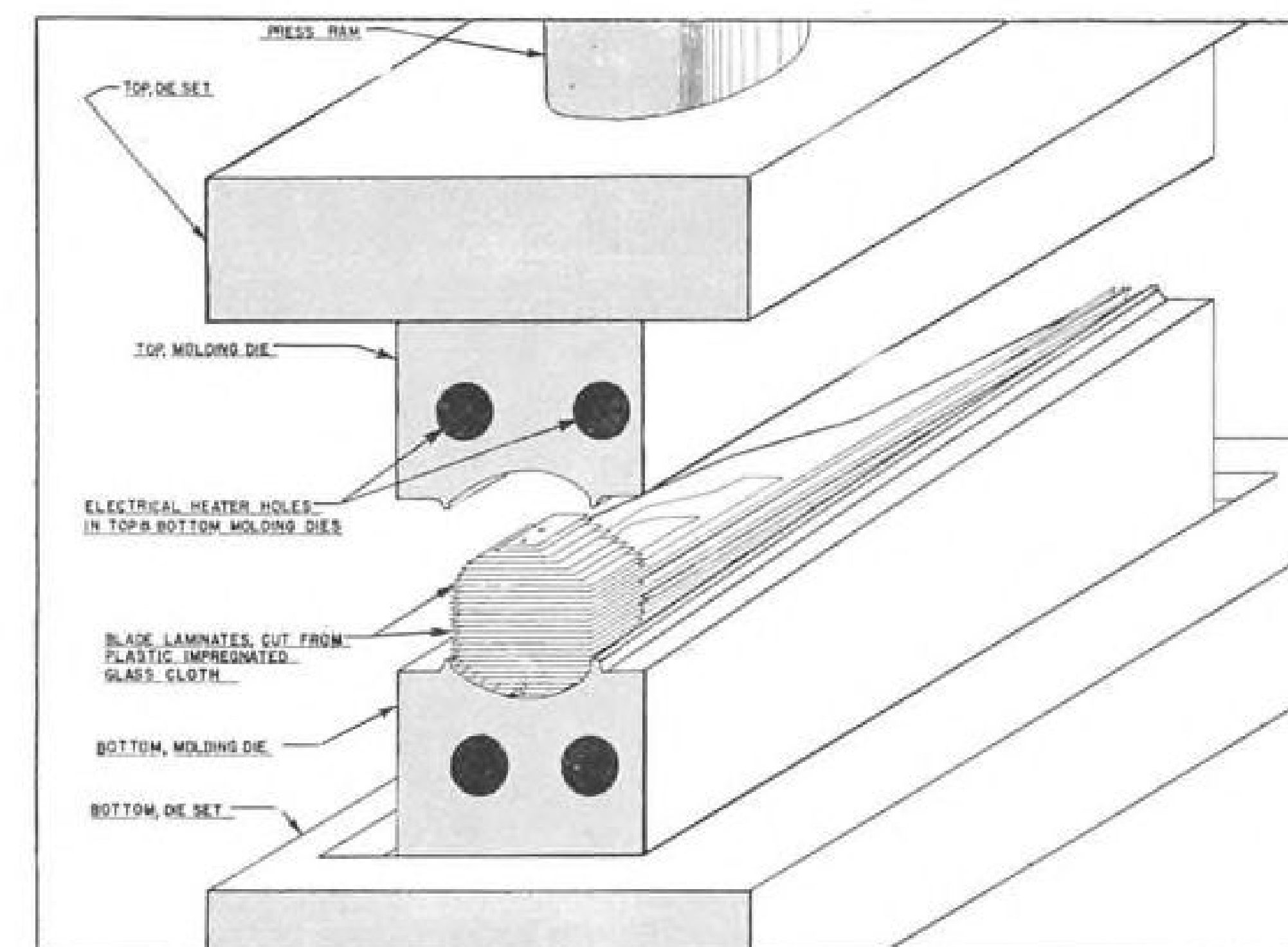
Inspection of the disassembled blades after the test run showed that they were

in perfect condition, exhibiting no signs of impending failure or erosion. The results are significant because the compressor blade application probably represents the most rigorous use of the material in a stressed structure, considering the operating forces involved.

► **Next Phase**—Thompson considers its plastic blade development strictly an experimental project at this time. Next step in the program, now that the endurance potentialities of the blades have been indicated, is to see precisely how they stack up for the job they would be expected to do in service. This will be a close-check operation—plastic blades will be fitted into seven complete rotor stages of a turbojet compressor for test, with full instrumentation. This, coupled with other information Thompson is gathering, should result in comprehensive qualitative data to assist design engineers in evaluating the practicality of using the plastic blades in compressor applications.

► **In Its Field**—Work on Thompson's plastic blade project started about 16 months ago and has been carried along entirely on company funds at the jet division. (First published information that glass-reinforced plastics were being studied for compressor blade service appeared in AVIATION WEEK Mar. 2, 1953, p. 104.)

The program was undertaken be-



LAYUP of glass-plastic compressor blade (minus covercloth) in die before molding.

AVIATION WEEK, April 5, 1954

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FATIGUE PROPERTY CHECK is given glass-plastic compressor blade after completion of 100-hr. test run in turbojet. Portion of third-stage rotor is at bottom.

cause, as the largest manufacturer of jet blades, the company felt it had to be alert to all prospects in the field. All data amassed to date will be turned over to any engine manufacturer at its request. Thompson already is making experimental plastic blades for engine builders.

► **Favorable Properties**—In addition to the consideration that fibrous glass-reinforced plastics are a non-critical material, Thompson sees the glass-plastic blade possessing many advantageous characteristics. These include:

- **Relatively high damping capacity.** This characteristic keeps stress low, makes blade less susceptible to fatigue failure.

- **Low mass weight.** This blade property improves acceleration characteristics of the engine because of the resulting lower moment of inertia. Starting torque also is reduced.

- **Low creep rate.** The material exhibits practically no creep, hence minimizes chances of stress rupture. In spin pit tests at 110% overspeed for 15 min. there was no measurable creep on a 30-in.-dia. installation (wheel plus plastic blades), in contrast to steel blades, which grew .001 to .002 in.

- **High strength weight ratio.** The ma-

terial's strength-to-weight relationship is about three times that for compressor blade steel.

- **High impact strength.** Relative to its mass, the glass-plastic's impact strength is equal to that of compressor blade steel.

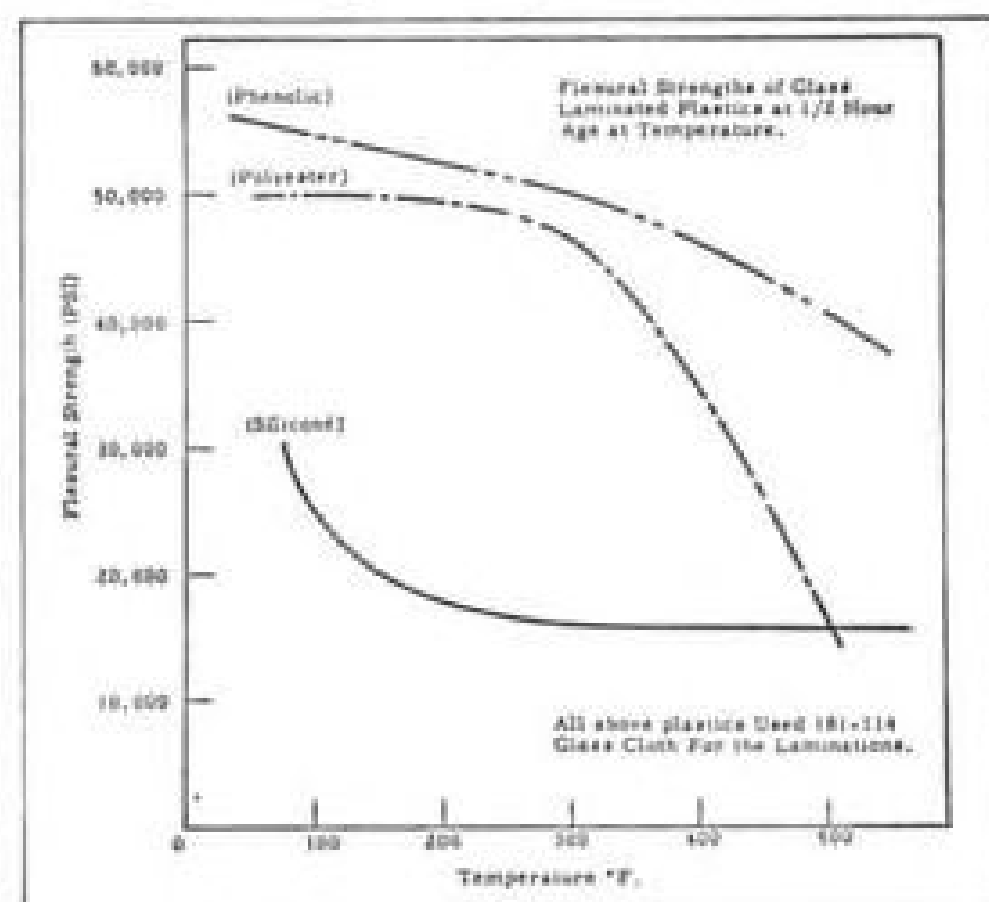
Disadvantages of the plastic blade are seen as including non-isotropic strength properties and the difficulty of adequate inspection.

► **Temperature Factors**—Temperature limitations do not appear to interpose any significant hurdle. Ability of fibrous glass-reinforced plastic materials to withstand 500F now seems feasible. The third stage compressor application in the 100-hr. test ran about 300F. Within the foreseeable future, phenolic-impregnated fibrous glass plastics should be able to withstand about 700F for about 10 hr. in a compressor blade application. This, of course, does not represent any operating condition, merely indicates the direction in which the temperature potential of the material is heading.

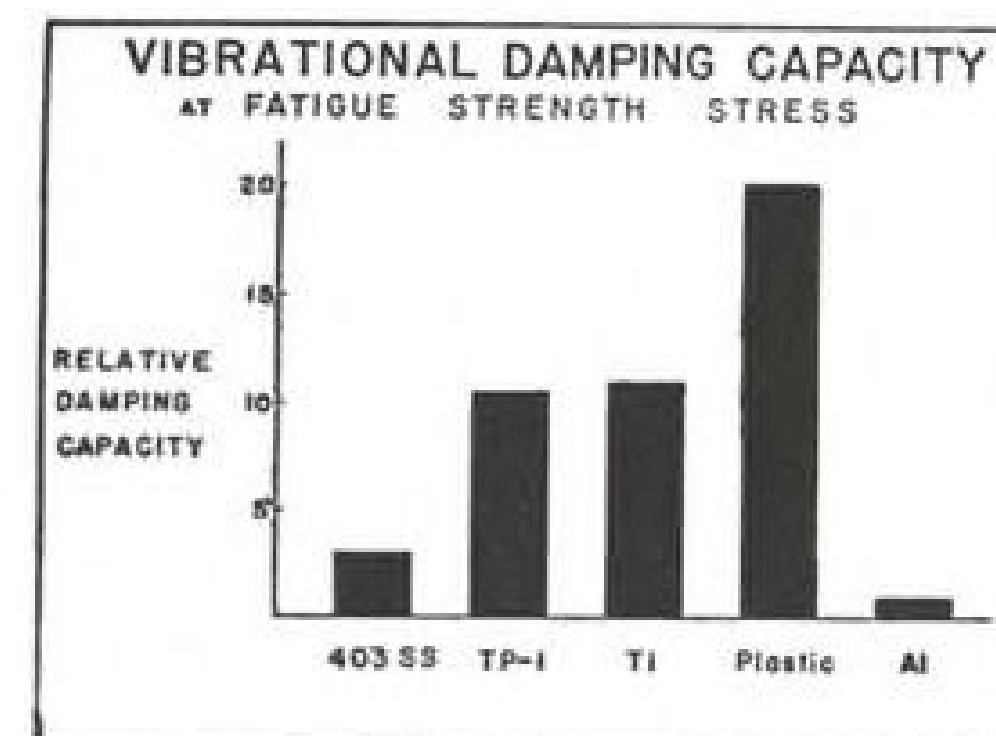
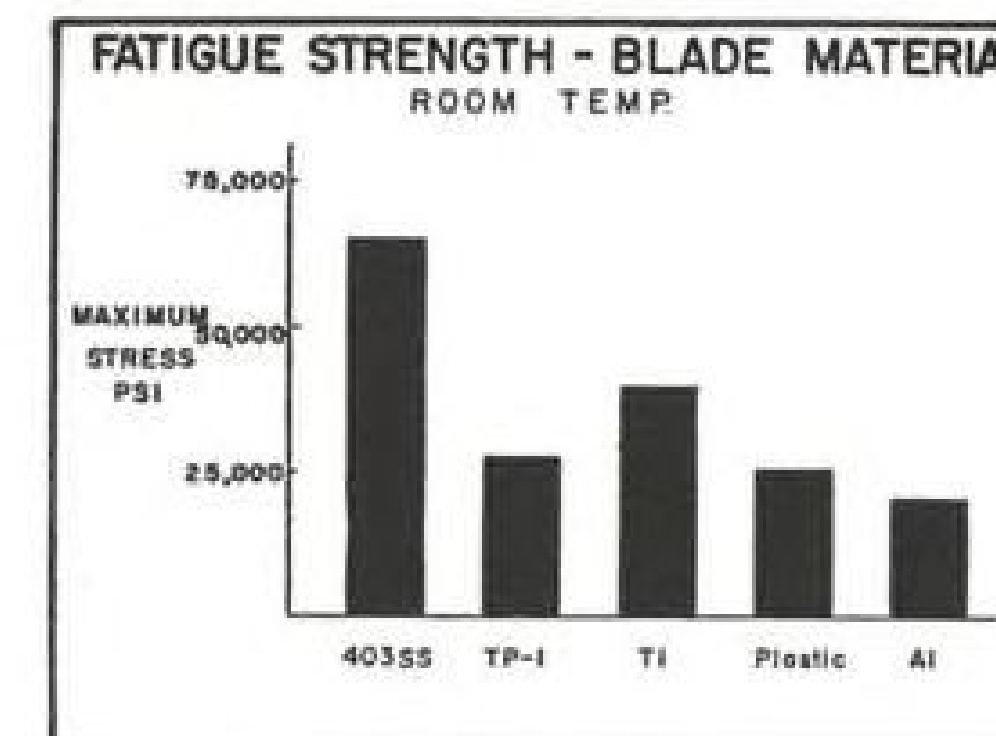
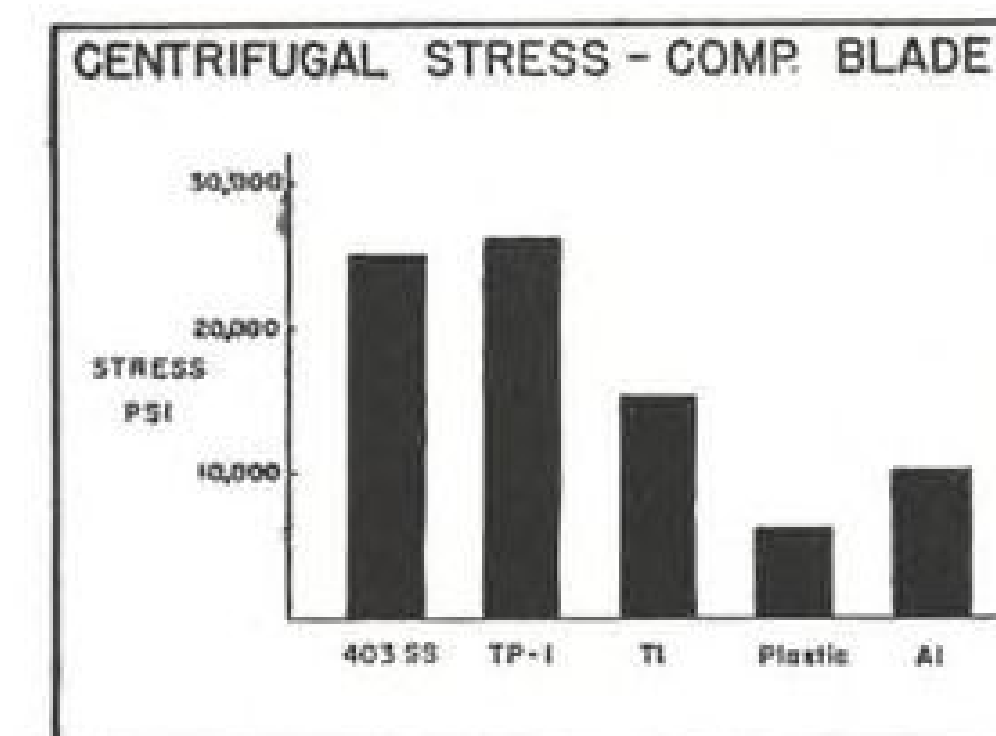
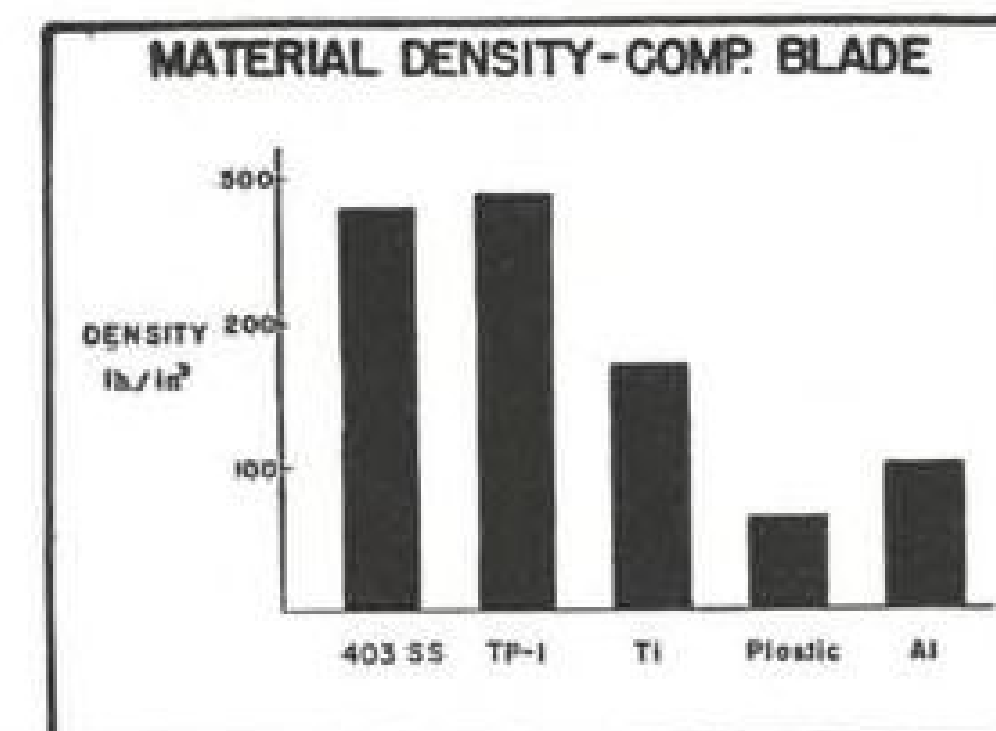
► **Checks Continuing**—Meanwhile, properties of the blade at elevated temperatures are undergoing progressive evaluation at Thompson's jet division, along with other checks on such characteristics as fatigue, impact and erosion resistance and various strength properties.

Experiments also are continuing with layup methods, using various techniques and materials with the aim of improving directional properties. The various production aspects of making glass-plastic blades are getting a close look.

► **Blade Molding**—The molding job for the compressor blade is more difficult than the usual procedure for forming reinforced plastics, it is reported. Closer control is required in die (mold) design, of pressures, temperatures and pre-layup phases. However, results are very



FLEXURAL strengths vs. temperatures.



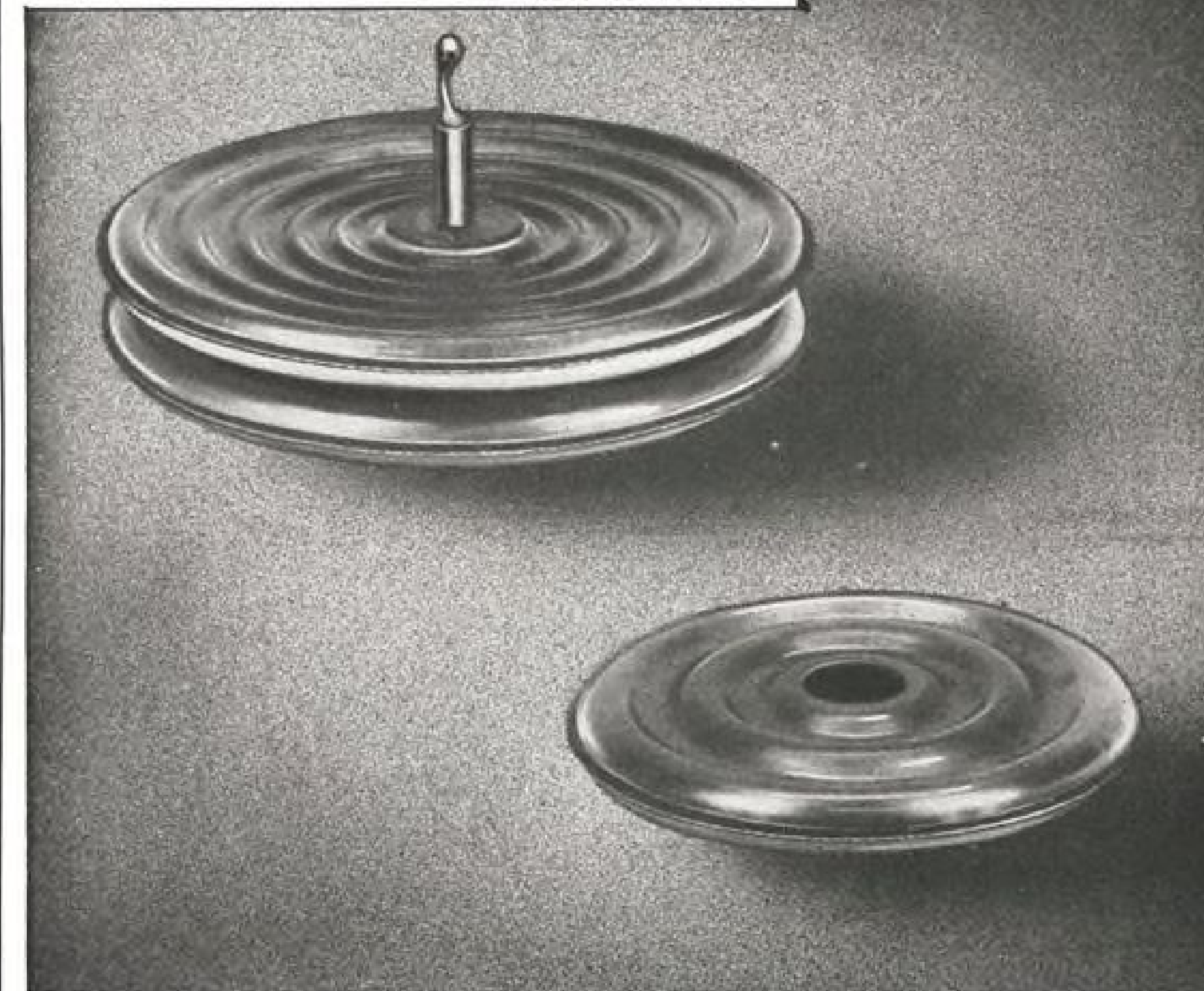
RELATIVE PROPERTIES of various compressor blade materials—403 stainless, TP-1 (Thompson Products sintered iron powder), titanium alloy, glass-plastic (phenolic resin), and aluminum alloy.

significant—excellent surface finish and dimensional uniformity are obtained.

The molding operation begins with the dry layup, which approximates the shape of the blade. The laminations—cut from phenolic-impregnated fibrous glass cloth—are held together mechanically.

The layup is placed in a male-and-female heated die arrangement in which it is subjected to a pressure forming cycle. When the molded part is re-

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moved, it is about 90% complete. At this point, the dimensional accuracy is just about as good as can be attained. Flash can be flicked off with the fingernail.

A post-curing operation is required for the resin in the blade to impart the necessary strength properties.

► **Root Details**—Present method of retaining the blade in the wheel was designed to be as simple as possible, yet afford high reliability so that retention problems would not enter into the blade evaluation.

Root configuration used is a dovetail made in the form of an aluminum alloy die casting requiring no machining. It is not represented as being the optimum method for anchoring the blade, and Thompson is continuing to explore the various aspects of retention.

PRODUCTION BRIEFING

► **Piasecki Helicopter Corp.**, Morton, Pa., has leased 240,000 sq. ft. of space at the former Autocar plant in Ardmore, Pa., 12 mi. from the copter firm's main plant. The acquisition, which will nearly double Piasecki's effective production area, will be used to make copter components and is in line with Piasecki's policy of reducing its subcontracting to maintain an even level of employment.

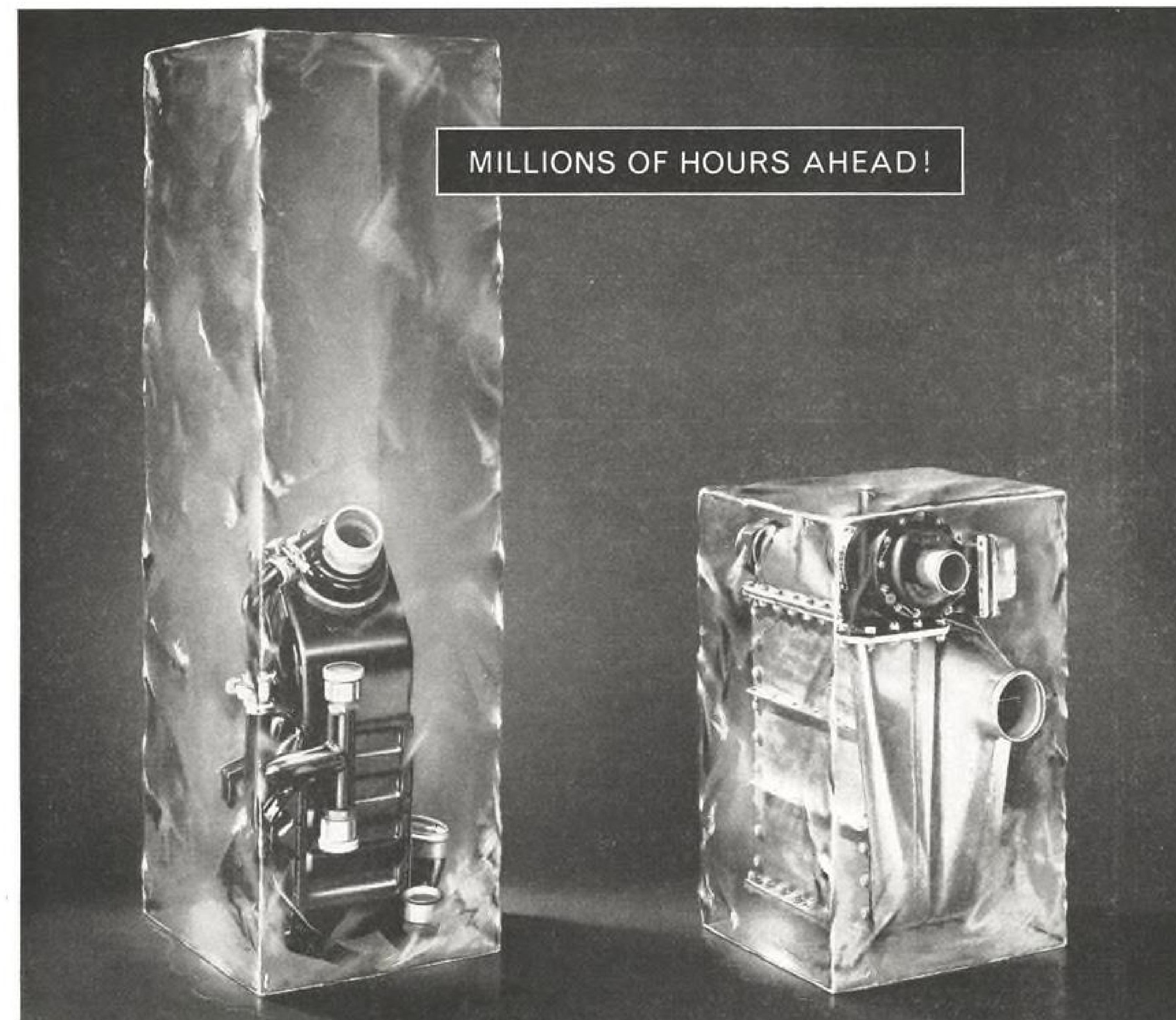
► **American Helicopter Co.**, has exercised its option to renew for another three years its lease on the 35,600-sq. ft. Falcon Field, Ariz., plant and plans to install additional pulsejet engine testing facilities.

► **Revere Corp. of America**, Wallingford, Conn., has opened a new plant in Meriden, Conn., slated to double production capacity 50%.

► **Temco Aircraft Corp.**'s Greenville, Tex., facility is working on a contract to overhaul a "large number" of USAF Douglas C-47s, with completion scheduled for early 1955.

► **Mesa Plastics Co.** has opened a larger plant at 11751 Mississippi Ave., Los Angeles 25, Calif., which will include present offices and facilities, plus room for output of a new and improved line of diallyl phthalate molding compounds, for use in missiles, UHF tuners, electronic triggering devices, solenoids, electronic fuses, directional devices and other applications.

► **Mathewson Corp.**, Inglewood, Calif., metal fabricator and maker of special sealing parts, has entered the special valve field covering high-temperature, synthetic oils, fuels and chemical lines.



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ment hours, and by unparalleled experience — 42,795 units produced and 15,000,000 operating hours.

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This is another example of how

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Navy Contracts

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

Air Associates, Inc., Teterboro, N. J., actuator gap assys., power units for various aircraft, \$74,577.
AlResearch Mfg. Co., Div. of the Garrett Corp., 9851-9951 Sepulveda Blvd., Los Angeles 45, Calif., maintenance parts and assys. used on power units, \$947,482.
American Pipe & Steel Corp., 2201 W. Commonwealth Ave., Alhambra, Calif., buoys, seaplane mooring, \$31,089.
Avien-Knickerbocker, Inc., Aviation Engr. Div., 58-15 Northern Blvd., Woodside, N. Y., indicator, fuel quality, 247 ea., \$60,917.
R. G. Corp., 136 W. 52nd St., New York 19, N. Y., spark plug, \$860 ea., \$45,186.

General Lab. Associates, Inc., 17 E. Railroad St., Norwich, N. Y., coil, 1,948 ea., \$93,972.
Glidden Co., 11011 Madison Ave., Cleveland 2, Ohio, lacquer, cellulose nitrate, \$137,145.
Greer Hydraulics, Inc., 454 18th St., Brooklyn, N. Y., propeller governor test stands, \$76,030.
Hardman Tool & Engr. Co., 1845 S. Bundy Drive, Los Angeles 25, Calif., seat assys., \$35,304.
Loral Electronics Corp., 794 E. 140th, New York 54, N. Y., test set for APM74 equipment, 71 ea., \$200,291.
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn., assemblies for use on HSD propellers, \$73,856. \$59,329; spare parts for use on HSD propellers, \$28,719; assemblies for use on HSD propellers, \$424,309.
Westinghouse Electric Corp., Aviation Gas Turbine Div., Lester Branch Post Office, Philadelphia 13, Pa., maintenance parts

for support of WEC engines, 520 ea., \$51,990.
Scintilla Magneto Div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., parts for engines, \$205,585.
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn., parts for HSD propellers, \$38,690.
Wm. R. Whittaker Co., Ltd., 915 N. Citrus Ave., Los Angeles 38, Calif., valve assy., 15 ea., \$29,082.
Lowe Bros. Co., 424 E. Third St., Dayton 2, Ohio, enamel, camouflage, \$68,142.
Marquette Metal Products Co., 1145 Galewood Drive, Cleveland 10, Ohio, 26 items for maintenance of aircraft, \$49,714; various assys. and windshield wiper components, \$29,082.
Surface Combustion Corp., 400 Dublin Ave., Columbus, Ohio, leads, heater & clamp assys. for various aircraft, \$28,728.
United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford 8, Conn., material for J57-P9, \$5,162,427.

USAF Contracts

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

Boeing Airplane Co., Seattle, Wash., spare parts, \$25,000,000.
Boeing Airplane Co., Wichita 1, Kan., modification of B-47B aircraft, 162 ea., \$10,000,000.
Century Engineers, Inc., 2741 N. Naomi Street, Burbank, Calif., launcher assy., 400 ea., \$94,000.
Columbus Engr. Co., 480 Broad St., Columbus, Ohio, reel tow target, 42 ea.; indicator, cable length and speed, 92 ea.; spare parts, \$74,574.
Consolidated Vultee Aircraft Corp., San Diego, Calif., T-29C aircraft, 85 ea.; T-29D aircraft, 40 ea.; C-131A aircraft, 26 ea.; \$17,584,392.
Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., F-1 autopilot comp., spare parts, special, tools, \$438,935.
Eidal Mfg. Co. Inc., P. O. Box 1299, Albuquerque, N. M., semi-trailers, spare parts kits, 88 ea., \$657,800.
Fairchild Camera & Instrument Corp., Robbins Lane, Syosset, L. I., N. Y., modification kits for camera, 280 ea., 280 ea., 540 ea., \$110,447.
Family Films Inc., 8840 Olympic Blvd., Beverly Hills, Calif., release prints of Speak No Evil, Honor Thy Family, In His Name, 53 ea., 53 ea., 53 ea., \$29,203.
Heintz Mfg. Co., Philadelphia, Pa., machinery and equip. for production of J71 components, \$55,000.
Glenn L. Martin Co., Baltimore 3, Md., squadron guidance equip., 2 sets, spare parts, engr. chgs., \$991,100.
Mitchell Camera Corp., 656 W. Harvard St., Glendale, Calif., 35- and 16-mm. hi-speed motion camera, 10 ea., 10 ea., \$127,543.
North American Aviation Inc., Los Angeles International Airport, Los Angeles 45, Calif., airplanes, spare parts, 120 ea., special tools, ground, handling equip. and data, 120 ea., \$42,164,255.
Ronan & Kunz, Inc., Marshall, Mich., nitrogen storage containers, 18 ea., \$132,419.
Sperry Gyroscope Co., the Sperry Corp., Great Neck, L. I., N. Y., spare parts for A-4 GBR sights, \$910,465.
Sundstrand Mach. Tool Co., Rockford, Ill., constant speed alternator drives, 2,377 ea., \$14,712,000.
Westinghouse Elec. Corp., 32 N. Main St., Dayton, Ohio, rework 400-amp. generators, 634 ea., \$29,531.
Mercer Metal Corp., 435 W. Warren St., Celina, Ohio, adapter assy., flush mount rocket launcher, 3,500 ea., \$116,830.
North American Aviation, Inc., Los Angeles International Airport, Los Angeles 45, Calif., repair of GFAC, \$200,000.
Photoswitch, Inc., 77 Broadway, Cambridge, Mass., amplifier, component of compass system, 1,488 ea., \$988,488.
Radio Corp. of America, RCA Victor Div., Camden, N. J., maintenance tools, test equip. for radio set, \$734,200.



F3H-1N DEMON displays empennage on platypus tail. Stabilizer pivots for trim, maneuvering. Wings fold for carrier stowage.

McDonnell F3H: Navy's Jack Of Many Trades

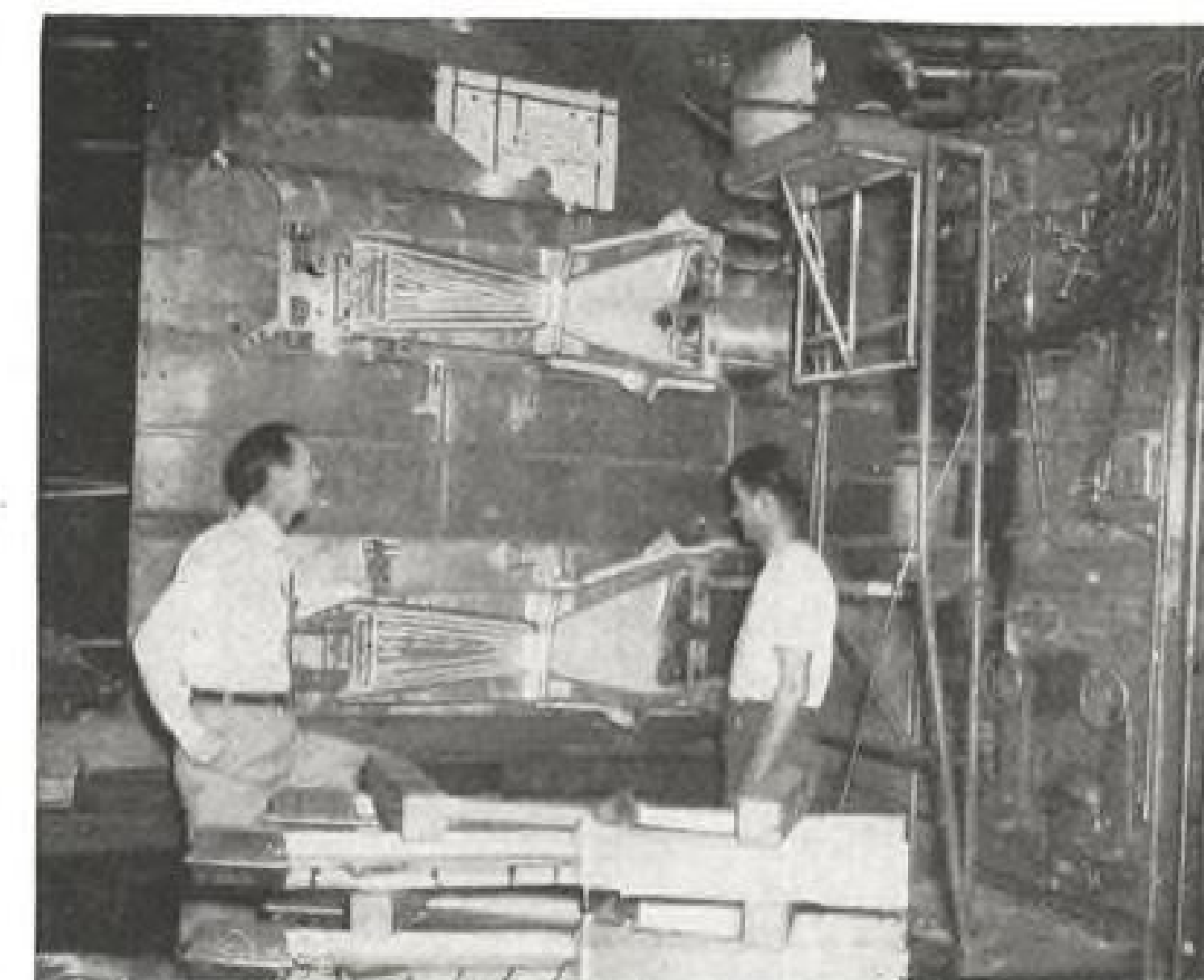
Production successor to the Banshee series, the Navy McDonnell Demon will appear as the all-weather fighters F3H-1N and -2N, F3H-2M missile launcher and F3H-2P photo-recon plane.

First 60 Demons are scheduled to take Westinghouse J40s, remainder will be muscled by Allison J71s.

Plane's large amount of internal fuel gives it fighter-bomber mission range.



DEMON SIZE is emphasized in this view. Thin wing has leading edge slats.



CARRY-THROUGH structure for Demon wing set for profiling.



SIDE PANELS will be joined to form the forward fuselage.

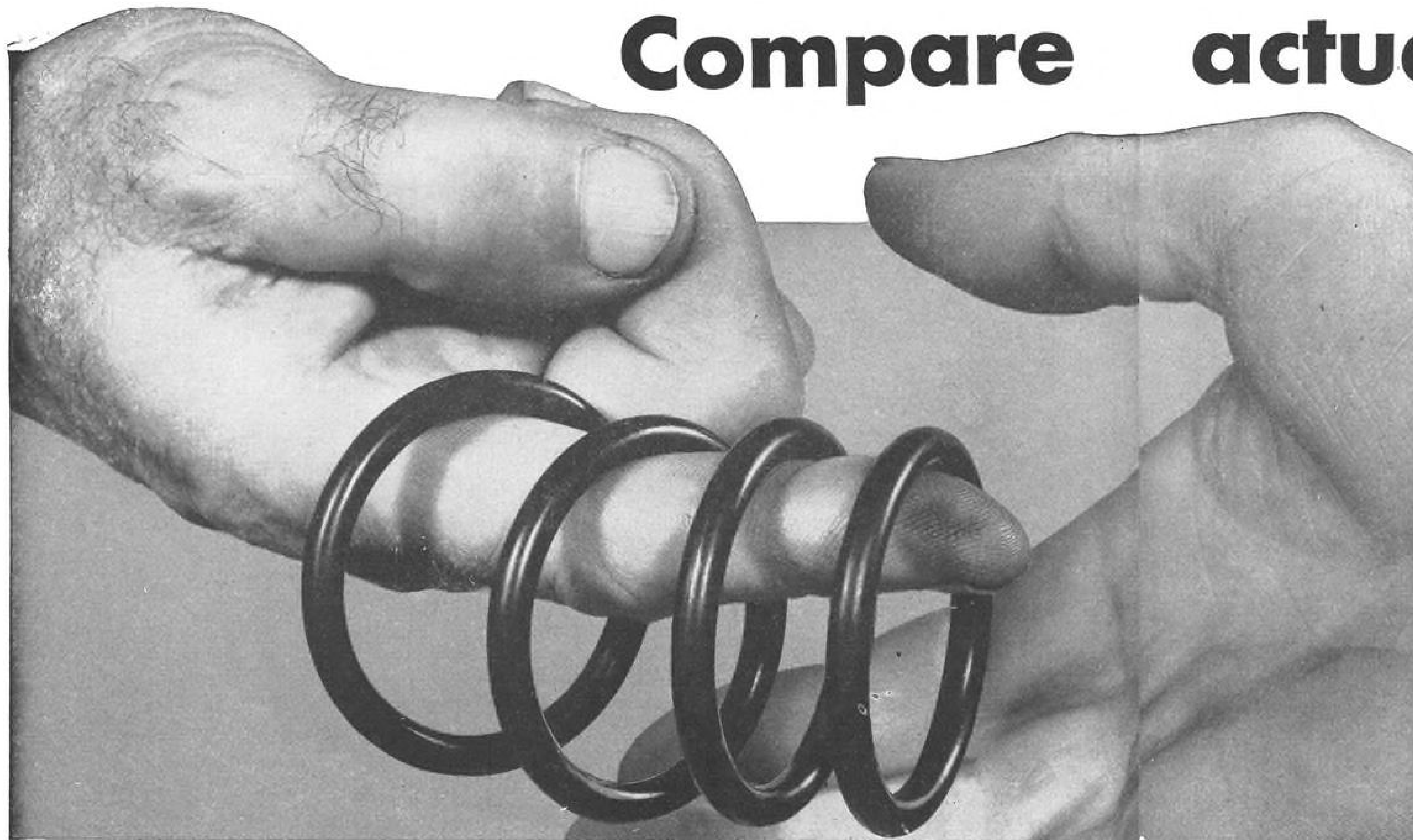


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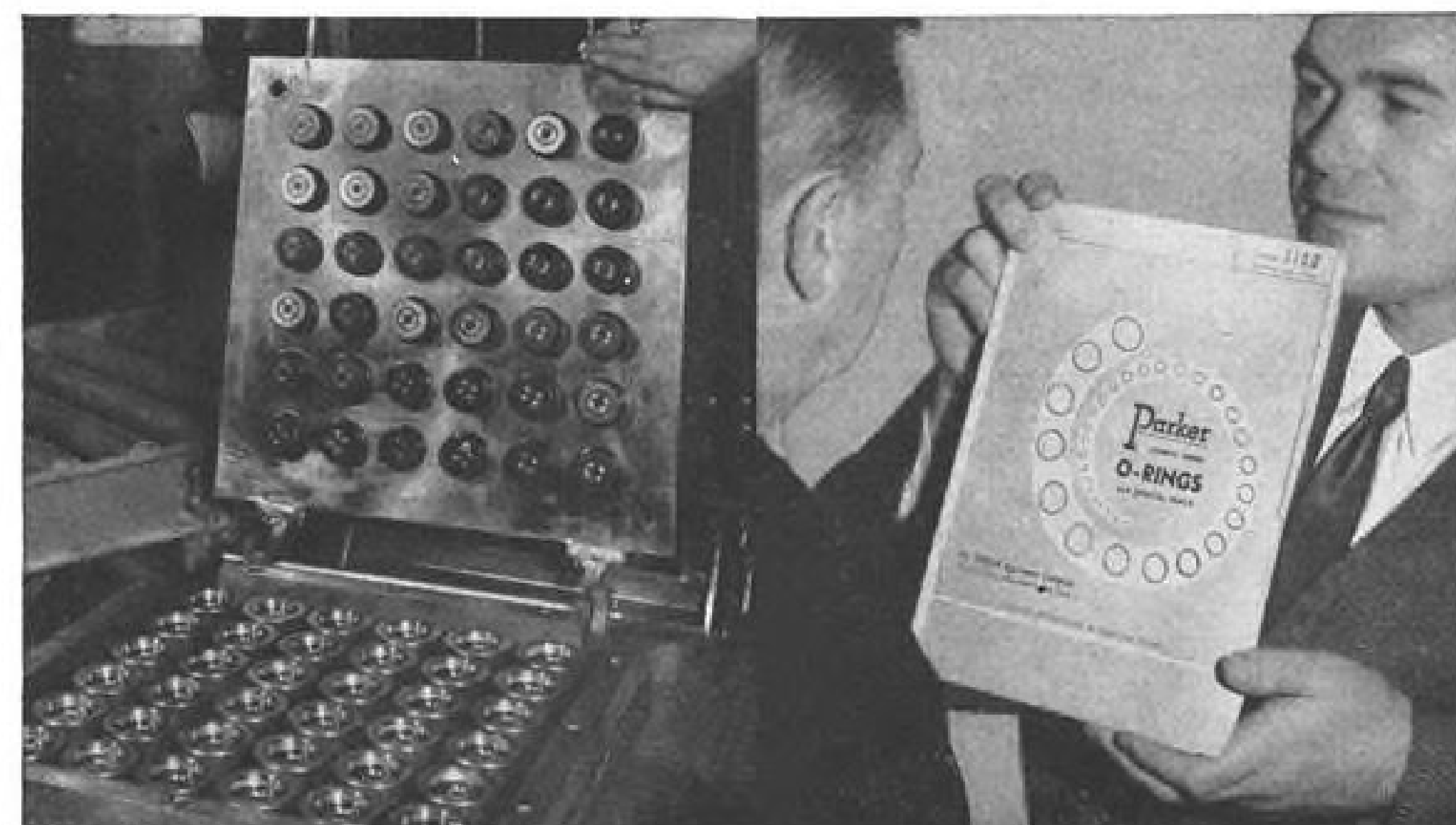
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AVIONICS

Arinc Pinpoints Military Tube Failures

- Removals could be cut by better maintenance, careful handling, use of fault-predicting devices.

By Philip Klass

Half of the tubes removed as defective from military electronic equipment either have no apparent defect or the defect appears to be caused by rough handling during maintenance. This and other significant disclosures on the reliability of electron tubes in military applications are made in a recent report by Aeronautical Radio, Inc., on its military-sponsored tube study.

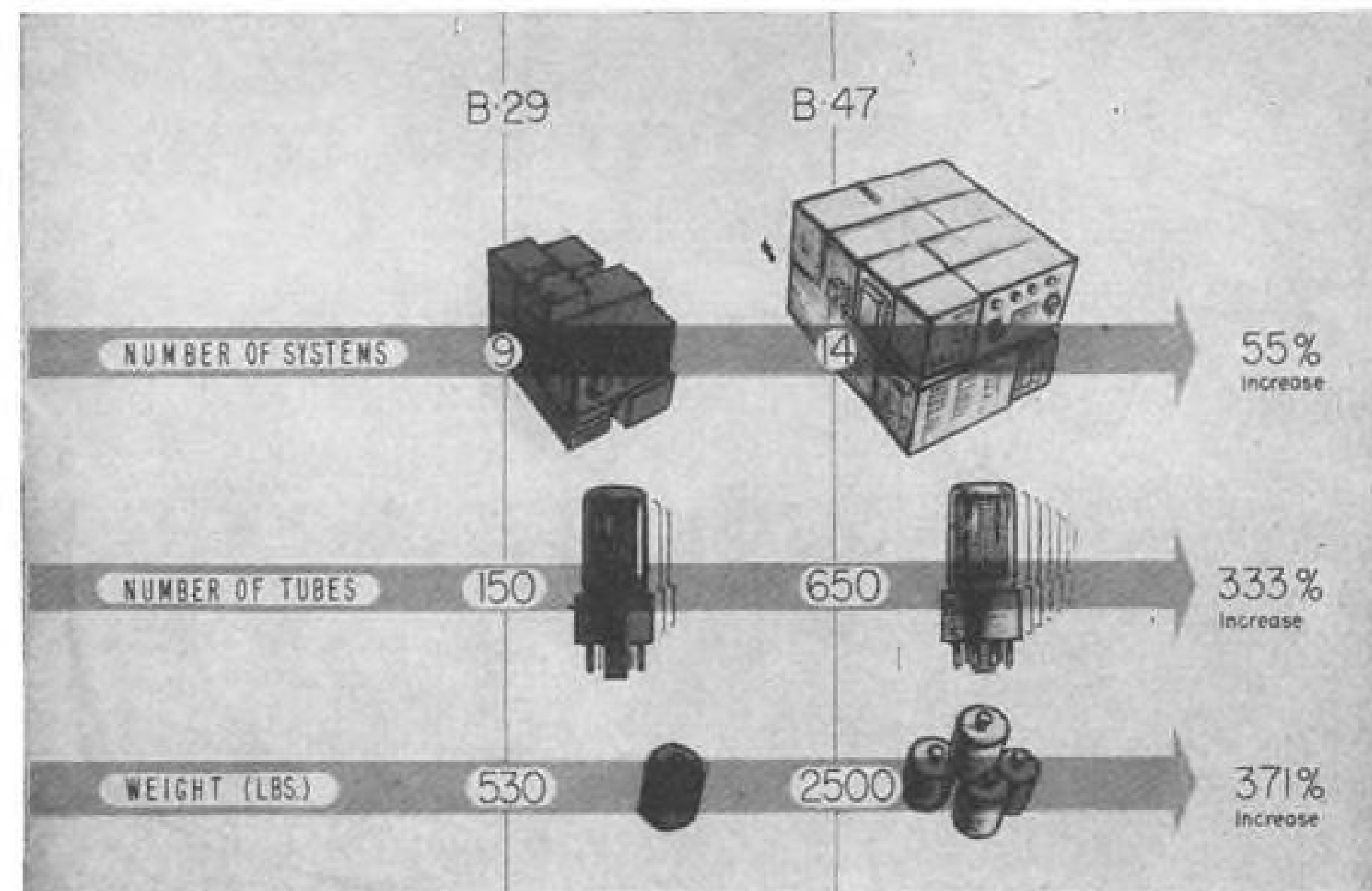
The Arinc report shows that the equipment designer, military services, and to some extent the aircraft manufacturer, must share the blame with the oft-criticized tube manufacturer. Improved equipment reliability will depend on the efforts of all concerned, the report indicates.

► **Most Extensive**—The Arinc program, most extensive ever attempted, monitored nearly half a million tubes operating in 44 different types of Air Force, Navy and Army equipments at eight different bases.

The report's conclusions are based on a study of 45,000 tubes removed as defectives during the period of Sept. 18, 1951 through Mar. 31, 1953. An analysis of another 43,500 tubes removed during the balance of 1953, but not included in the present report, confirms the earlier findings, an Arinc spokesman told AVIATION WEEK.

► **Defects and Failures**—Arinc's study showed that of 45,000 tubes removed as defective:

- One-third appeared to be free of defect when later tested in the lab, indicating that their removal should be charged to inexperienced maintenance personnel and inadequate test equipment or maintenance provisions.
- One-third were deterioration failures due to normal aging which could be detected in advance by "fault predicting equipment" (AVIATION WEEK Nov. 24, 1952, p. 51) and removed before they caused equipment failure.
- One-sixth showed defects which were probably the result of handling during tube installation or equipment maintenance.
- One-sixth were catastrophic type failures.



TREMENDOUS GROWTH in number of avionics systems in modern aircraft emphasizes why the problem of tube failures is a challenge to industry and the military.

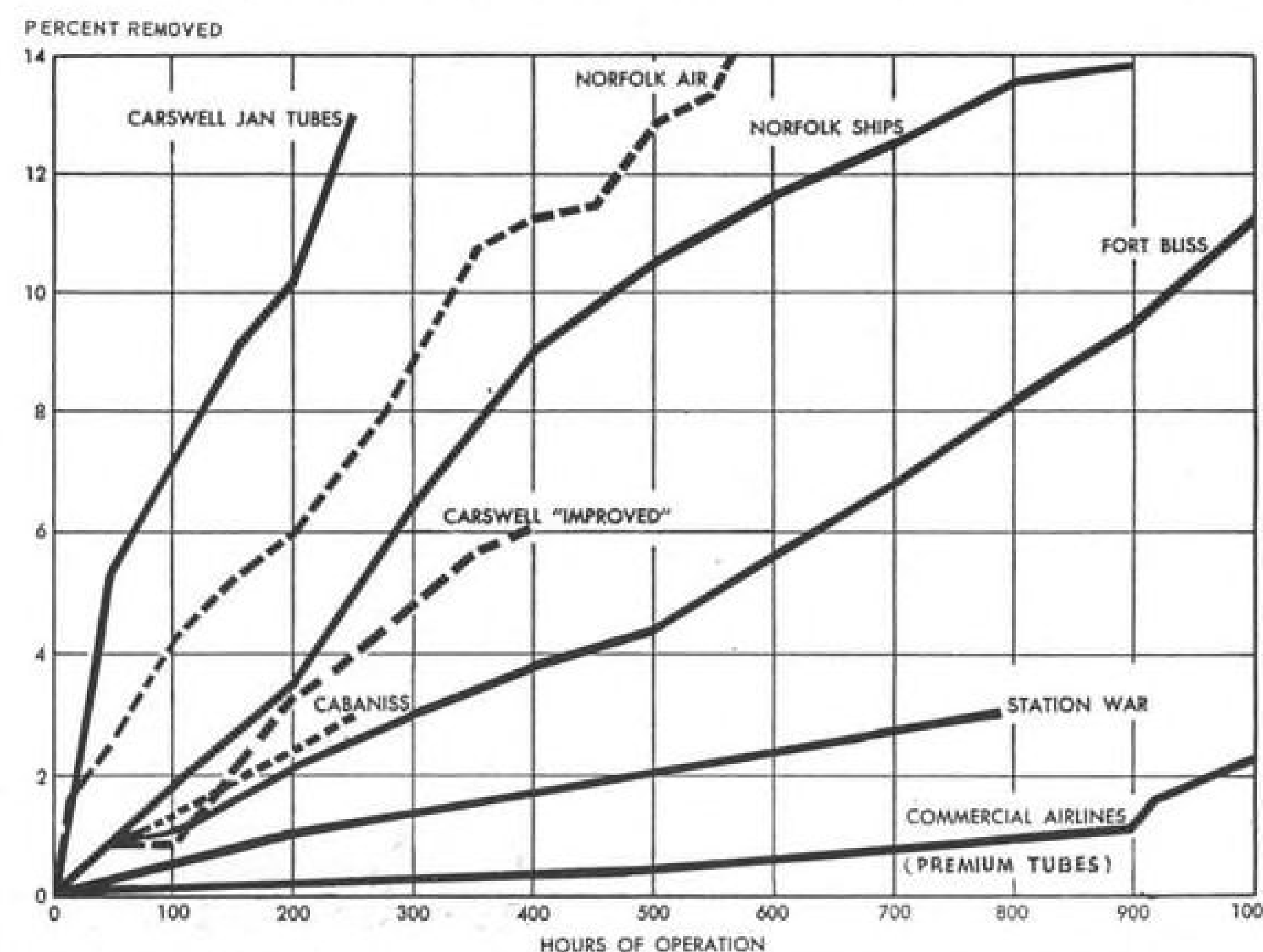
ures which would cause sudden and unpredictable equipment failures.

► **Tube Removal Rates**—Arinc found a wide variation in tube removal rates among the eight military facilities participating in the program. The variation reflects the different environments in which the tubes and equipment operate and the maintenance conditions at each base.

The eight participating groups in-

cluded three Air Force bases (Carswell, MacDill, and Bergstrom), one Naval Air Station (Cabaniss Field), Norfolk Naval Base (including both airborne and shipboard equipment), Radio Station WAR (Washington), Army European Command, and Fort Bliss.

Highest tube mortality was recorded at Carswell AFB, where an average of seven JAN type (non-premium) tubes per hundred sockets were removed in



TUBE MORTALITY CURVES in Arinc report show that tube failures depend on operating environment, quality of maintenance and use of premium-type tubes.

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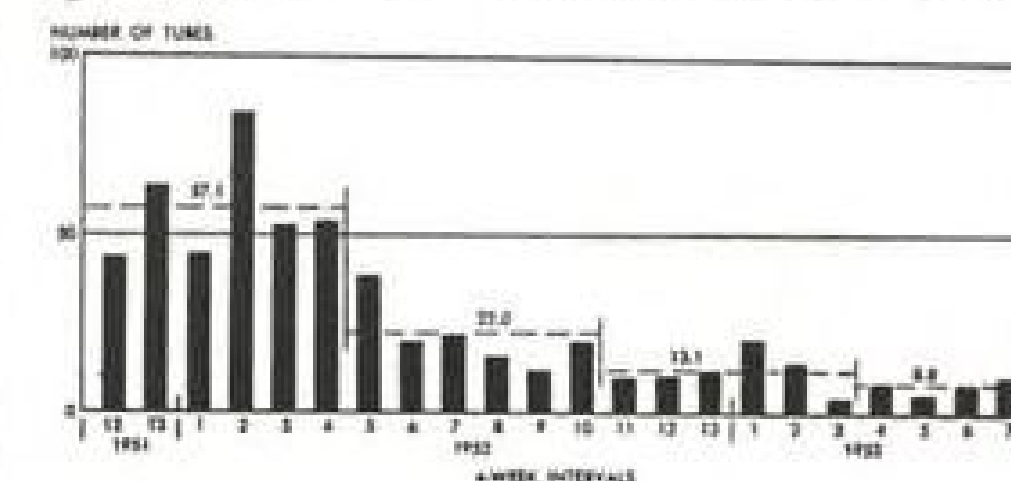
GI MAINTENANCE personnel find it difficult to cope with growing complexity of military electronics systems.

the first 100 hours of operation. Lowest removal rate was for Station WAR where replacements averaged 0.4 per 100 sockets/100 hours (see graph, p. 52). When premium type tubes were used, Carswell's replacement rate dropped to around 1.5 per 100 sockets per 100 hours.

Average removal rate for all tube types under surveillance (JAN and premium) at all bases is between one and three per 100 sockets/100 hours. Limited experience indicates that a specific premium-type tube lasts two to four times longer than its JAN counterpart, Arinc reports. The actual improvement might be even greater.

► **Airline Comparison**—An Arinc survey shows that airline replacement rate for premium-type tubes is only 0.3 per 100 sockets/100 hours, roughly $\frac{1}{3}$ the rate for comparable tubes at Carswell AFB, for example. There is a logical explanation for this difference.

Airlines use less complex equipment which has had a longer period of debugging; they have relatively well-trained and permanent maintenance personnel. As a result, "airlines have been able to limit tube removals substantially to mechanical, or catastrophic failures and to those tubes that have worn out electrically to the point where they are near the end of useful life," according to F. R. Jervis, who is engi-



TEMPERATURE'S ROLE in tube mortality is shown by drop in failures of 6AR6 and 6098 tubes in radar bombing system when operating temperature was cut.

neering manager of the Arinc surveillance program.

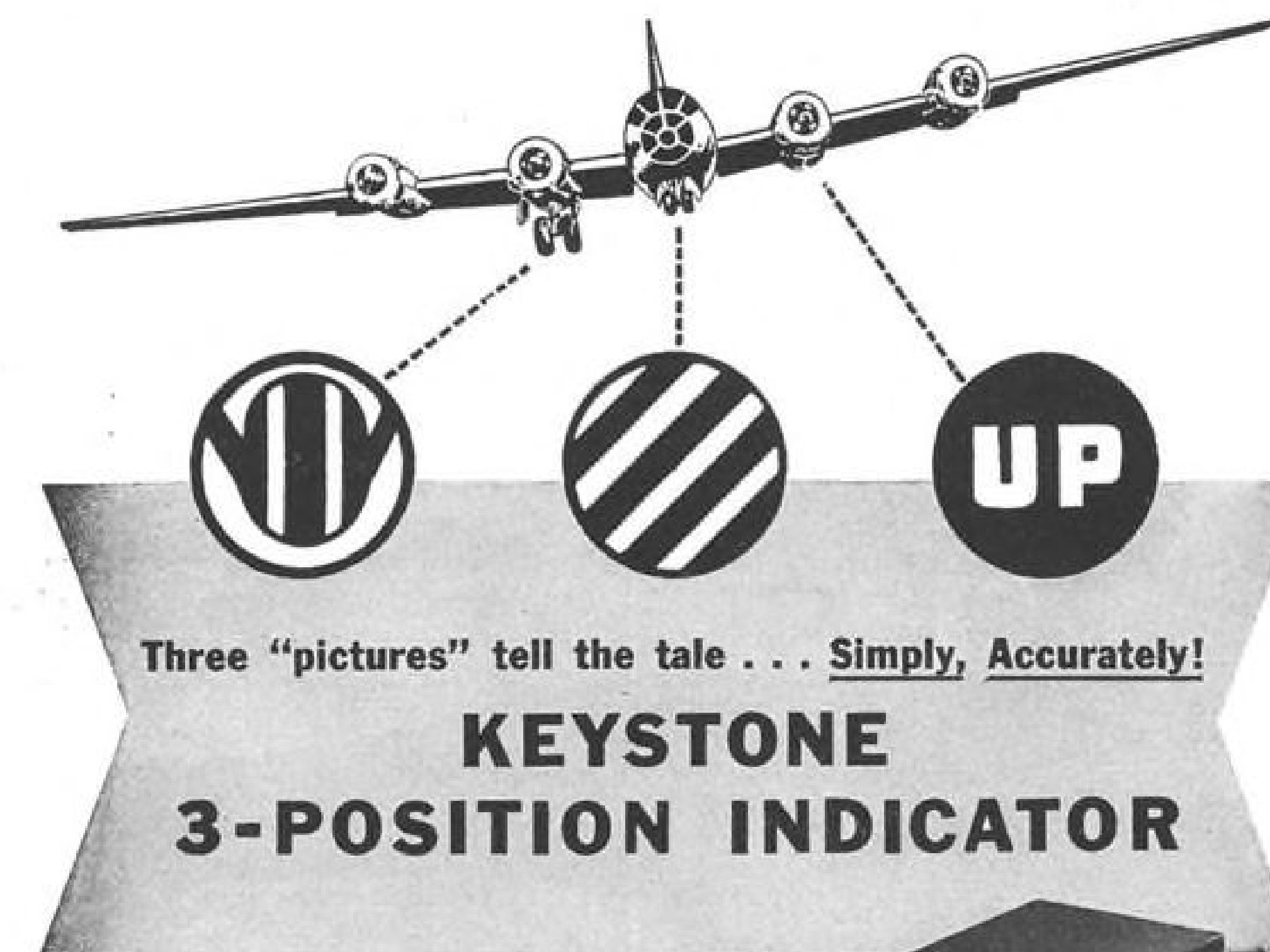
► **Benchmark and Target**—The airline figure provides a good benchmark for measuring the reliability of newer premium tubes under near-optimum conditions and gives the military a target at which to aim.

The task of reducing replacement rates below present airline figures is primarily a job for the tube manufacturer.

The job of getting military replacement rates down to the airline figure is primarily one for avionics equipment designers and the military services, with some help from tube and aircraft manufacturers.

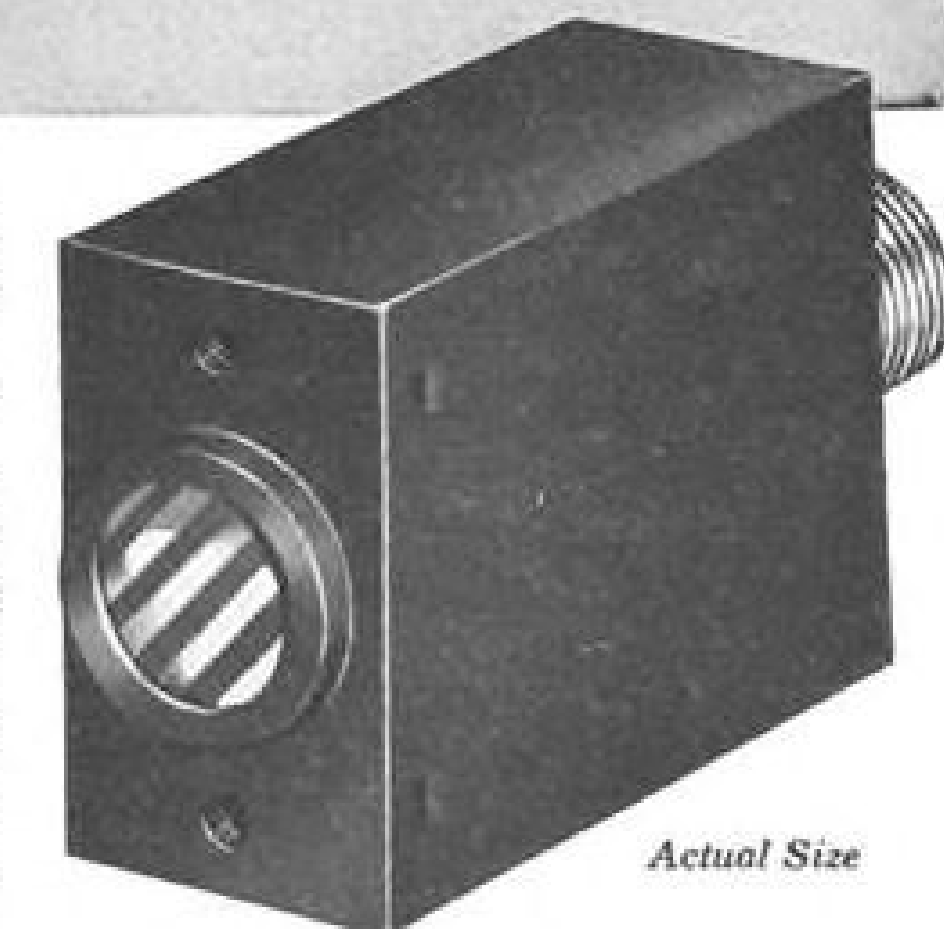
► **Coping With Complexity**—According to the Arinc breakdown, there is nothing that tube manufacturers could do to prevent half of the military tube replacements (unless they designed tubes with solder-type terminals instead of the familiar plug-in base). These replacements result from the fact that "in most cases, military maintenance cannot cope with complexity of present equipment," Arinc says.

At three of the participating bases, Arinc says, "maintenance is performed by systematically trained but inexperienced enlisted personnel and tubes are frequently removed in clusters because repairmen . . . have not always the time,



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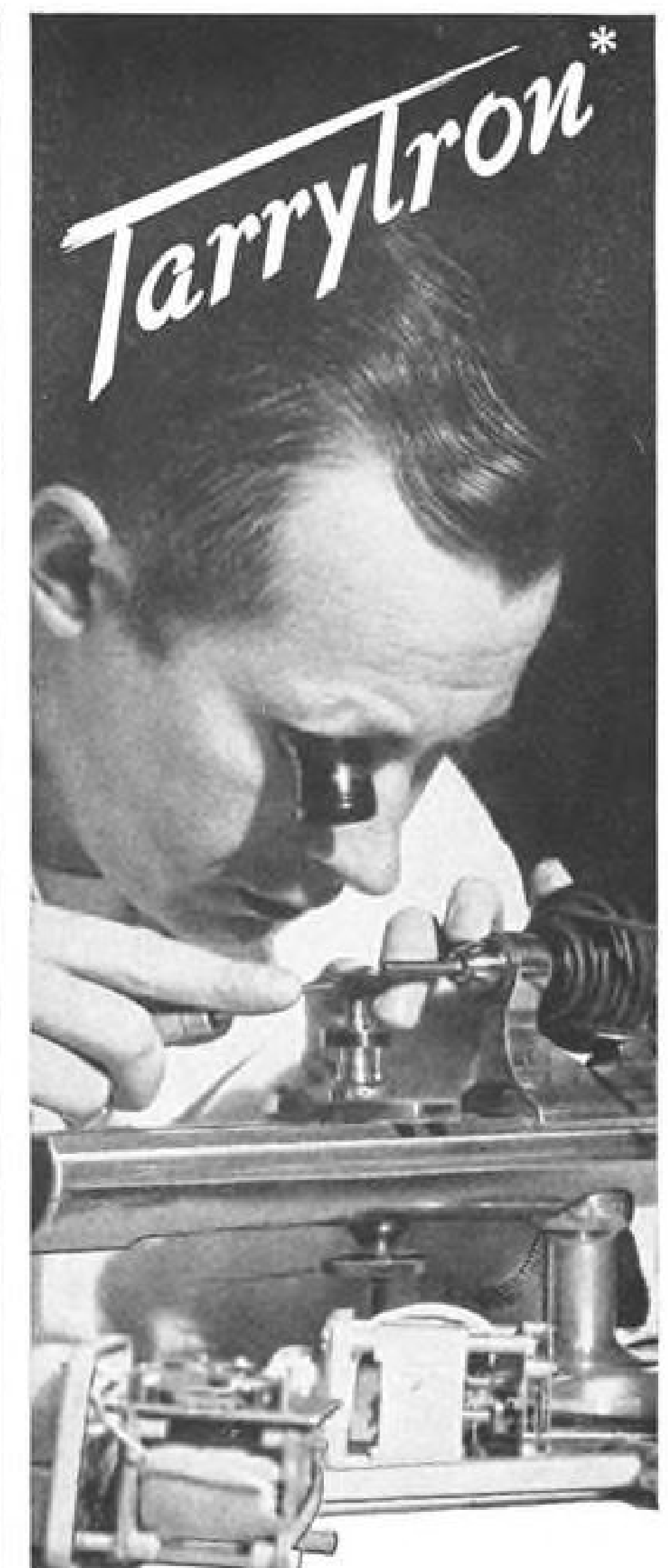
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knowledge, or facilities for distinguishing between good and bad tubes."
► **What Comes Naturally**—"It is difficult or even impossible for maintenance men of average technical background to identify the true source of trouble. The tendency to change tubes rather than to delve into the true cause also has a psychological basis, in that tubes are easy to change and are considered relatively cheap," the Arinc report says. It is often "the only available method of quick trouble-shooting."

Arinc cites the electronics school at one base where instructors train students in trouble-shooting techniques by installing defective tubes to create equipment malfunctions. This subconsciously conditions maintenance men to suspect tubes when they later encounter equipment failures.

► **Damage From Handling**—"The chances of damaging a tube while replacing it in a compact, present-day equipment are relatively large . . . and increase if any subchassis or other component has to be removed and replaced," the report continues. "The damage may occur immediately or be delayed until heat cycling or vibration during subsequent tube operation adds to the initial stress."

With miniature and subminiature tubes, base pins can be damaged easily or broken in the process of removal or installation.

► **Waste of Time**—At one AF base,

Arinc data showed that some tubes were replaced 50% of the time when equipment came in for service, yet 30% of these removed tubes later showed no defect. The report concludes that "under these circumstances, trouble-shooting by replacing tubes is a waste of time . . . (and) this will become even more true . . . (as wider use is made) of reliable tube types."

Arinc found exceptions, for example at Station WAR where it reports that maintenance personnel had proper training, tools, and time to do a good job. However, the report concludes that "while the maintenance situation can and doubtless will be improved in peacetime, in case of national emergency it cannot be expected to be any better than at present, and it will probably be worse."

► **Challenge to Designers**—"Frequent maintenance involving excessive handling and reinsertion of tubes may easily defeat the very purpose for which it was instituted by introducing more defective tubes than it detects. If an equipment is to be subjected to a rigorous environment, it should be designed to provide performance test facilities so that maintenance may be carried out with a minimum of tube handling," the Arinc report emphasizes.

"Real progress toward improved reliability . . . will be made only if emphasis is placed on the design of equipment for easy servicing rather than on the

improvement of maintenance (personnel)."

The report urges designers to provide:
• **Unitized construction** of sub-assemblies, with provision for quick replacement.

• **Malfunction indicators** built into each sub-assembly, or an automatic system to "eliminate the malfunctioning unit from the system."

Although this may increase system complexity, Arinc believes that reliability will nevertheless be improved.

► **Marginal Performance**—"Results of the surveillance program show that equipment as now designed barely succeeds in performing all its operations and that no margin of performance is left in reserve for unfavorable conditions or any kind of emergency," the report says. "This . . . puts an additional heavy burden on inadequately trained maintenance and operating personnel."

For example, it is not enough to design equipment to perform satisfactorily when tube transconductance is within the range called out by JAN or MIL space for new tubes. A properly designed equipment, the report says, should perform satisfactorily until transconductance has fallen to the limit specified for minimum JAN life test.

To illustrate its point, the report says that 45% of a batch of 6AK5 tubes replaced for low transconductance as evidenced by poor equipment performance, were actually higher than the value specified for minimum JAN life test and would have been acceptable if the equipments were "properly designed" by Arinc standards.

► **Another Example**—When double triodes with very high gain are employed as pre-amplifiers in servo amplifiers, tubes with very low microphonic output are usually required, the report notes. In many cases, equipment manufacturers preselect tubes to get ones with low microphonic output. When it becomes necessary to replace these tubes in the field, the maintenance man either does not know of the low microphonic output requirement, or else lacks sufficient tube stock to permit selection.

The result is unsatisfactory equipment performance and so the tube is replaced again and again until, by mere chance, one with low microphonic output is found, the report says.

Another version of the same problem occurs when a manufacturer selects a tube like the 6113 (premium version of the 6SL7) for its low microphonics but fails to note on the chassis or in the instruction book that the 6SL7, its electrical JAN equivalent except for low microphonics, cannot be substituted if a spare 6113 is not in stock.

► **Good Bill of Health**—Out of 12,000 different receiving tube applications

studied, Arinc found only 40 serious instances of misapplication. These usually show up quickly because of large quantity tube returns.

More subtle kinds of misapplication which produce only slight tube hardship and cause only minor reduction in equipment reliability are much more difficult to detect. Examples of this type include tube use:

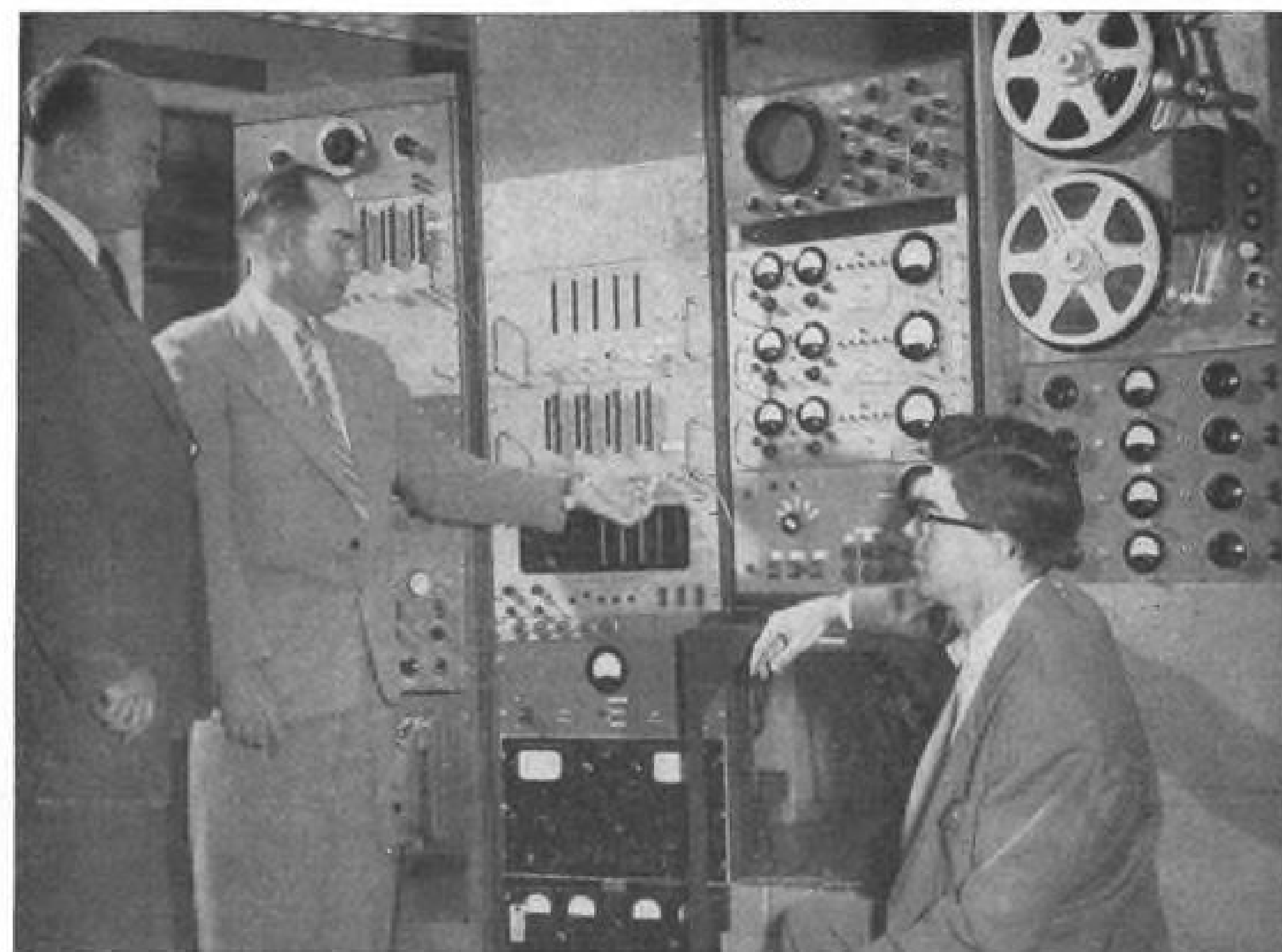
• **At maximum rating** when another type is available which could be operated at a more conservative rating.

• **When not designed** for particular application and where a more suitable type is available, such as using a pentode in a triode connection.

Arinc warns that the total effect of many subtle types of misapplication can be more serious than a single severe misapplication of one tube type.

► **High Temperature Fatal**—Life expectancy of tubes decreases very rapidly when bulb temperatures are allowed to reach 200C in soft glass tubes manufactured with normal processing, Arinc reports. Keeping tube temperatures within safe limits is the responsibility of the tube manufacturer, equipment designer, and the aircraft manufacturer who locates the equipment in the airframe, and thus determines its ambient temperature.

In one radar bombing system, failure



Automatic Data Reducer

Automatic data reducer, developed by Lockheed Aircraft Corp. engineers, unscrambles and records telemetered aircraft or missile flight test data on magnetic tape, converts it into binary code which is re-recorded on punched cards for later use by automatic computers or graph plotters. The electronic unscrambler uses four-track recording tape.

One track contains timing information, one records vibration, and the other two hold the bulk of the test data. The two latter tracks may contain more than 60 channels each, Lockheed says. The company claims that the equipment cuts data reduction time from a period of several weeks to as little as two-three days.



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rates of 6AR6s used in the power supply were four to five times higher than the average of all other tubes used. Investigation showed that the temperature of these tubes reached 315C during flights above 30,000 ft., roughly 100C above maximum rating, with the power supply installed in an unpressurized section of the airplane.

► **Prompt Relief**—Two corrective measures were taken: transfer of the power supply to a pressurized zone, and installation of more effective blowers in the equipment. A temperature check after relocation showed average bulb temperature had dropped to 181C for all 6AR6s and their premium counter-

parts, type 6098. The changes were made at different times in various aircraft but in general were completed during the second quarter of 1952.

Tube replacements of the 6AR6 and 6098 dropped sharply from an average of 57.1 to only 8.8 for a four-week period (see graph, p. 54). Arinc attributes the improvement to reduced tube temperatures, inasmuch as there was no significant change in replacement rate of other tube types used in the same bombing system.

► **Operating Procedures**—Operating procedures have an important bearing on tube reliability, a fact which the engineers who write instruction books and

operating placards would do well to note. For instance, it has been common practice to instruct flight crews to put fire control, autopilot, radar, and similar gear in "standby" conditions so that tube heaters will be energized and the equipment ready for instant action when needed.

Long periods of standing operation, with heaters energized but with anode power off, may induce interface formation on tube cathodes, a major cause of tube performance deterioration, Arinc data shows.

Improper operation of a radio transmitter usually produces more tube damage than improper use of a receiver, which is one explanation for the higher mortality of transmitting tube types. For example, an improperly tuned radio transmitter can result in high plate dissipation, which in turn can produce a variety of tube failures.

► **Not Singled Out**—Arinc's report does not single out equipment manufacturers for constructive criticism; much of the report is devoted to Arinc's findings on tubes themselves — their comparative mortality rates and individual weaknesses. A report on these findings will be the subject of a later AVIATION WEEK article.

Many avionic equipment designers can justifiably shift a portion of the blame for past sins to the military. All too frequently in the past the military services have insisted on squeezing all possible size, weight, and performance out of a new piece of equipment, at the expense of reliability, while giving lip service to the need for more reliability. This was not a capricious military whim, but a requirement imposed by the need for more and more avionic equipment without compromising aircraft payload or range.

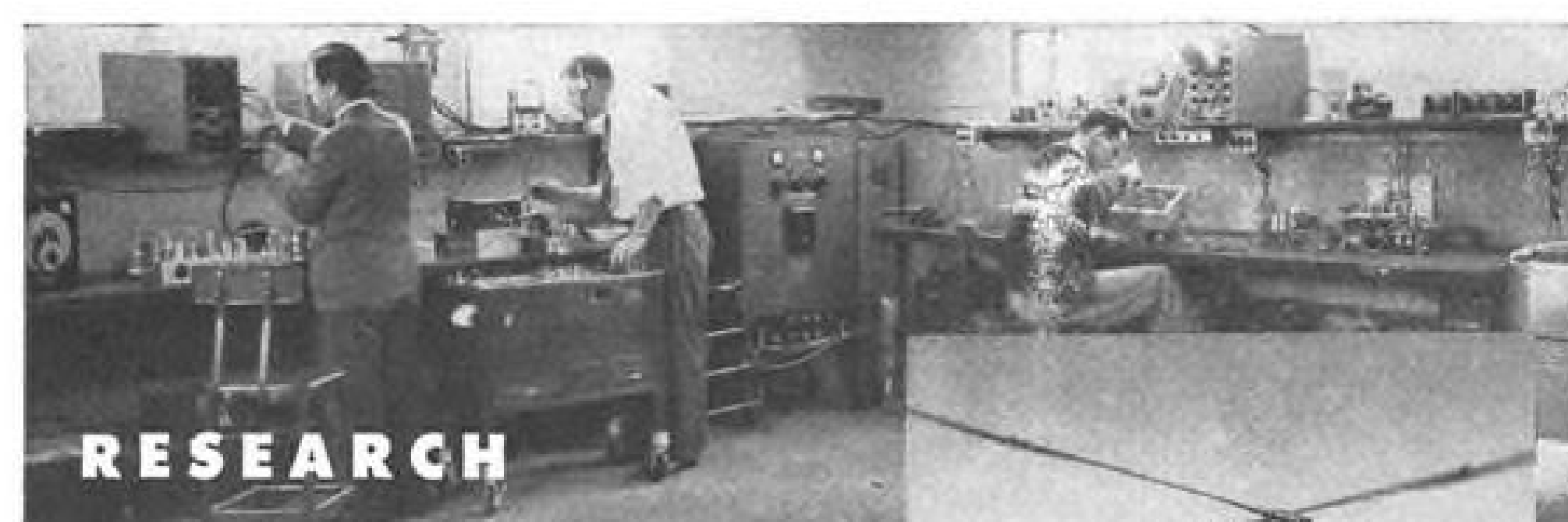
► **Recommended Reading**—Without attempting to place blame, the Arinc report documents the consequences of past sins and omissions.

All segments of the industry, including military engineers who supervise industry's developments, could well study this first general report, and succeeding reports to follow. Copies are available for 50 cents from L. E. Davis, Aeronautical Radio, Inc., 1523 "L" St. N. W., Washington 5, D. C.

Transistors Simplify Fuel-Gage System

The nation's first completely transistorized aircraft fuel measuring system (capacitance-type) has been unveiled by Minneapolis-Honeywell. The new device is 75% lighter, 86% smaller, and uses less than half the power of comparable systems employing electron tubes, M-H says.

The new fuel gage, first shown at the



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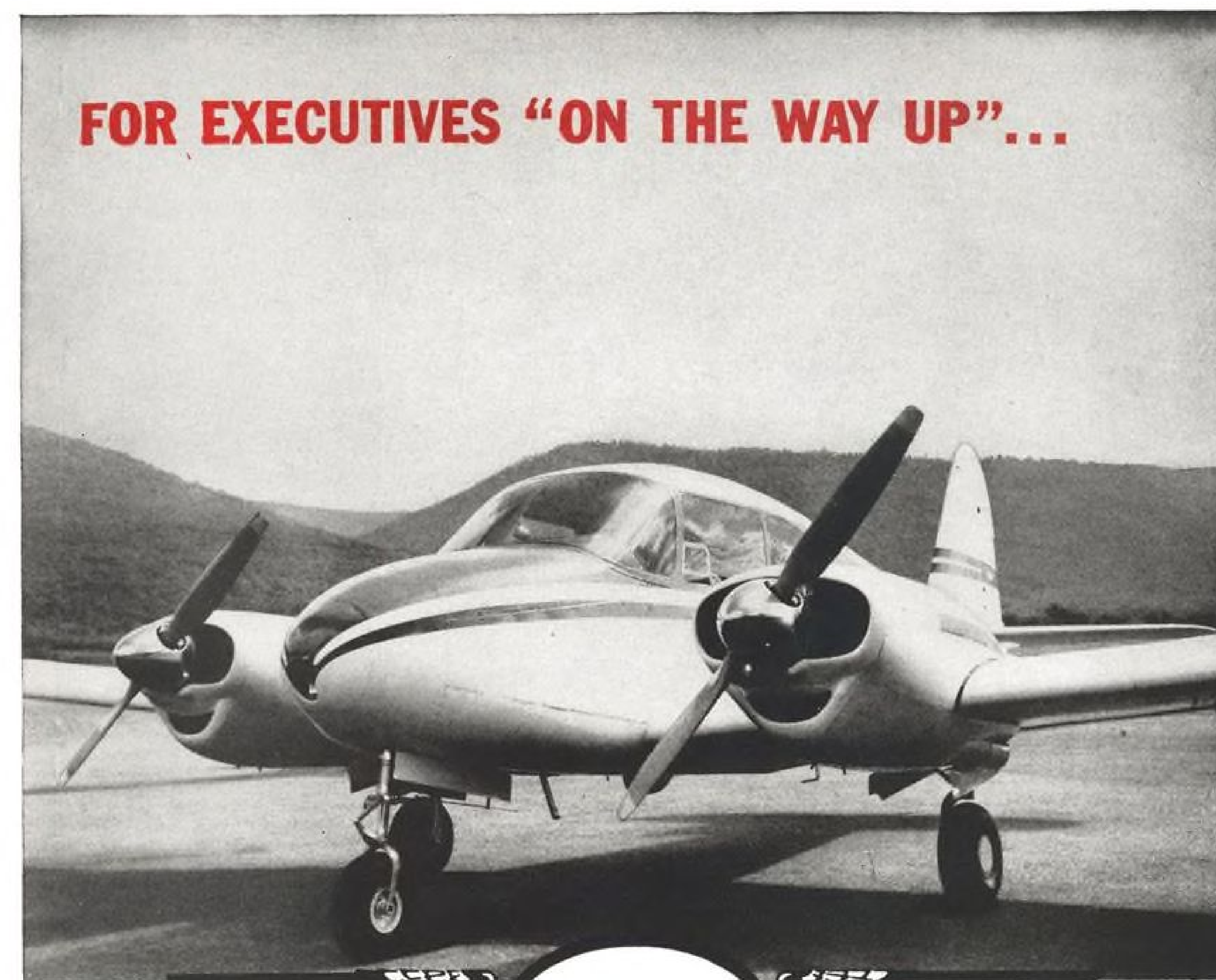
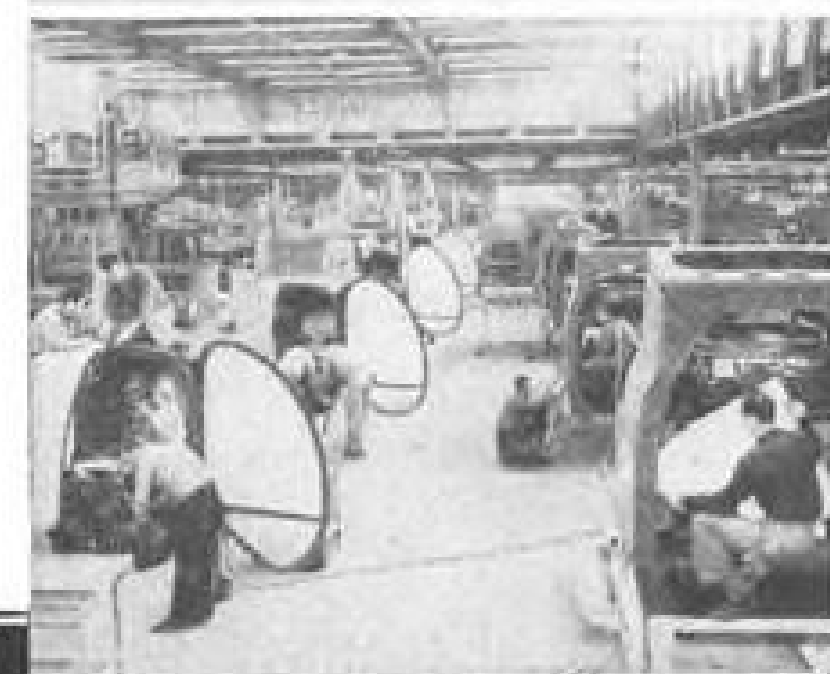
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CANADIAN REPRESENTATIVE: RAILWAY & POWER ENGINEERING CORPORATION, LIMITED.



THIS IS FIRST transistorized fuel-gage system in nation, says M-H.

recent national IRE convention, uses M-H's recently announced power-type transistors which develop sufficient power to drive the panel indicator. Equipment accuracy is maintained through the temperature range of -67° F to 165° F, company says.

Use of transistors enabled M-H to combine system amplifier and panel indicator into a single hermetically sealed case, eliminating previous large separate electron-tube amplifier. New two-unit transistorized system weighs 2.3 lb., compared to 5.3 lb., for previous three-unit tube version.

Big Airports to Get New Bendix Radars

Improved Bendix Radio air surveillance and precision approach radars are slated for installation at 31 major airports, including several equipped with older ASRs and PARs.

Important new feature of the ASR-3 traffic control radar is an automatic direction finder which identifies an aircraft during its radio transmissions by running a line through the airplane's blip on the radar scope.

►Where They Go—The new ASR-3, now being tested by the Civil Aeronautics Administration at Baltimore's Friendship Airport, will replace older equipments at LaGuardia, N. Y. International, Chicago, Washington, Atlanta, Los Angeles, Boston, and Cleveland. Airports presently without radar, at Knoxville, Louisville, Nashville, Ft. Worth, Miami, Burbank, Denver, and Buffalo, will also get ASR-3s.

The new PAR-2, under test at Philadelphia International Airport, will be installed at Pittsburgh, Detroit, Oakland, San Francisco, Portland (Ore.), Seattle, Kansas City, Indianapolis, St. Louis, Dallas, Houston, and Anchorage (Alaska), as well as replacing an older



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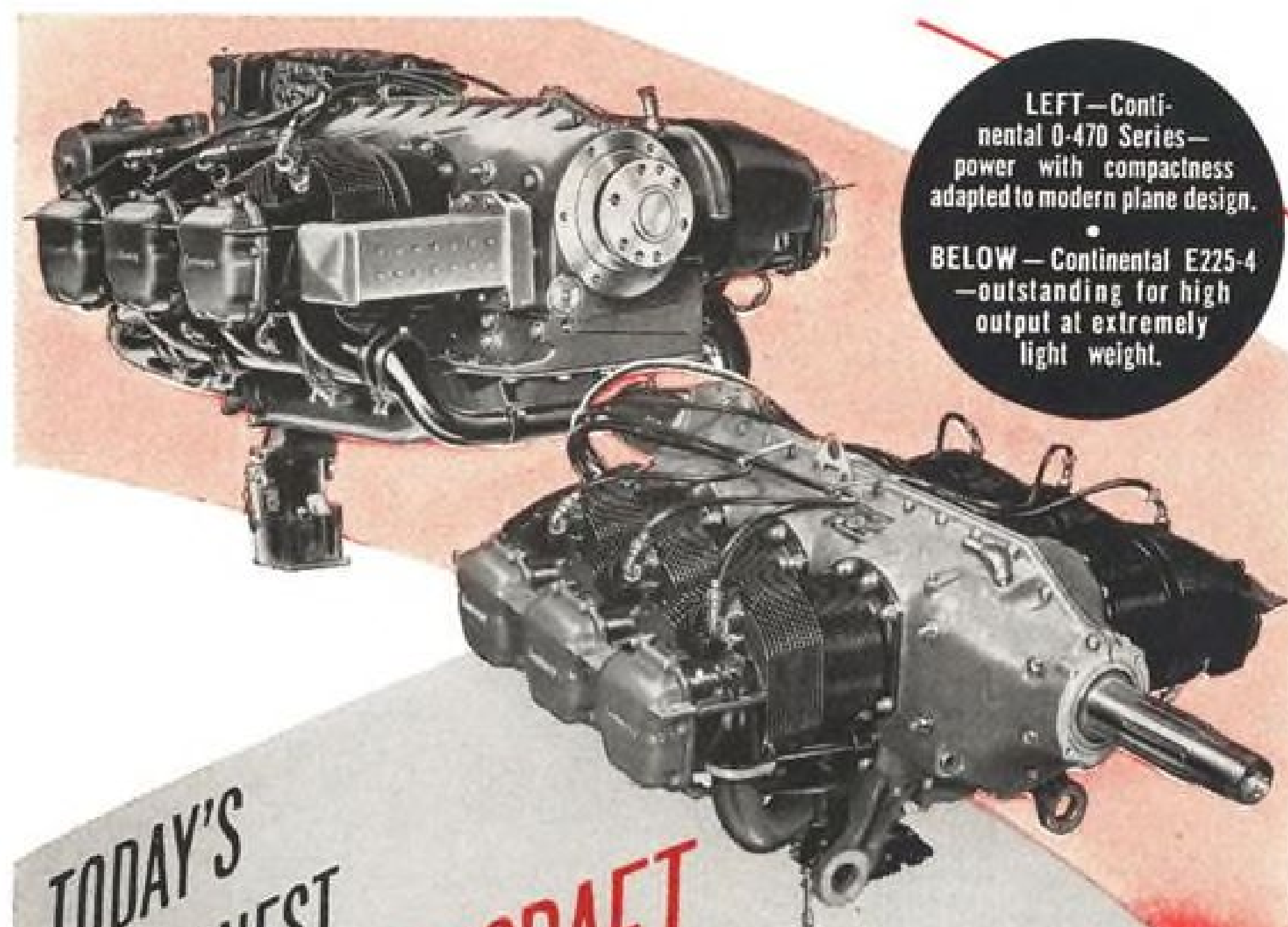
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set at Newark Airport in New Jersey.
► **Other Features**—In addition to ADF provisions, the Bendix ASR-3 provides moving target indication (MTI) which enables radar operator to blot out radar echoes from fixed ground objects, leaving only airplane targets. (The General Electric ASR-2 also has MTI.) The ASR-3 also provides video mapping which reproduces a map of the surrounding area on the radar scope to indicate obstructions or other danger areas.

Circular polarization, which greatly reduces rain-clutter on the scope during a storm, can be provided but is not called out by the CAA specs, a Bendix spokesman says. The company reports it currently has orders for GCAs from several foreign governments for installation at Copenhagen, Gander, Bombay, Frankfurt and Hamburg.



► **Experts Visit Air Arm**—Dr. Dean Wooldridge and Dr. Simon Ramo have been recent visitors to the Westinghouse Air Arm plant in Baltimore. This prompts speculation that they are now consultants to Air Arm, which was their biggest competitor in the interceptor fire control field when Ramo and Wooldridge were directing the technical activities of Hughes Aircraft Co. Troubles with Air Arm's newest system recently led Navy to cut back on production, at least for the time being.

► **Comets Get Flight Directors**—Air France has purchased Collins Radio Company's Integrated Flight Systems for use on carrier's de Havilland Comet 2s and 3s, Collins reports.

► **New Digital Computer Role**—Jacobs Instrument Co. has proposed to USAF a digital computer for use with flight simulators, claiming advantages of versatility, accuracy, cost, size, and ease of manufacture and repair. Company proposes to use its Jaincomp-C or -D, described in AVIATION WEEK Feb. 1, p. 45.

► **New Gyro Consultant**—Henry Konet, former chief engineer of mechanical instruments at Eclipse-Pioneer Division of Bendix Aviation, has formed the Konet Co. to do consulting engineering in gyroscopes, instrumentation, and controls. Company address is 101 N. Franklin Turnpike, Hohokus, N. J.

► **F-86D Avionic Weight Reduction**—Lear has proposed to USAF a modified version of its F-5 autopilot now used on the F-86D, which could save 25 lb. of weight, eliminate much duplicate avionic gear now carried. New "Super F-5" would eliminate need for separate yaw damper, horizon indicator vertical gyro, heading indicator directional gyro.

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IN 1953 THAN
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LETTERS

Misdirected Efforts?

The comment on flying boats by Clarence Chamberlin (AVIATION WEEK Feb. 15, p. 102) was most interesting. I sincerely wish we might find a way to draw out more such earnest comment from our aviation elders, based, as it is, in this case, on a lifetime of experience in the business.

It is sad but true that much of our aviation effort is misdirected.

Most of our present effort is in the direction of more complication, more gadgets, more power, instead of greater efficiency, more payload per unit of thrust, cheaper unit construction, wider acceptance.

With $\frac{1}{3}$ of the earth's surface covered with water, and this water touching the shores and forming the harbors of every populated area on the surface, we still build our biggest and best planes to operate from land.

We arbitrarily limit them and greatly restrict their mobility and utility by designing them to operate only from a land runway (or floating deck) that:

- Costs millions of dollars to build.
- Can be wiped out by a single enemy bomb.

• Necessarily is so far removed from any saturated population that secondary means of transportation is necessary to and from such population areas, if the primary means is to be utilized.

It would seem that new, independent thought is in order, based on the overall problem.

The solution will be forthcoming when we combine the experience and lessons of the past with sound judgment and present knowledge.

T. ROBINSON, Aircraft Design Engineer
968 Fairfield Ave.
Bridgeport, Conn.

Playboy's Price

I read an interesting article about Playboy lightplane in Aviation Week, Jan. 18. It says the price is \$995. Does this include that of 80-hp Continental engine? The same power engine costs more than \$1,000 in Japan. I am waiting more details from you with gratitude in advance.

KIYOSHI AKEGAWA
777 Yamazaki
Kamakura, Japan

(The price of the Playboy kit is \$995, which does not include engine. The Playboy is manufactured by Stits Aircraft Co., P. O. Box 3084, Riverside, Calif.—Ed.)

Douglas Electricity

I have read the interesting report on the Douglas DC-7s being operated by American Airlines, prepared by George L. Christian and published in your Feb. 8 issue. I would like to correct his belief that the DC-7 is the first commercial Douglas airplane which does away with the vacuum system and uses all electric instrumentation.

Pan American World Airways' DC-6Bs, Pan American-Grace Airways' DC-6s and

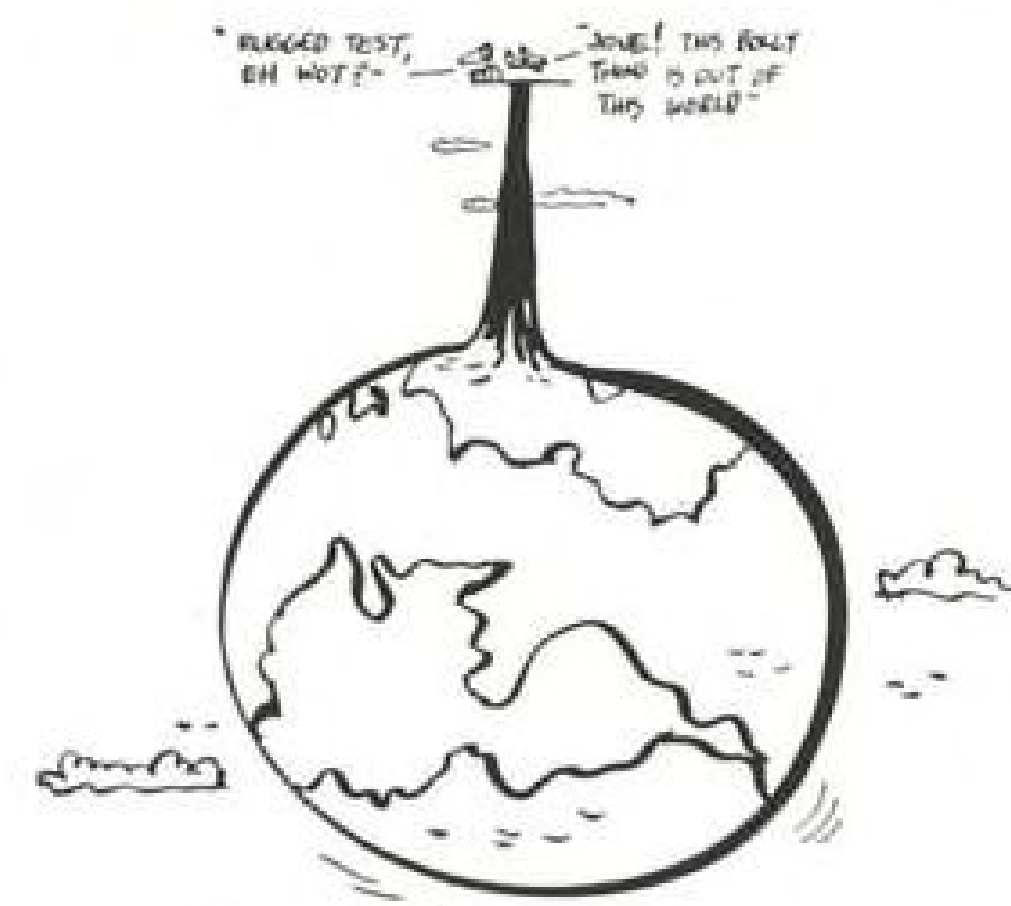
DC-6Bs, Compania Mexicana de Aviacion's DC-6 and DC-6Bs had electric systems. Also, in addition to the Boeing Strato-cruisers, PAA ordered all-electric systems for their fleet of Convair CV-240 transports delivered some years ago.

W. A. DEL VALLE, Resident Engineer
Pan American World Airways System
c/o Douglas Aircraft Co., Inc.
Santa Monica, Calif.

(The writer of the original article was told by an American Airlines official that the DC-7 was the first Douglas plane with all-electric instruments.—Ed.)

High-Flying Comet

I regard your magazine as the finest and most comprehensive publication pertaining to aviation today. I read it from cover to cover and find its coverage of events accurate and unbiased. I was somewhat amused, however, at the typo in "Comet 2 Tests"



on page 16 of the Feb. 1 issue. I know they are giving Comets rugged tests nowadays but, really, isn't flying from a 5,000-mi.-high field a little preposterous?

WILLIAM NOONAN
4157 Vivian St.
San Diego, Calif.

To quote from your 1 Feb. 1954 issue, page 16, "The airliner (Comet 2) soon will fly to Jan Smuts Airport at Johannesburg to test performance off a 5,000-mi.-high field."

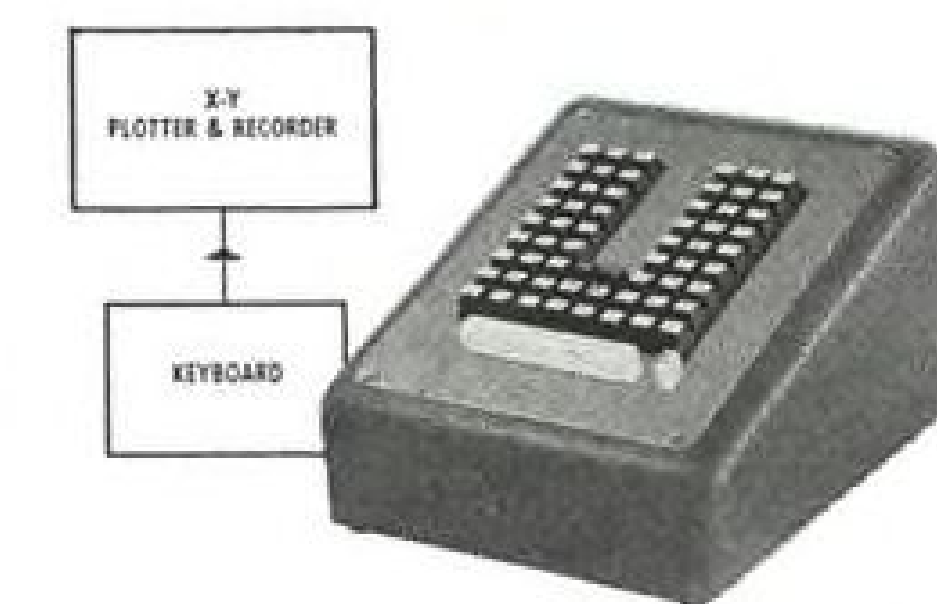
Are we really this far behind the British?
CAPT. JOHN J. McELROY
Air Force Flight Test Center
P. O. Box 0-49
Edwards, Calif.

(We are teaching an embarrassed proof-reader the difference between mi. and ft.—Ed.)

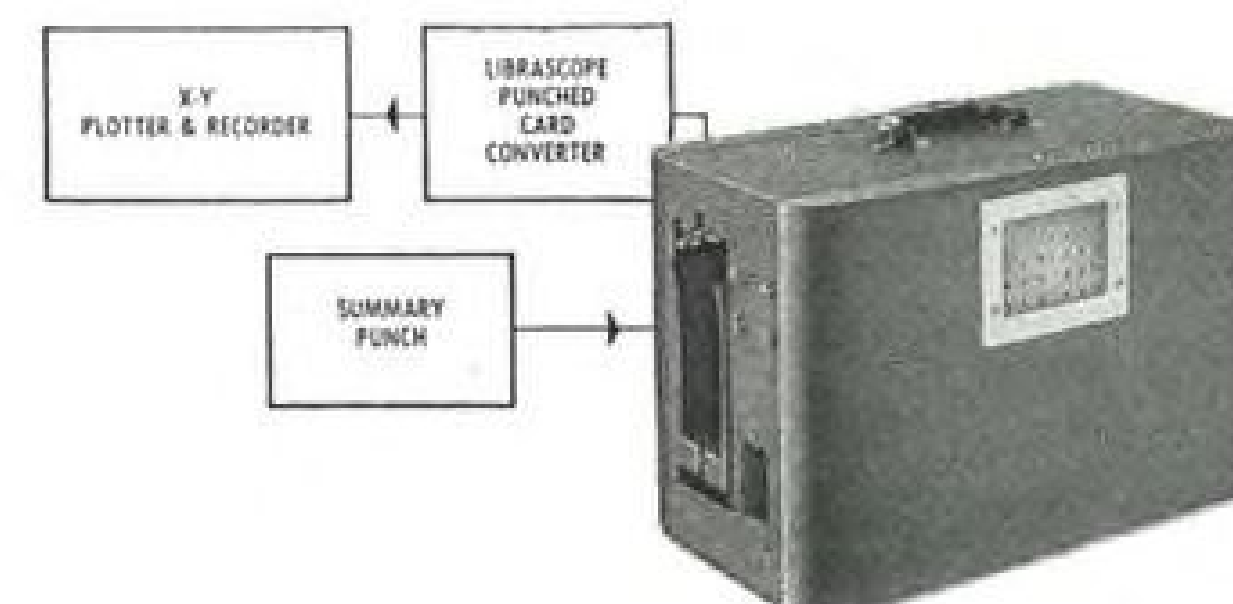
Pilot Viewpoint

Regarding Robson's "Cockpit Viewpoint" and his three-year summary as of Jan. 25, 1954, it is a fine contribution every time it comes out and I look forward to it. Recommend, however, that the title be amended to "Airline Pilot Cockpit Viewpoint" because, try as he might, Robby represents just that one (and worthy) viewpoint! You can't teach us old dogs new tricks.

J. S. (Military Pilot)



DECIMAL KEYBOARD: Consists of a three-decimal bank for each axis with associated plus-minus keys. Depressing plot bar initiates plot and clears keyboard automatically. Also manual clear button. Size: 8½ x 11 in., Weight: 12 Lbs.

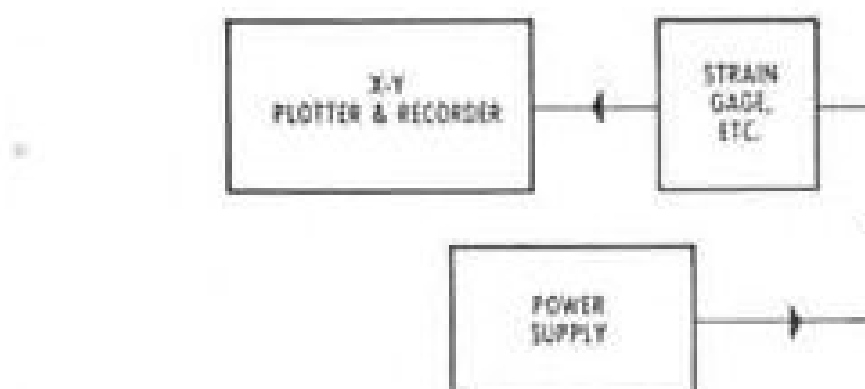
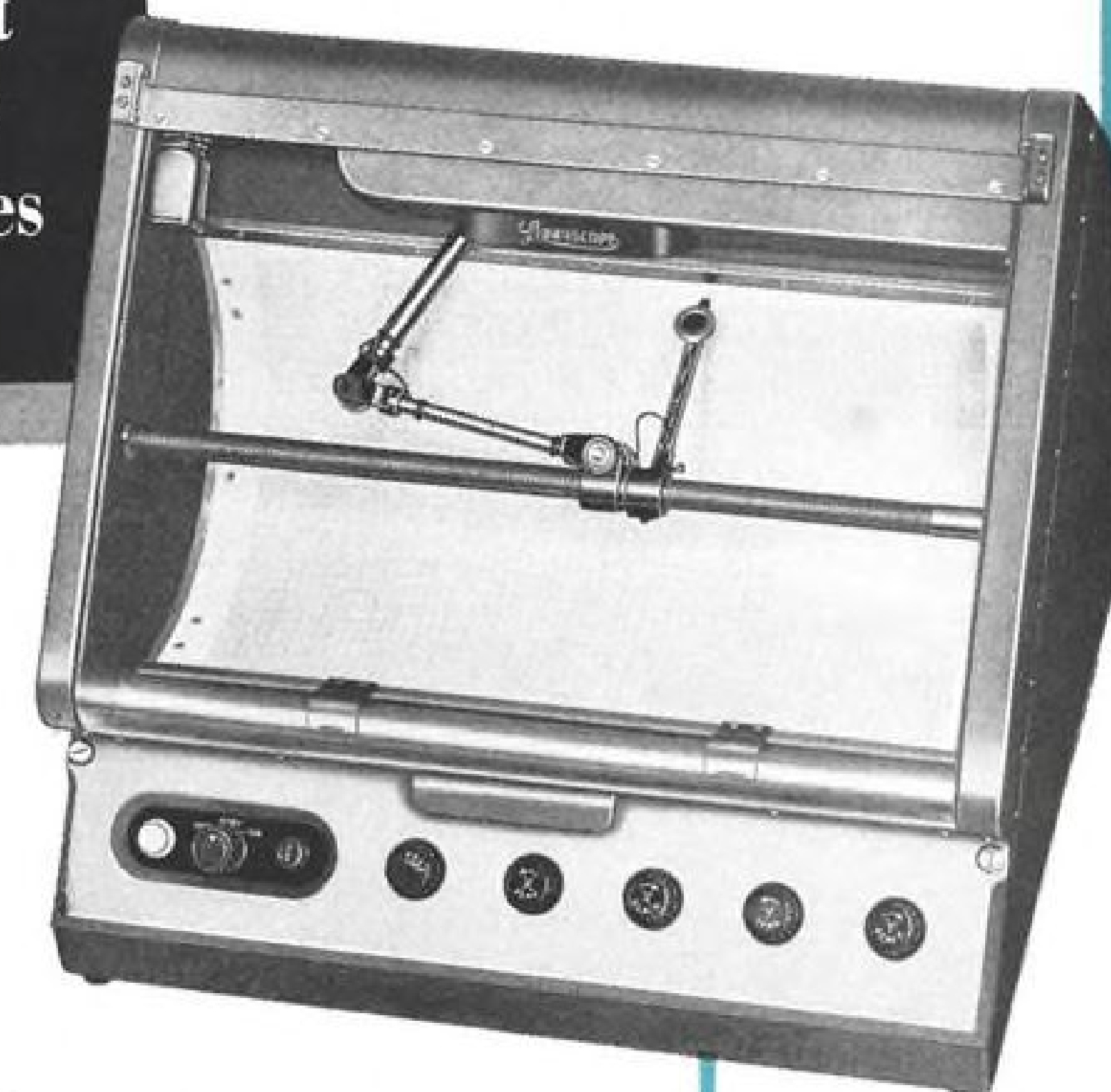


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TCA Reports on Freighter Operations

Airline reworked various Bristol features to fit craft for rugged northern operations; personnel like the ship.

By George L. Christian

Montreal—First tangible evidence of Trans-Canada Air Lines' two-year fleet expansion program was the recent delivery of three English-built Bristol Freighters (AVIATION WEEK Sept. 7, 1953, p. 49). The planes were put into service just before Christmas of last year to help with the holiday rush of mail and packages.

Other aircraft will soon swell TCA's current fleet of 23 North Stars, 26 DC-3s and 3 Freighters. They are eight Turbo-Compound-powered Super Constellations and 15 turboprop-driven Vickers Viscounts. The latter will give TCA the turboprop transport lead in North America.

Engineering & Maintenance

Although the Bristol 170 Freighter is still relatively new to TCA engineering and maintenance personnel, they told AVIATION WEEK that their preliminary impression of the aircraft and its Bristol Hercules engines is that they will give a minimum of trouble.

► **Simple and Rugged**—E. Patrault, TCA's regional supervisor of maintenance at Malton Airport, Toronto, was pleased with these features of the aircraft:

• **No hydraulic system.** Bristol eliminated the hydraulic system on the Freighter. Landing gear is fixed, flaps and brakes are pneumatically operated and windshield wipers are electric.

• **No vacuum system.** TCA had the Freighter modified to eliminate all vacuum flight instruments. Therefore, since de-icing is accomplished by pumping de-icing fluid through porous metal strips in surfaces' leading edges, no vacuum pumps are needed.

• **No fuel dumping system.** The Freighter's maximum takeoff and landing weights are the same—44,000 lb. This eliminates the requirement for fuel dumping equipment to bring the plane's landing weight down quickly in case it becomes necessary to land immediately after taking off at maximum gross weight.

• **Fixed gear.** Main and tail wheel landing gear are fixed. While undoubtedly slowing the plane in flight, the fixed gear eliminates need for heavy actuating equipment and associated maintenance, and the hydraulic system (or other power source) to actuate the gear. The fixed gear is extremely rugged—it withstands the beating imposed by landing on rough fields or snow-rutted lakes and rivers.

► **Easy to Handle**—Freighter pilots report that the plane handles well and "makes wonderful landings."

One pilot expressed his opinion this way: "The machine flies like an Anson—sloppy on the ailerons and good on the elevators. . . . The plane has excellent climb characteristics and generally performs much better than expected."

During a flight on the Freighter from Montreal to Toronto, another TCA captain told this reporter: "The aircraft handles more like a trainer than like a transport. . . . The plane's servo tabs

make the controls very light to handle, making you at first tend to over-control the ship. . . . It is easy to hold even full rudder in case of single-engine operation."

► **Off the Shelf**—TCA bought its three Freighters "off the shelf." As a result, it had to ask that certain modifications be made by Bristol, or accomplish them in its own overhaul shops after the aircraft had been delivered.

Here are some of the more important mods performed by TCA on its Type 170s, according to F. T. Moore, TCA's special assignments engineer.

• **Revamped electrical system.** The instrument layout in the cockpit had to be changed. All the instruments were involved. Some were merely relocated to conform to TCA's standardized instrument layout. Others were removed and replaced with other instruments which do the same job.

For instance, all vacuum-driven flight instruments were replaced with electrically driven units. Alternating current for the instruments is supplied by two inverters operating off the main bus. The output of either is sufficient to meet all a.c. needs. TCA procedure calls for using the even-numbered inverter on all even-numbered flights and the odd-numbered inverter on odd-numbered flights, to equalize wear on the units. A third, stand-by inverter is available for emergencies.

The relocation and replacement of these instruments involved some wiring changes. While in the process, TCA engineers found that some of the Freighter's wiring did not come up to



PLENTY OF ROOM INSIDE. Freighter's hold can take a Sabre jet fighter (left) or 31-ft. steel girders for radar tower (right).



the standards TCA had set for its passenger aircraft.

TCA engineers readily admit that this was their first experience with an aircraft designed primarily for the carriage of freight. Nonetheless, the carrier decided to rewire the Type 170s in accordance with Trans-Canada's standard practice.

An example of wiring practice that was not up to TCA's standard: Running wire bundles through relatively sharp-edged lightening holes without chafing protection between wires and bare metal.

The Freighter's many toggle switches posed a problem. British practice is the reverse of U.S. and Canadian custom. British use the "up" position for "off" and the "down" position for "on." At first, TCA thought it could simply reverse the toggle switch panels, but that made the identification engraving next to the switches read upside down—so new panels were made.

• **Auto selective pitch coarsening.** Standard equipment on the Freighter was automatic propeller pitch coarsening—comparable to auto prop feathering in the U.S., except that blades go to only within a few degrees of the full-feathered position.

But TCA did not want auto pitch coarsening, because it did not need the added performance this feature permits. So TCA asked Bristol for what they termed "auto selective pitch coarsening."

Here is how it works: System uses the same pitot differential pressure sensing setup. There are two pitot tubes on each wing, one outside the propeller wash, near the wingtip, the other just outboard of the engine nacelle, inside the prop wash. If an engine loses power, slipstream produced by its prop diminishes. When this loss amounts to 70% of the maximum wash created at

takeoff power, the differential pressure between the two pitot tubes on that wing causes the auto selective pitch coarsening system to select the prop of the offending engine. It arms the system and lights a bulb on the instrument panel above that engine's tachometer telling the pilot which engine is apparently losing power.

The pilot checks the instruments of the engine in question (tachometer, manifold pressure, fuel pressure, etc.) and also judges by the feel on his rudder pedals, to see if the engine is really losing power or if the malfunction lies elsewhere.

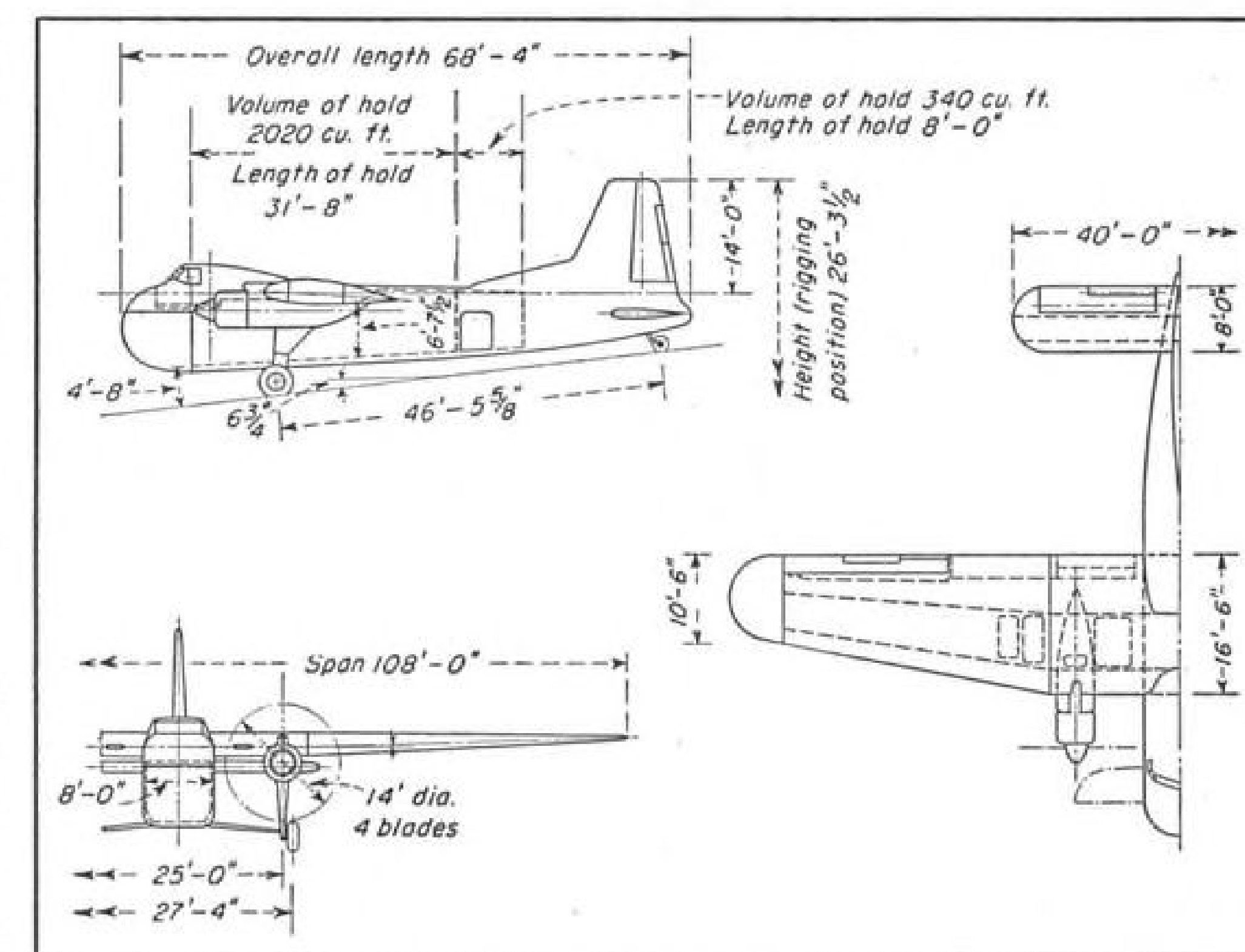
If there is a bona fide power loss, he pushes a single prop blade coarsening button on the left of the control wheel and the prop blades of the malfunction-

ing engine immediately coarsen. Pilot does not have to choose a special button for the prop—the system automatically selects the correct propeller.

Advantage of this system is that the pilot has control of the coarsening action and initiates it only when he is satisfied that power failure is sufficient to warrant going on single engine.

The system is operative only when throttles are at full takeoff power position.

• **More Btus.** TCA engineered its own cabin heater installation because of the extremely cold weather the Freighters would fly in. The two 50,000-Btu. Daniels heaters, supplied with the plane, were removed from the port front loading door and replaced with a 200,000-Btu. Janitrol heater manufac-



Bristol 170 Freighter.

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T-60
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STANDARD-SIZE CAR rides up ramp. Bristol-installed heaters are on each door.

tured by the Aircraft-Automotive div. of Surface Combustion Corp. This installation not only provides more heat, but standardizes the heater with those to be installed in the 15 Vickers Viscounts TCA will receive later. Only difference is in the fuel discharge nozzle. In the Viscounts it will be designed to discharge JP-4 jet fuel and in the Bristols 100-130 octane gasoline.

The installation also includes these features: heater operates continuously instead of cycling on and off as in most U.S. set-ups; a controllable temperature sensing element positions a mixing valve which blends the correct proportions of outside cold air and heater air to provide discharge air of the desired temperature; excess hot air is dumped overboard through a special duct.

TCA also built a special right-angle, removable air duct to connect the door-mounted heater to the cargo hold heater ducts when the nose doors are open to load or unload cargo. Thus, heat may be distributed during the whole loading or unloading operation to protect perishable cargo and keep cargo handlers warm.

• **Fuselage protectors.** Trans-Canada got Bristol to install fuselage protector plates to shield the plane's body from ice and rocks which the props might sling into its sides during ground operation.

► **Freighter Features**—Here are some Freighter features which are not normally found on American-built civil aircraft.

• **Anti-icing system.** Freighters are equipped with the TKS anti-icing units. The system pumps Aero Shell Compound #7 anti-icing fluid (basically alcohol with glycerine added for clinging qualities) through porous metal strips mounted in the leading edges of the surfaces. System includes 54-gal. anti-icing fluid supply tank, two electric motor-driven pumps mounted in par-

allel, and nine distributor lines which supply nine porous dispensing strips.

Three strips are located in the leading edge of each wing, one each in the horizontal stabilizers, and one in the vertical fin.

The 54 gallons of de-icing fluid is sufficient for three hours of continuous operation. TCA procedure calls for topping off the supply drum at every stop during winter flying.

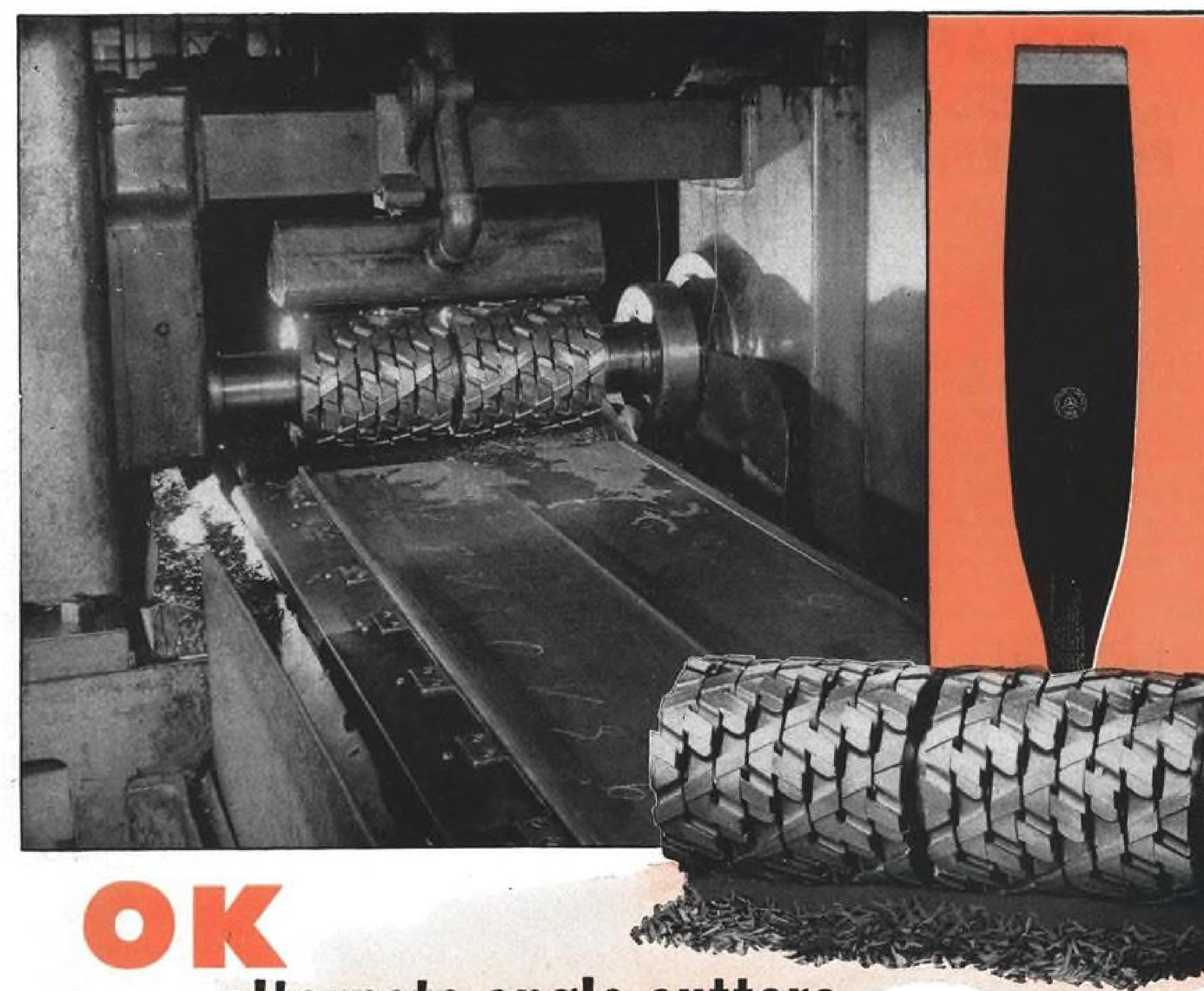
Under normal conditions, only one pump operates at a time, the other acting as a stand-by unit.

Pilots say that the system works effectively as a de-icer as well as an anti-icer. They report cases where the system quickly removed ice which had already formed on the wing.

They say also that if the TKS system is turned on for a short while during final approach, fluid will run back over top surfaces of the wing and stabilizers. This makes it easy to remove any snow or ice which might accumulate while plane is on the ground.

• **Ice detector.** The Freighter is equipped with an ice-detecting system. A small metal mast protrudes from the forward fuselage near the pilot's side of the cockpit. Small bleed holes in the mast clog up as soon as the slightest amount of ice begins to collect. This causes differential pressure change to close a microswitch, lighting a red light in front of the pilot. He may turn on the TKS wing anti-icing system, the propeller anti-icing system (which uses the same fluid as the wings) or the windshield system (which uses alcohol). As soon as the red light goes on, a mast heater is turned on through a delayed action switch. In a few seconds, the ice on the mast is melted off and the whole system is ready to go to work again.

• **Pneumatic system.** TCA engineers report the Freighter's pneumatic system has been trouble-free so far. Two Hy-



OK

alternate angle cutters

slab-mill tough chrome-nickel-moly prop blades at Curtiss-Wright

JOB DATA

FEED 8.25 inches per minute

SPEED 30 revolutions per minute

DEPTH OF CUT from 0.055 to 0.10 inches

LENGTH OF CUT 123 inches

STEEL Chrome-Nickel-Molybdenum alloy

CUTTERS 16 mounted 8 and 8 for straddle milling

Climb-milling the taper on 25x123x.800" chrome-nickel-molybdenum steel plates for the famous hollow-steel propeller blades used on big B-36 International Bombers is regarded as one of the more rugged metal-cutting assignments at the Curtiss-Wright Caldwell plant.

For this second operation, 16 OK alternate angle cutters straddle the center rib of the blade, 8 and 8, are mounted on a 75 hp planer-type miller. The taper extends 123" increasing from 0.055 to 0.10". The cutters are standard OK alternate angle mills with overlapping high speed steel blades. The angular set gives a shearing action, coiling and turning the chips away from the cut. Streamline in design, OK cutters are free from pins, screws, gibs and locks. They pack huskier blades for heavy cuts and more blades per body for finishing cuts. Blades are secured by a driving fit. Mated serrations in body and blades prevent any lateral movement and provide a fine scale adjustment to compensate for wear.

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matic compressors, one mounted on each engine, supply air compressed to 450 lb. to the system.

Two small "whiffer tubes," one for each compressor, keep moisture out of the system. Whiffer tubes are small venturis in the compressor outlet lines which suck in small amounts of methanol for the purpose of acting as an anti-freeze for the air going into the pneumatic system.

The pneumatically operated wing-flap actuator, made by Dunlop, operates in two steps. In the first part of the movement, bringing the flaps to the maximum lift (30%) position, the entire jack moves out on a stationary piston. To go to the full landing (60%) position, a movable piston within the jack extends in a conventional piston-cylinder relationship. Flaps lock mechanically in the full-down position by a cam overriding center.

Air pressure to brakes is reduced to a maximum of 150 lb. Two gages on the pilot's instrument panel show air pressure going to each brake at all times. It is standard procedure for pilot on final approach to depress both brake pedals fully. This makes sure each brake is getting its full 150 lb. Thus he knows whether he will have full brakes when he touches down. If anything is wrong in the brake system, he is fore-

warned and can take necessary corrective action.

• **Liquid-spring gear.** Main and tailwheel landing gear are made by Dowty and use the "liquid-spring" principle (AVIATION WEEK Mar. 23, 1953, p. 48). In the liquid spring strut, all shock absorption is taken up by fluid instead of the fluid-and-air combination used in conventional Aerol struts.

TCA says it has experienced a bit of trouble with the gear in extremely cold weather because of the very small amount of fluid used in the cylinder (tail wheel strut fluid capacity is 0.6 pt.). Contracting of this small amount of fluid during freezing temperatures causes struts partially to collapse.

Taxiing in the Freighter prior to taking off and after landing gave the impression that the struts were somewhat more springy than Aerols—they gave a plane a pleasant, easy movement on the ground.

Inside the Freighter

The flight in the Freighter brought out several points.

The plane took off easily at a gross weight of 40,000 lb. at an indicated airspeed of 100 mph. Power settings were 2,800 rpm. and 56.5 in. Hg manifold pressure. Climb speed was 140 mph. indicated, 1,000-fpm. rate of climb, with power settings of 2,400 rpm. and 45 in. Cruise speed was 160 mph.

In spite of complete Fiberglas sound proofing which TCA had installed in the hold and "lobby" in the rear of the plane, the flight was very noisy. The plane was well heated and stable, in spite of cold weather and some bumpy air.

Cockpit is quite crowded, and has low ceiling, making getting into or out of the pilot's or co-pilot's positions awkward. When seated, there is little head clearance for either man, but once seated, the cockpit is relatively comfortable. Access to the cockpit is via a small metal ladder and a hatch in the cockpit's floor. Visibility is good.

► **Pilot's Viewpoint**—The captain had these comments to make as the flight progressed. "The aircraft is very stable. . . . There is little difference in its handling characteristics whether heavily or lightly loaded. Under the former condition, the tail is a little heavier. . . . In case of engine failure, the plane's tendency to yaw is quite small and resultant rudder pressure is light. . . . The pneumatic system works well, brakes are smooth, don't grab and are free from atmospherics. . . . All 200,000 Btus. from the heater may be directed into the cockpit through a damper if necessary."

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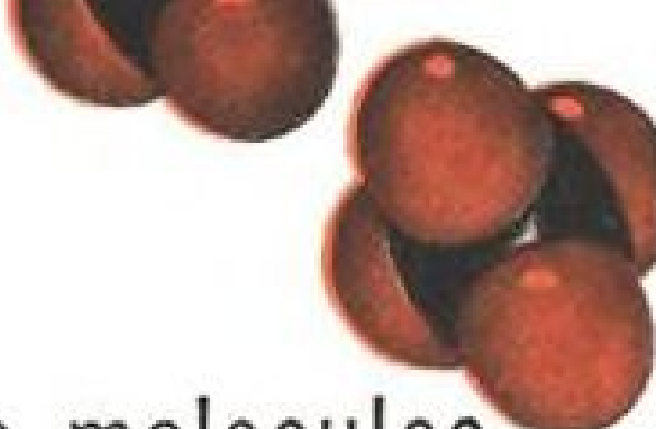
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ing engines. "If they'll turn, they'll start."

► **Aircraft Systems**—These are the Freighter's major systems:

• **Fire protection.** When a fire warning occurs, a light shows up in the feather button of the engine concerned. Actuation of the button not only feathers the prop but also dumps the contents of a 6-lb. bottle of methyl bromide down the carburetor air intake. Pilot may manually discharge another 6-lb. bottle into the accessory section and a 12-lb. bottle through a center spray ring mounted between the engine's two rows of cylinders.

• **Inertia switches.** Two inertia switches, set to operate at 6G, are mounted in the belly of the aircraft. Units are electrically connected in series so that failure of one does not trip the system. The switches automatically discharge all the methyl bromide bottles mentioned above. In addition they disconnect the entire electrical system from the main bus.

Exception is the emergency bus, which supplies power to energize the manually operated fire extinguishing system, one radio transmitter and one receiver, cockpit and navigation lights, and the operation of the instruments on the left side of the instrument panel. The emergency bus, whose current is supplied by the plane's batteries, is completely independent of the Freighter's normal electrical system.

• **Heat distribution.** Hot air from the heater is fed into a duct mounted on top left side of the cargo hold. A special duct transfers hot air to the cockpit. Airflow is controlled by the pilot through a damper.

In the hold, eight risers with individually controlled dampers bring the air from the main duct to floor level. Two other risers will bring air to the six-seat lobby behind the main cargo compartment and the lavatory in the tail of the aircraft.

TCA officials say that canvas walls are being made to shield off particular compartments so that their heat may be individually controlled.

Three temperature-sensing units, located in the forward and center sections of the hold and in the lobby, tell the pilot on a single instrument the heating conditions in those three sections of the plane.

TCA & Freight

The Bristol 170 was conceived from the beginning as a freight aircraft and every possible consideration was given to making it as functional and utilitarian as possible. As a result, the plane has outstanding advantages in TCA's opinion, compared to one (such as the North Star) built primarily as a

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Although jet ignition is a comparatively new development in the fifty year span of powered flight, progress in this vital phase of aviation has been truly remarkable.

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Here, indeed, in the Scintilla TLN-10 jet ignition system, is a classic example of how the present national policy of greater value for the taxpayer's dollar is being put into practice.

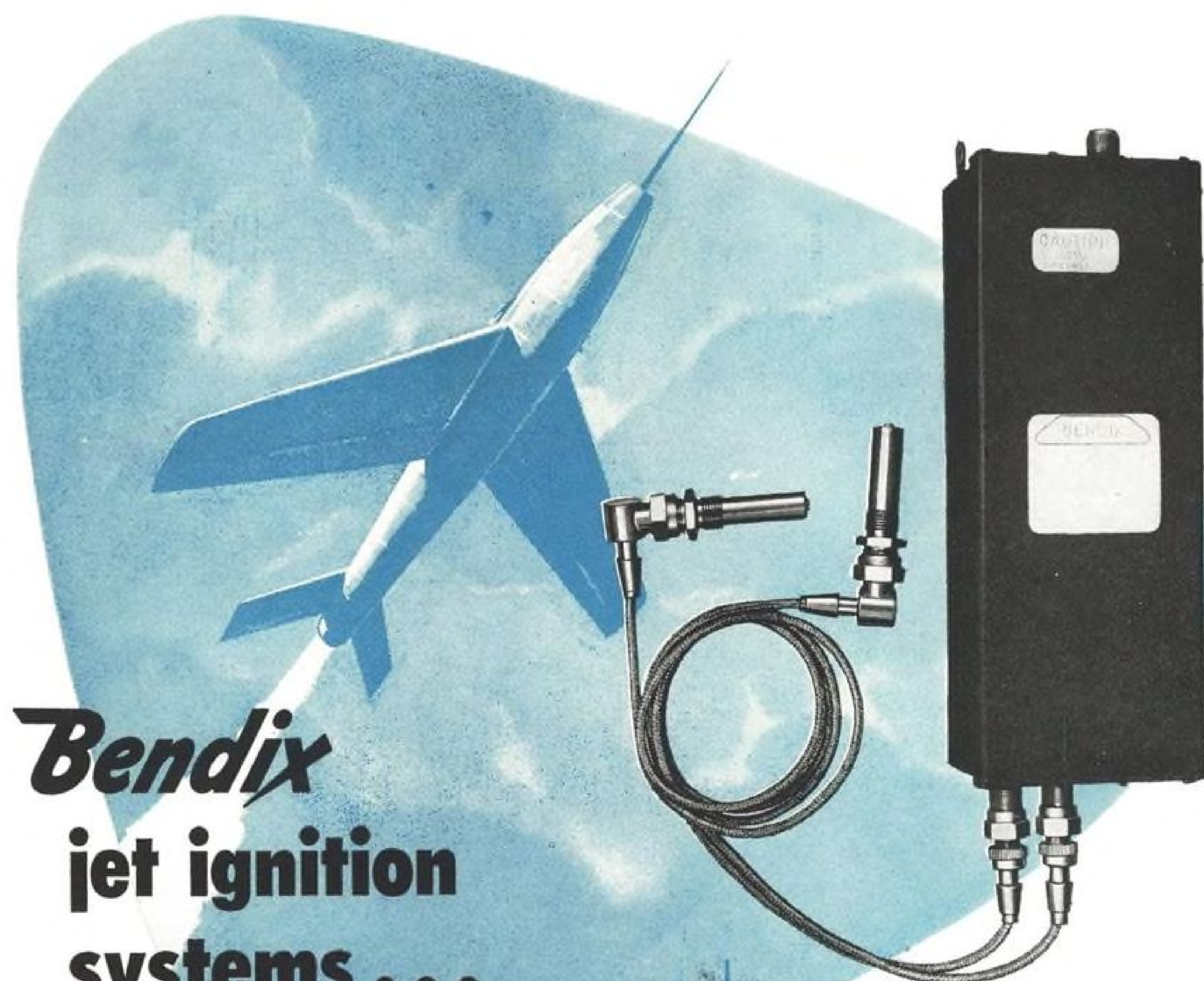
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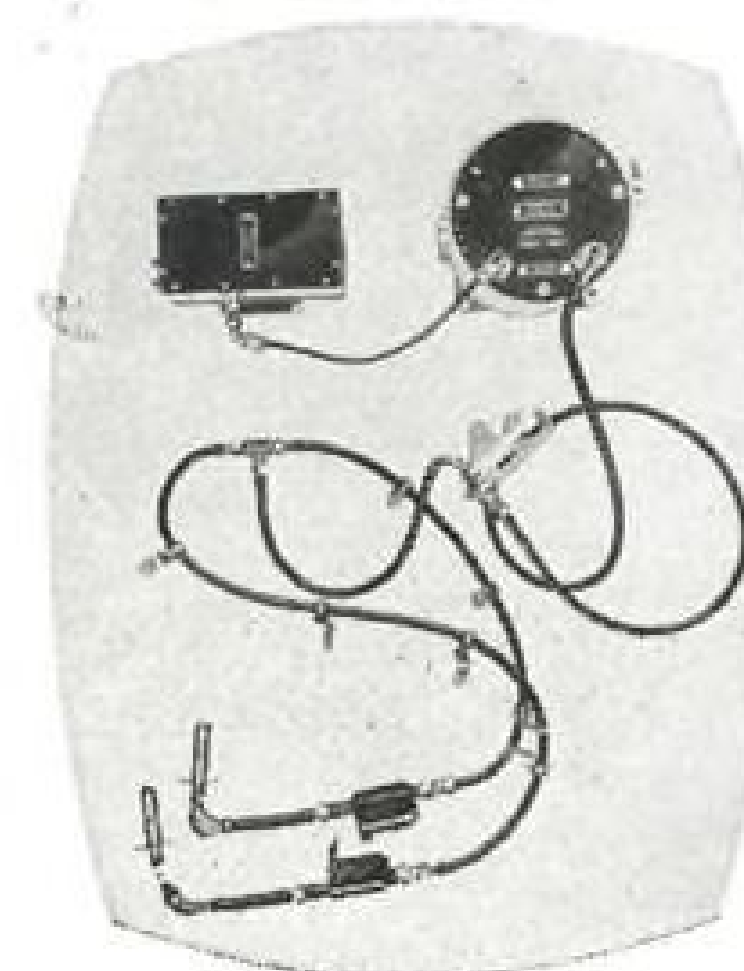
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- Lower Cost—Simplified Service—Weight Reduction—Requires less current.
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- The TLN uses low voltage only and eliminates problems encountered with production and control of high voltage, such as dielectric losses, corona, capacitance loading, and flashover.
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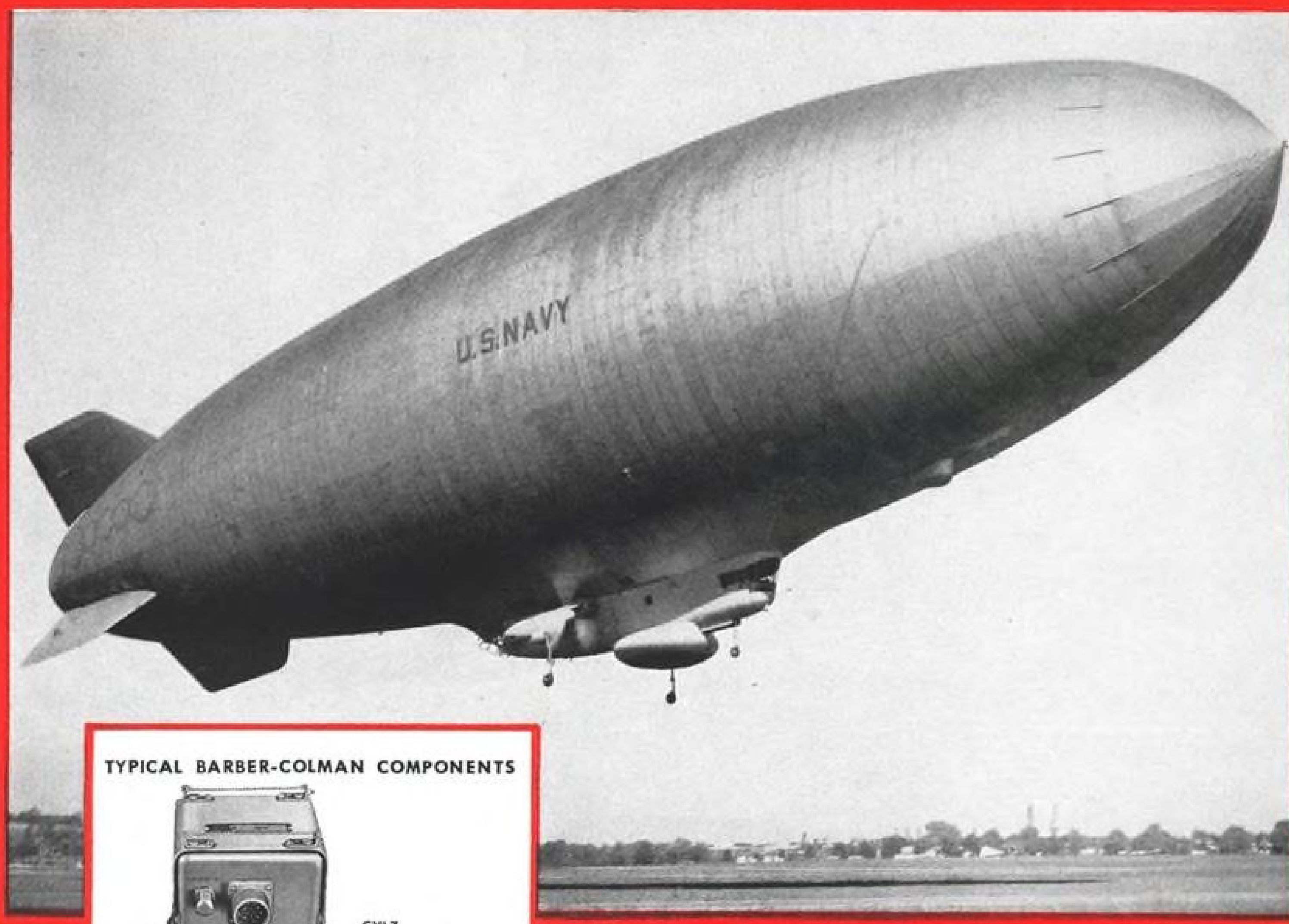
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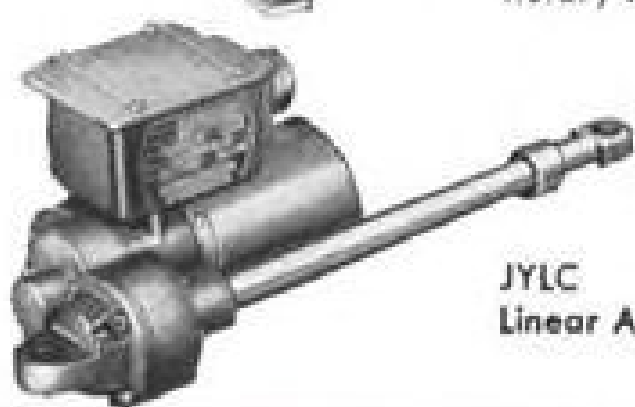
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passenger plane and then converted to a cargo craft.

► **Big and Bulky**—Ability of the hold to take large, bulky, unusually shaped loads is a big asset. Loading door is 80 in. wide and 90 in. high. Cargo hold capacity is 2,360 cu. ft and hold length is approximately 32 ft., with an additional 8 ft. available in the rear lobby. These dimensions, coupled with a low (4 ft. 8 in.) loading sill, enable plane to handle a large variety of cargo.

Plane can take aboard a standard-size automobile in 15 min., starting from scratch. This time includes setting up the ramp, using two men, and driving the car aboard. Additional cars may be driven in in a matter of minutes.

Once TCA was asked to fly eight long steel girders to the North Country for a radar tower installation. The girders measured some 32 ft. in length and weighed a total of about 6,400 lb., not counting a large quantity of accompanying nuts and bolts. Upon arrival, it was found that the unloading equipment had frozen into uselessness, so the girders were off-loaded by hand, with the temperature down at -32F. The girders had to be hand-lifted, a little at a time, because protrusions on the structure prohibited dragging them out of the hold. This would have been virtually impossible with a high-silled plane, according to TCA spokesmen.

► **Fast and Easy**—TCA cargo specialists cite these statistics to show the great speed advantage in loading the Freighter, as compared to a North Star cargo plane.

Average loading or unloading time for the North Star is 1,500 lb./hr. On the Freighter, 350 pieces of cargo weighing 8,000 lb. (three pieces weighed a total of 2,200 lb.) were off-loaded from a binned plane in sub-zero weather in 30 min. In another instance, a plane with a 12,000-lb. load was turned around in New York in exactly 1 hr.

Two items carried with the plane to expedite cargo handling are a two-wheeled magnesium hand cart which enables one man to handle up to 500 lb. at once; and two oak rollers, 2 in. in diameter and 42 in. long, with which to roll bulky cargo into place.

A Freighter problem cited by TCA is that, if plane is parked on uneven ground with one main wheel higher than the other, fuselage distortion makes opening and closing doors difficult.

► **Loading Ram**—TCA's supervisor of ramp service, Joe Sky, gave AVIATION WEEK details of a new loading ramp, a prototype of which is currently being built by TCA.

The mobile unit will be of all-steel construction and will measure 7x14 ft.

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It will be mounted on 16-in. steel wheels equipped with high pressure, pneumatic tires. Front wheels will be steerable, rear fixed.

Four hand-operated hydraulic pumps, two at each end of the unit, will allow the pallet to be raised from 33 in. to 60 in. By using the pumps differentially, one end of the pallet can be at the maximum height of 60 in., while the opposite end remains at 33 in., giving a sloping ramp arrangement. Ramps may be used with the Freighters, and to help load the belly compartments of the eight Super Connies TCA is getting.

With the new ramp, TCA will be able to accept loads from shipper's trucks and put them directly in the aircraft.

If the prototype proves out, TCA contemplates building five to 10 units, at an estimated cost of \$1,800 each.

► **Freight Future**—TCA is actively engaged in selling its airfreight service in general and its Bristols in particular to Canadian industry. It recently sent one of its Freighters carrying cargo handling and traffic specialists on a tour of several of its important freight stops. Spark-plugged by Hugh Johnson, director of cargo sales, the team of specialists organized meetings at the airports of each of the cities it visited. Representatives of major industries were invited to inspect the Freighter, were given a resume of its advantages and what it could do to help with their shipping problems.

Johnson pointed to the rapid growth of airfreight within TCA. Systemwide airfreight was started by TCA in early 1948. In that year, the airline carried 1,869,944 lb. In 1953, the figure soared to 12,283,745 lb. for domestic airfreight alone. If air express and overseas airfreight figures are included, the 1953 figure swells to 18,795,490 lb. Johnson predicted that TCA would haul 21 million lb. of domestic airfreight alone in 1954.

TCA has established several routes for its Freighters: Montreal-Toronto-Ft. William-Winnipeg; Montreal-New York; and Toronto-New York. But the Bristols will be available to go anywhere on a charter basis.

TCA's delivery standards are: "Next day delivery up to 1,500 miles, second day beyond."

In a further effort to stimulate airfreight in Canada, TCA has been vigorously asking for more air cargo space and facilities at major Canadian airports.

To make airfreight as attractive as possible to shippers, Trans-Canada recently slashed rates some 30%—on long hauls the reduction amounts to about 50%. These rates are typical for 100-lb. air freight shipments: Toronto-

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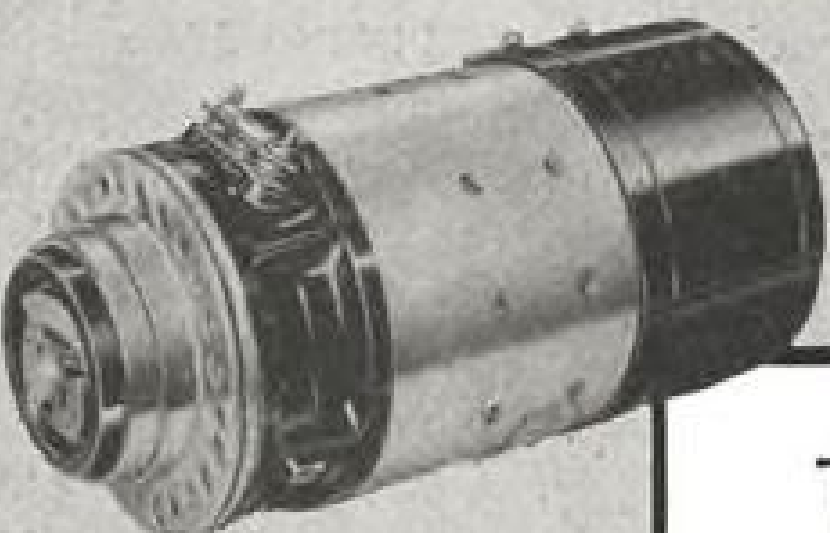
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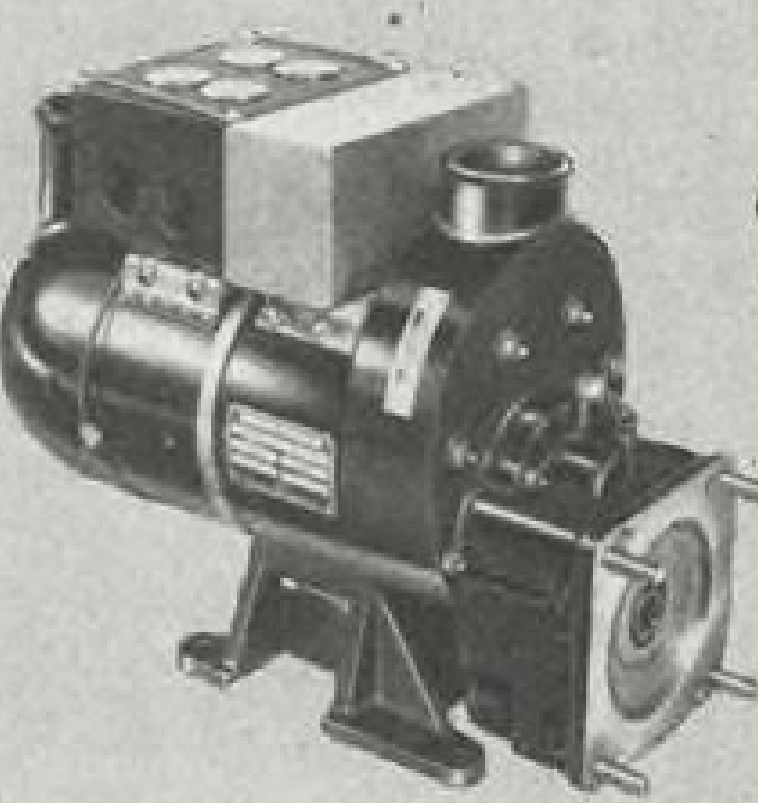
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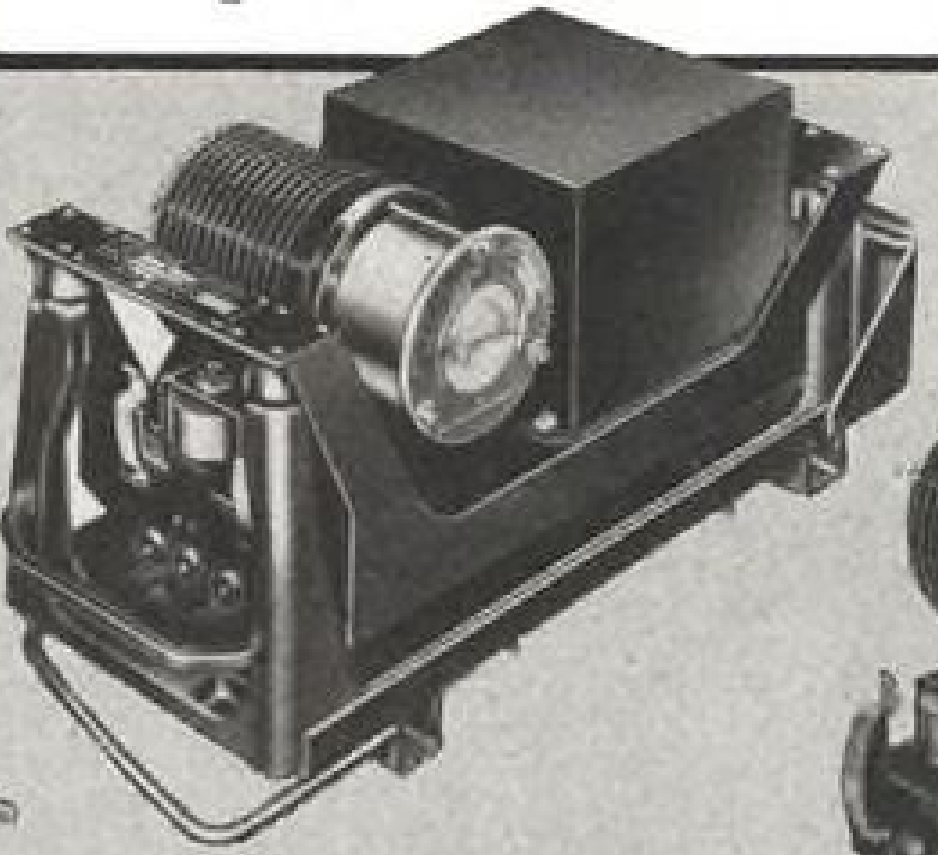
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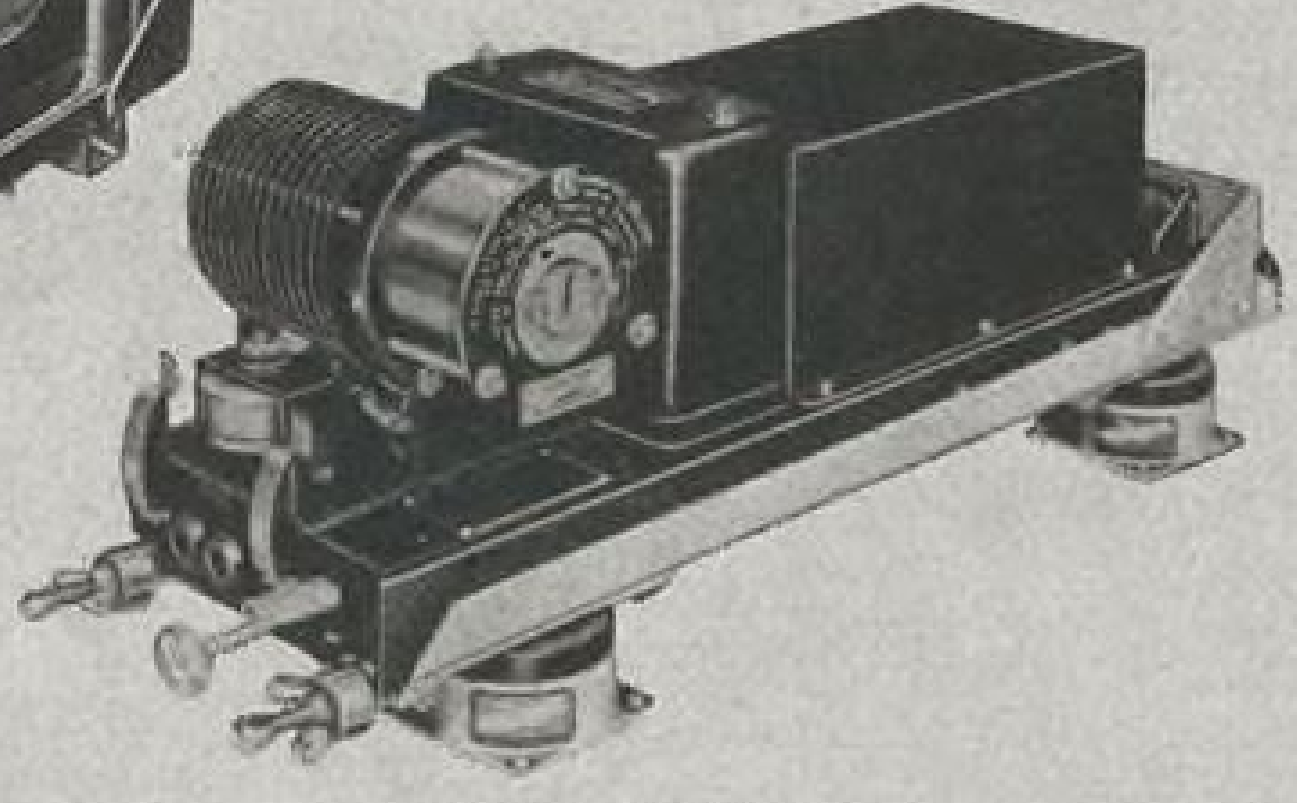
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Winnipeg, \$10.10 (distance is over 900 miles and compares to corresponding rail express rates of \$8.90); Montreal-Ft. William, \$8.90 (a distance of roughly 750 miles, rail express fee is \$7.50).

So, when the considerable increase in speed of transportation shipments is compared to the relatively slight increase in shipping charges, TCA is confident that its service, bolstered by the flexibility of the Bristol Freighter fleet, will see wide expansion in the coming year.

Lightweight Battery Starts Turboprops

(McGraw-Hill World News)

Stockholm—A new Swedish aircraft battery has been developed which reportedly will start turboprop aircraft engines without aid of an outside electrical source.

The battery is said to weigh half as much as conventional lead batteries, is spill-proof and practically unaffected by cold. Produced by the Boliden Battery Corp. and based on a British invention, the battery reportedly has been tested successfully in cold-weather operation on the Vickers Viscount. Vickers and Rolls-Royce cooperated in the tests, according to the manufacturer.



Safe Work Ladder

All-metal stepladder developed by Lockheed Aircraft Service's New York base is safe and economical, LAS reports. Based on a one-year trial using 24 ladders, LAS estimates it will save \$5,880 over a five-year period by using these repairable units instead of buying previously used expendable ladders. Savings in repair and replacement costs at LAS's Idlewild base in the one-year test add up to more than 79% of the total initial cost of the new ladders. During the year not a single accident due to ladder failure was reported.

AVIATION WEEK, April 5, 1954



ELECTRICALLY HEATED PITOT (AIRSPEED) TUBES

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Manufacturers of electrically heated aircraft parts
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NEW AVIATION PRODUCTS



ILLUMINATED TAXIWAY sign is clearly visible to transport as it heads for runway.

Taxi Guidelights Aid Pilots, Tower

Illuminated taxiway guidance signs recently installed at Greater Pittsburgh Airport help pilots find their way around the 1,100-acre field. This is said to be the first such complete installation on a commercial air field, at least in this country. Pilot reception of the lights is reported to be excellent.

Principal advantage of the 85 signs installed at Pittsburgh is that they allow pilots who are unfamiliar with the location of runways, taxiways, ramps, visitors areas, etc., to find their way around simply by following the signs instead of having to receive complex instructions from the control tower. This reduces conversation between pilots and tower gives both more time to concentrate on other matters.

► **Follow the Signs**—With the signs, the control tower operator simply tells the pilot what runway he is cleared to, wind direction, time, altimeter setting, followed with such advice as: "... Use taxiway ahead to your right and follow the signs." Only other requirement is for pilot to get clearance to cross active runways and to take off.

The signs have completely eliminated a situation which used to arise occasionally: pilots getting lost, particularly in bad weather.

Another advantage is that pilots can see signs from a distance of 500 ft., therefore can taxi at steady ground speeds of about 35 mph. without fear of overshooting a taxiway or having to slow down to make sure they are on the right path. This makes ground operation easier on pilot and plane and expedites ground traffic. During Pittsburgh Airport's rush hours (between 5-8 pm.) planes often land and take off at a rate of one a minute.

Manufactured by the Crouse-Hinds Co., of Syracuse, N. Y., the signs are made of aluminum and contain from one to six interchangeable letters which can be inserted from either end. The letters, numbers or symbols are made

of orange-yellow translucent plastic on a black background. Illumination is provided by a 325-lumen, 6.6-amp. lamp or a standard 25-watt, 120-v. bulb.

► **Breakable Couplings**—The signs are mounted at all taxiway and runway intersections and other strategic points. They serve for both in- and out-bound traffic, since both sides give information. Markers are mounted on breakable couplings at heights varying from 20 to 30 in. above the ground.

When designating runways, the runway numbers are so arranged that identify both ends of the runway for the pilot. For instance, if he sees "32-14," he knows that, because the 32 shows up to the left of the sign, the 32 end of the runway is to his left, the 14 end to his right.

Some of the abbreviations used with the signs are: "VSTR" for itinerant aircraft areas, "MIL" for areas set aside for military planes, "CRGO" for areas for cargo aircraft and "HGR" for hangar or hangar area.

The signs can be installed on existing Crouse-Hinds type ERL taxi light bases if they are properly located, according to the manufacturer.

Unusual Suspension Mount Controls Vibration Shock

A new mechanical suspension system of unusual design controls vibration and shock that might damage delicate aviation equipment. It can be used for the shipment of missiles, jet engines and other large units, as well as for the mounting of avionic equipment in aircraft.

The new mount has six springs, acting in different planes of freedom and pressing radially on an inner ring. Application of load causes an unequal deflection in each spring, giving each a different period of vibration. This construction prevents the resonant buildup

of amplitude which occurs in other spring-mounted assemblies, thus helping to protect the load, says its designer, Ray Applegate of Mechanical Suspension Mount Co., Ltd.

The period of vibration for any particular spring in the mount also changes with deflection. This is due, Applegate points out, to the use of conical outer compression springs and inner tension springs with non-uniform coil spacing and varying coil diameters. The inner springs preload the outer and serve as a damper.

Applegate says that his mount has passed numerous performance, environment and endurance tests. It has shown excellent ability to absorb impact loadings.

A Fiberglass container incorporating the mount and built to comply with Specification XAE-64 requirements for light weight, stacking, and loading, pressurization and easy removal of the mount, has been undergoing vibration and drop tests for about a year. It withstood room-temperature tests with no deformation or failure of the container or mount. At very low temperatures, container castings failed and lining materials became brittle, but the springs in the mount were unaffected and the unit is still good as new, Applegate claims. Production containers will weigh less than 50 lb., the designer says.

Since the mount is a complete assembly in itself, it may be used as a handling dolly or a shipping or storage unit, with or without a container.

Mechanical Suspension Mount Co., Ltd., 110 State St., Westbury, L. I., N. Y.

Rugged Pressure Gage Omits Linkages, Springs

Extreme ruggedness and high accuracy are claimed for a new type of pressure gage, now reported as standard with a number of aircraft and missile manufacturers.

In these gages, the indicator is attached directly to the closed end of the tubular pressure coil, instead of being tied in to the Bourdon tube through linkages, multiplying gears, hair springs, etc., as in usual pressure gage design.

The manufacturer says his units have undergone satisfactorily shock tests up to 50G, and 8G vibration tests at 20 to 500 cps. Ranges run from 0 to 100 psi. and 0 to 60,000 psi. The gages will withstand a 100% graduation range overload with no damage. They are hermetically sealed, and resistant to corrosion and fungus.

The new gages come in a variety of dial sizes, cases and capacity ranges, to be panel- or line-mounted, with NF or NC threaded connections, and with side or rear outlets. Some units have a

Stiletto-shaped twin jet

joins Douglas family of

high-speed research aircraft



Skystreak—world speed record 1948, 650 mph



Skyrocket—set world records in '53 of 1327 mph, 83,235 feet altitude

—the supersonic Douglas X-3

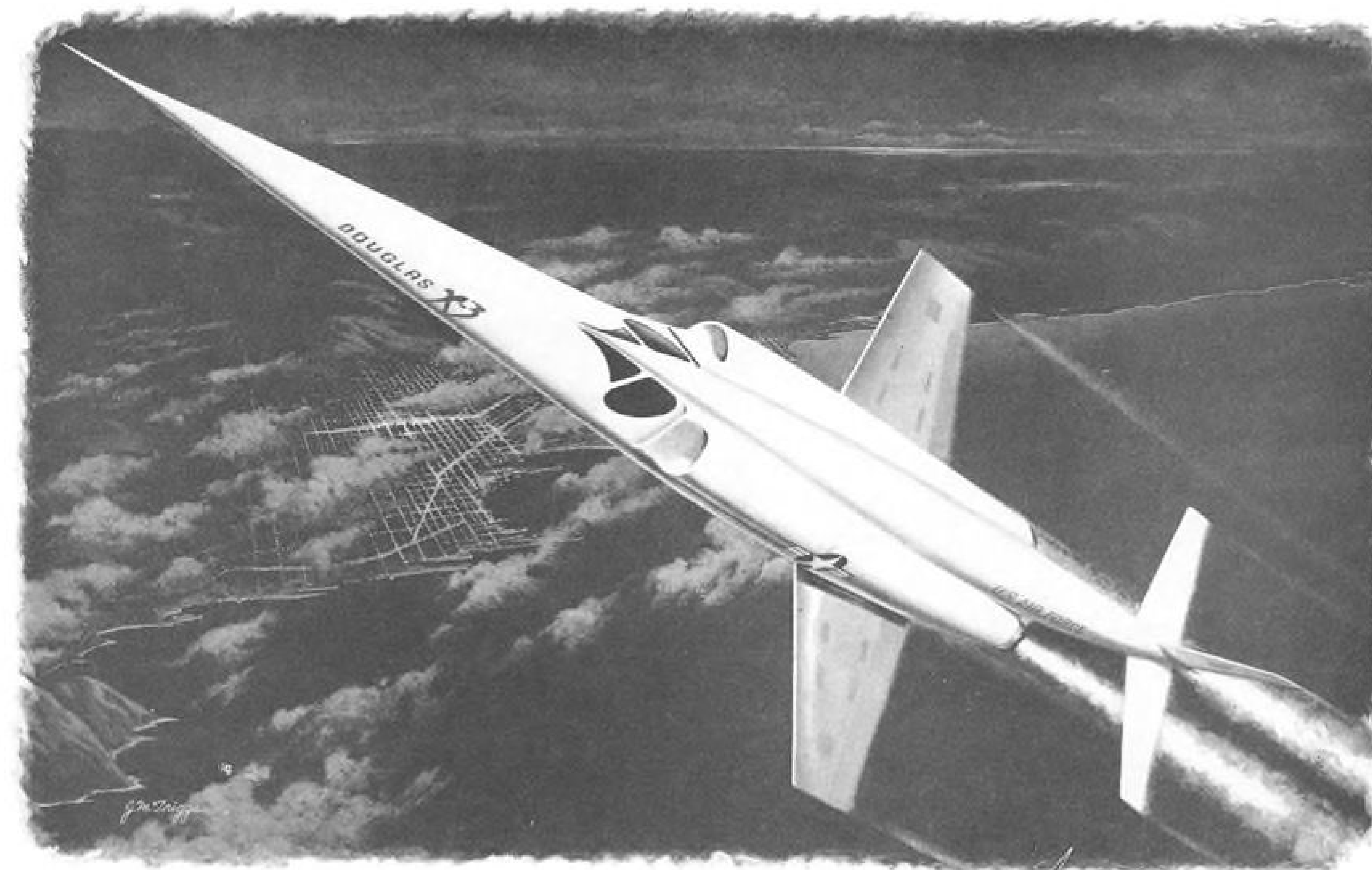
Now to the record-breaking Skystreak, the Douglas Skyrocket and the record-holding carrier-based Skyray, add this important experimental plane—the Douglas X-3.

Performance is secret, but a little can be told. Longer, heavier than a

DC-3 transport, X-3 flies on wings smaller than a DC-3's tail—using conventional jet engines for sustained flight. X-3 has already contributed basic facts on insulation, refrigeration, and the use of heat-resistant titanium, while its payload of research instru-

ments has been used to study the stresses and strains of flight at supersonic speeds.

Design of X-3 is another example of Douglas leadership in aviation. Faster and farther with a bigger payload is a basic Douglas rule.



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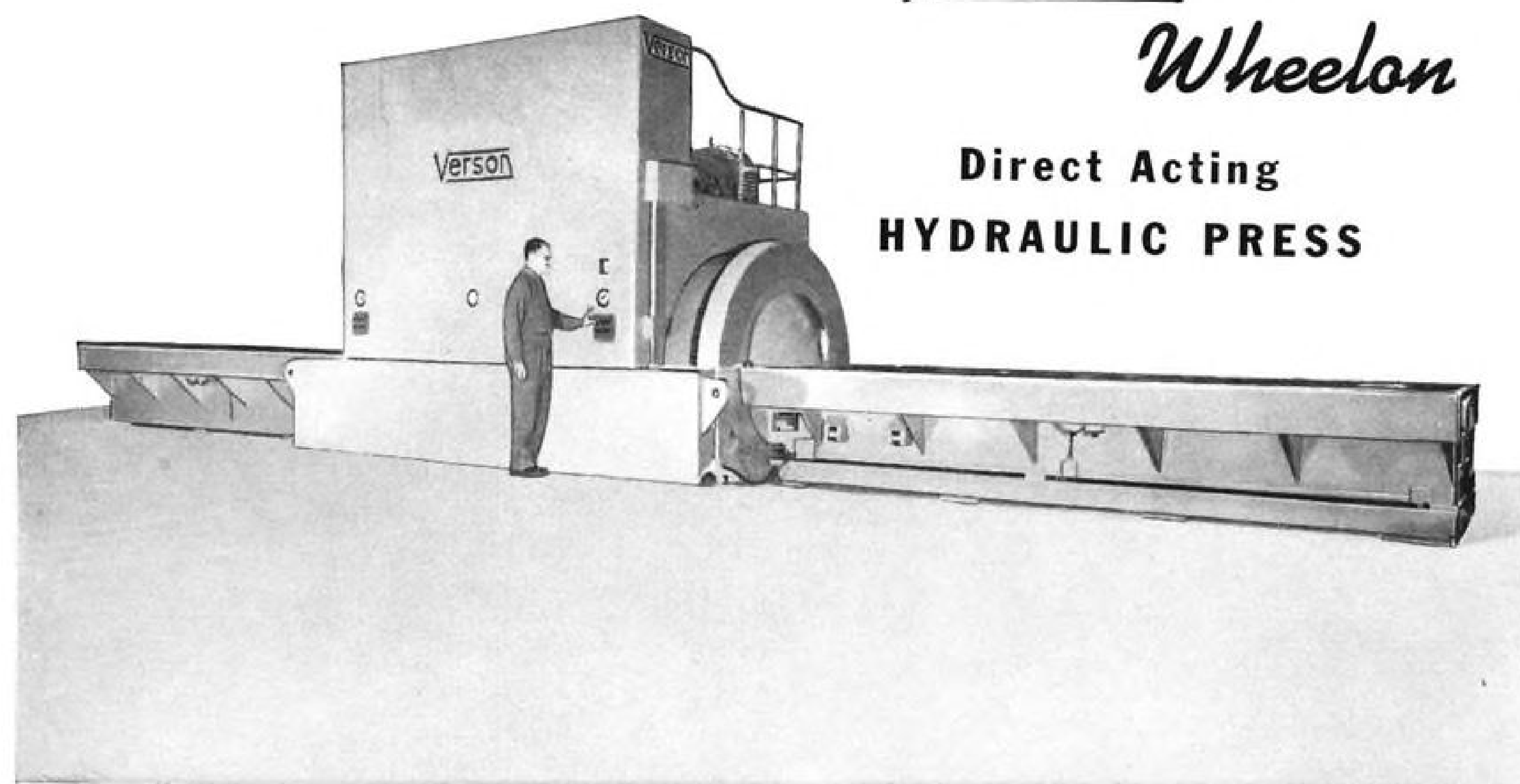
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The Verson-Wheelon Bulletin explains the simple operation of the Verson-Wheelon Press and shows examples of the work it performs. Typical specifications are also given. It is available on request.

Yes, this Verson-Wheelon Press has a capacity equivalent to a 21,000 ton rubber pad forming press. However, it does a better, more complete forming job than the rubber pad press; yet its cost is only a fraction of that of the conventional press.

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If you are now doing or contemplating rubber pad forming, you should consider a Verson-Wheelon Press before you buy. Compare the price and compare the work—it's the best way to convince yourself of the economy of Verson-Wheelon forming. The bulletin described at the left gives full information. Write for your copy, today.

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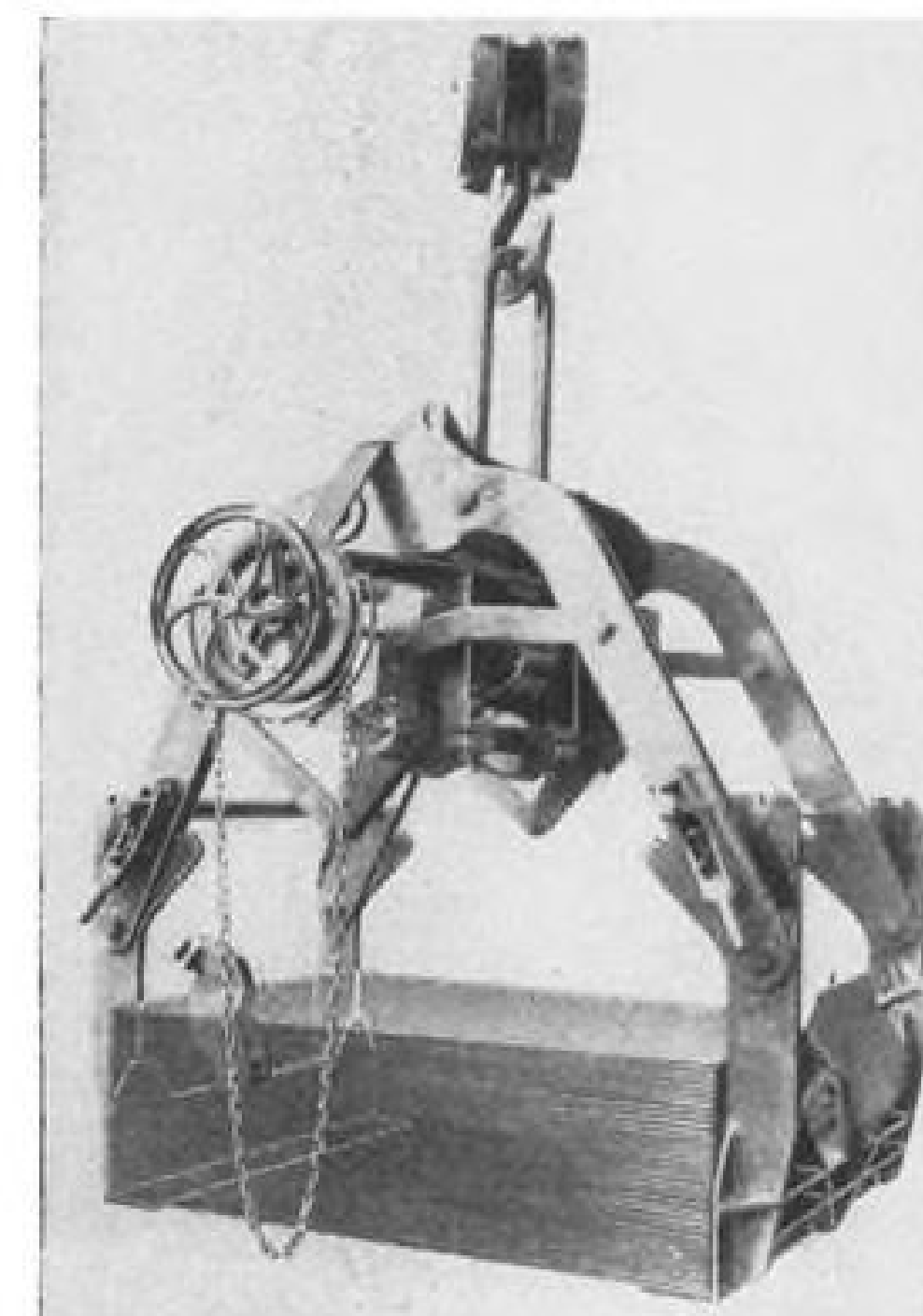
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One-Man Unit Handles Sheet and Coil Stock

Cullen-Friestedt Co. is introducing a new dual-purpose lifter for both sheet and coil stock. One man can handle it.

Unit was developed in cooperation with personnel of the Fisher Body Division of General Motors Corp. It reportedly is capable of handling up to 20,000 lb. of stock.

The lifter incorporates a hinged coil-bearing segment at center of each carrying angle. When loose or bundled sheets are to be handled, core bearers are swung down into carrying position where they rest on carrying angle for double bearing providing extra strength and safety.

Adjustment of jaws and carrying angles permits unit to handle wide range of sheet widths and coil stocks.

Cullen-Friestedt Co., 1300 S. Kilbourn Ave., Chicago.

Milling Cutter Makes 286 Accurate Slots at Once

I-T-E Circuit Breaker Co. has made a milling cutter for aluminum extrusions, that cuts simultaneously 286 slots, each 0.125 in. wide and 0.312 in. deep with .075 in. walls between, to finish dimensions. Manufacturer states that tolerances are held to .003 in. on slots with no cumulative tolerance.

Unit is produced by the company's Special Products Division, which specializes in products and components for radar and jet engines.

I-T-E Circuit Breaker Co., Philadelphia 2, Pa.

Automatic Machine Cleans Metal Parts in Batches

Magnus Chemical Co.'s Equipment Division is introducing an automatic multi-stage batch cleaning and processing method for metal parts.

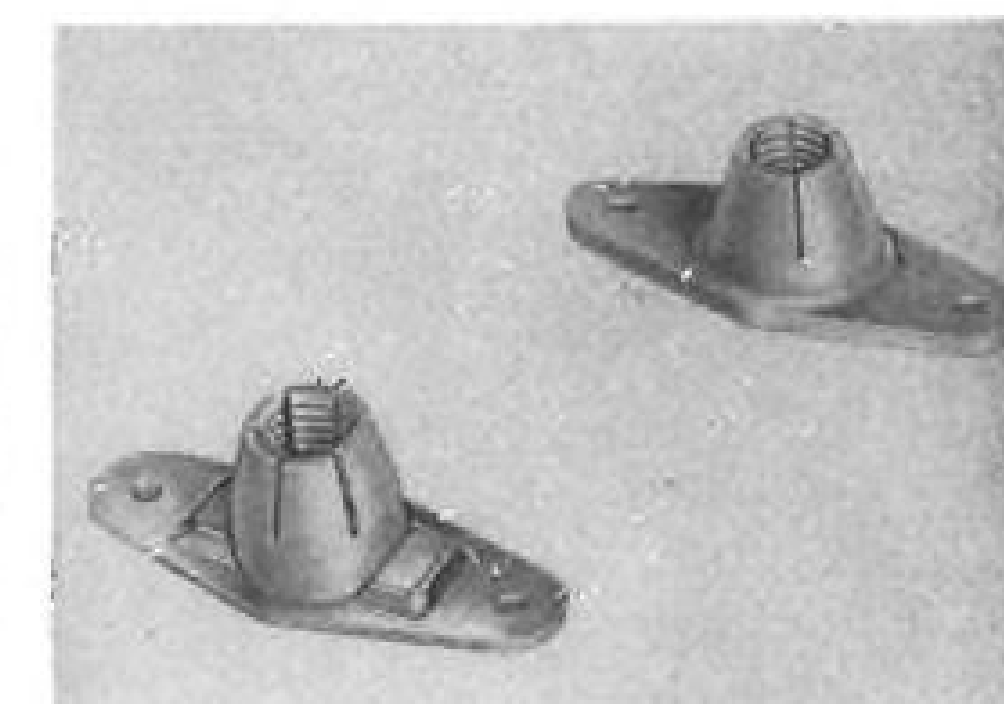
Designated "Aja Lif Automatic," the equipment consists of a series of independent, self-contained dipping units serviced by automatic conveyors.

Dipping, raising and transfer of parts from one stage to another is automatic, while parts to be processed are vigorously agitated in each solution according to a predetermined exposure.

Processing cycle can be varied according to technical requirements by means of a timing device. Entire unit is serviced by one operator.

Manufacturer states equipment can be designed for any number of stages, alkalis or acids, and also drying operations. It can be installed in any existing production line.

Magnus Chemical Co., Inc., Dept. AW, Garwood, N. J.



Lightweight Stop Nut Saves Critical Metals

Elastic Stop Nut Corp. of America is producing a new lightweight, high-temperature, two-lug anchor lock nut that is claimed to be 45% lighter than previous designs, easier to weld and requires up to 75% less critical material. Above photo shows new nut (left) contrasted with previous Esna design for the same purpose.

Designated Esna ZA1W1200, nut is intended for service up to 1200 deg. F. Available in 8-32, 10-32 and 1/4-28 thread sizes, it can be obtained with base plates with plain lugs, lugs with projections for welding or lugs with holes for riveting. Unit is functionally interchangeable with Esna ZA1-1200 nuts.

Chief advantages claimed for the new design are: smaller nut body without reduction in strength; use of unplated type 321 stainless steel for lugs, facilitating anchoring nut by welding; and savings of type 347 Columbium stainless steel by using it only in the nut body. Base plates are of 321 stainless steel.

Elastic Stop Nut Corp. of America, Union, N. J.

TO THE
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OR

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WITH EXPERIENCE IN

RADAR

OR

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HUGHES RESEARCH AND DEVELOPMENT LABORATORIES ARE ENGAGED IN A CONTINUING PROGRAM FOR DESIGN AND MANUFACTURE OF ADVANCED RADAR AND FIRE CONTROL SYSTEMS IN MILITARY ALL-WEATHER FIGHTERS AND INTERCEPTORS.

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TO BROADEN your field of experience in radar and electronics you will receive additional training at full pay in the Laboratories to become thoroughly familiar with Hughes radar and fire control equipment.

AFTER TRAINING you will be the Hughes representative at a company where our equipment is installed; or you will advise in the operation of Hughes equipment at a military base. (Overseas assignments, single men only.)

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Culver City, Los Angeles County, Calif.

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AVIATION WEEK, April 5, 1954

Rate Ruling Hints of CAB Offset Policy

- First indication is given in Atlantic subsidy case.
- Court decision holds up final PAA, TWA pay.

By Frank Shea, Jr.

First hints of how Civil Aeronautics Board will apply the Supreme Court offset ruling (AVIATION WEEK Feb. 8, p. 13) were brought to light last week as Examiner R. Vernon Radcliffe released the initial decision in the trans-Atlantic final mail rate case, involving Pan American World Airways, Trans World Airlines and the no-longer-existent American Overseas Airlines.

If Radcliffe's conclusions stick, CAB will take action to obtain evidence for determining mail pay needs of air carriers, based on their entire operations as required by the court ruling. Excess profits accrued in one division must be offset against requirements for other divisions, the court has held. This is considered particularly significant to airlines with combined domestic-international operations (AVIATION WEEK Feb. 15, p. 87).

► **Temporary Solution** — Contingent upon CAB's findings in complying with the offset decision, Radcliffe offered the following temporary conclusions on trans-Atlantic mail pay:

- TWA's fair and reasonable compensation for transportation of mail over its international routes from Feb. 5, 1946, to Dec. 31, 1952, is \$54,698,000.
- Pan American's mail pay for Atlantic Division operations from Jan. 1, 1946, to Dec. 31, 1952, is \$71,089,000.
- TWA's mail pay for operation over its present routes, or any routes that may be authorized in the future, will be computed by the following formula: For each calendar month on and after Jan. 1, 1953, an effective rate per designated mile flown, obtained by dividing designated miles flown during the month into the product of 1.32 cents times the lower of 1,765,671 times the number of days in the month or the standard available seat-miles flown in scheduled passenger service during the month.
- Computation of PAA's mail rate for present or future authorized routes from Jan. 1, 1953, will be accomplished in the same manner as TWA's, but designated miles flown during the month will be divided into the product of 1.75 cents times the lower of 2,491,585

New Domestic Airmail Rate Structure

A reorganization of the mail rate structure of the nation's 13 domestic trunk airlines is under way.

Civil Aeronautics Board has directed the airlines and the Postmaster General to submit statements before Apr. 23 proposing:

- New service mail rates, which each believes will be fair.
- Methods for standardization of equalization of mileages for mail rate purposes.

CAB seeks to devise a uniform rate structure that will prove "satisfactory in operation and fair and reasonable to all parties." It has reopened the mail cases effective Apr. 1.

Included in the review are American, Eastern, Trans World, United, Braniff, Delta-C&S, Northwest Orient, Capital, National, Western, Continental, Northeast and Colonial Airlines.

► **Investigation Fails**—A Board order last December ordering an investigation into the rate picture has not produced the desired results. Data collected from the airlines has not been sufficient to resolve the problem of standardization or equaliza-

tion of mileages as the Board had anticipated. That is fundamental to any uniform service mail rate structure, CAB says.

The Post Office Department did not supply the Board with any statement of its ideas on the matter. It is the Post Office's policy to give mail contracts to the airline with the lowest mail rate that has prompted the current investigation. Such a policy would wreck the present mail rate structure, CAB believes.

► **Retroactive Rates**—Post Office, concerned with keeping within budget limitations, is interested only in doing business with operators charging the lowest rates. These are the "Big Four" airlines, whose mail rates are 45 cents a ton-mile.

By reopening the rates now, the Board believes it will lay the ground work for redetermination of final service mail rates for the 13 carriers involved in an appropriate uniform rate structure.

When a new rate structure is established in the ensuing months following the current study, mail rates will be retroactive to Apr. 1.

times the number of days in the month or the standard available seat-miles flown in scheduled passenger service.

• Compensation to these airlines will be inclusive of, and not in addition to, the pay previously received by them for transportation of mail for the respective periods and operations concerned.

In addition to these findings, the examiner also concluded that AOA's mail pay for its entire system operations from Jan. 1, 1946, to Sept. 25, 1950, is \$23,213,000.

► **Serious Difficulties**—Radcliffe pointed out that, because the Supreme Court ruling was handed down after evidence had been filed and the records closed, serious difficulties are presented with respect to a final decision in the trans-Atlantic mail case.

Prior to the court ruling, the case had proceeded on the basis that it concerned the setting of final mail rates for TWA and PAA for their trans-Atlantic services alone. Previously established "final" rates for other divisions of these carriers were treated as final, subject only to the issue of possible offset of excess earnings.

► **Upset Premises**—But the offset decision completely upsets these premises, said Radcliffe. "The Board cannot, under the language of the decision, set final rates by divisions—only by carriers. The issues herein, the evidence and briefs, do not embrace the question of final rates for TWA and PAA in their entirety for the period involved."

The case has been transformed into one of setting "temporary" rates for the trans-Atlantic operations of these carriers, the examiner reported.

He said that before a final rate for each of these airlines can be set, further procedures will be necessary to make the required review of operations of other divisions to determine the need of each carrier as an entity.

In view of these facts, Radcliffe concluded that this initial trans-Atlantic rate decision could not meet the requirements of the offset ruling. As a result, he did not endeavor to do so.

► **Possible Impact**—The examiner did, however, include his own views as to possible impact of the court ruling upon the two airlines.

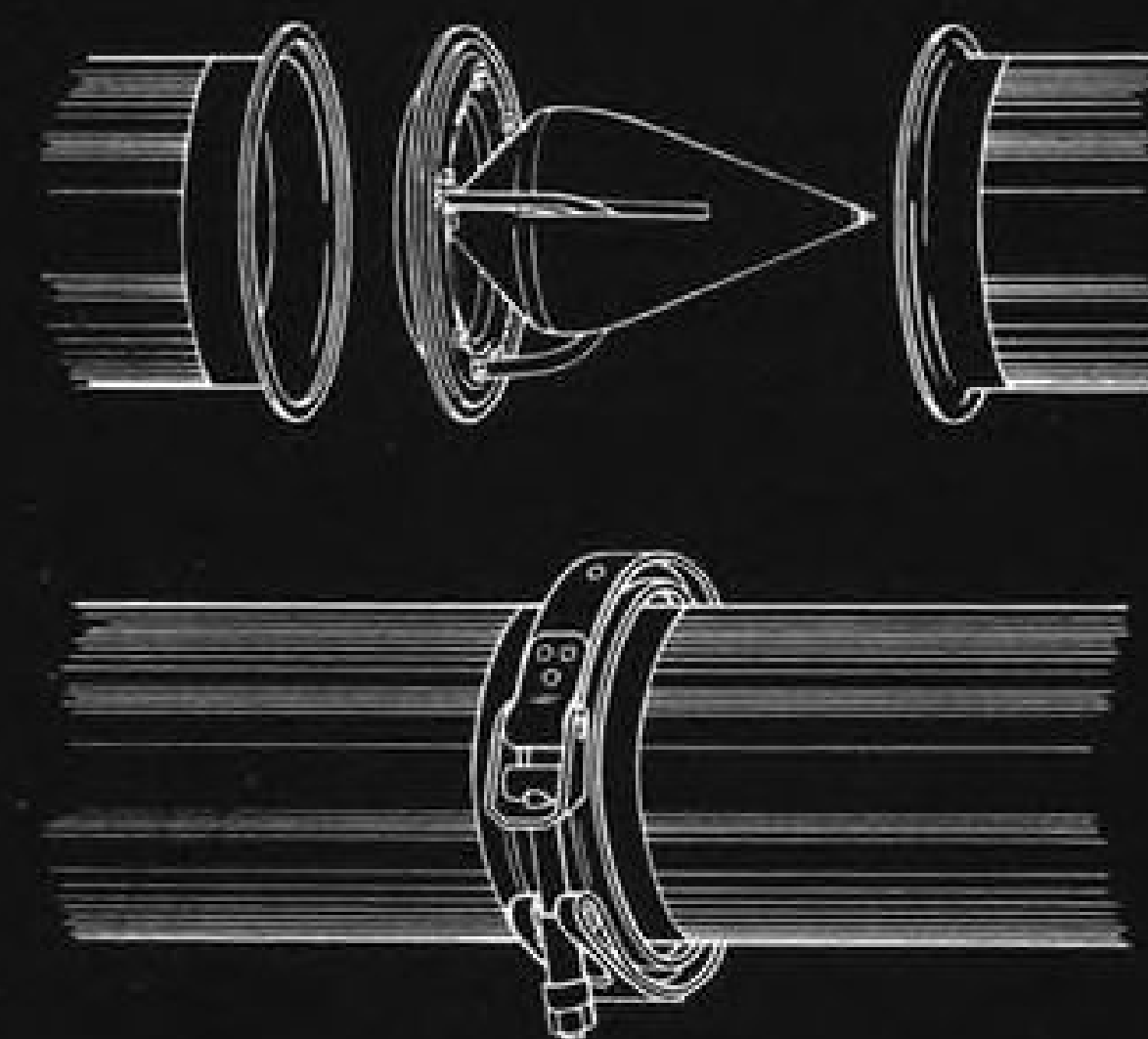
He said Post Office holds TWA had



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realized excess domestic earnings of \$12,158,000 for 1951 and 1952 that should be used to offset mail pay for its international operations. Post Office also contends that Pan American had excess earnings of \$5,105,000 for 1951-'52 in its Pacific-Alaska Divisions.

Radcliffe believes divisional losses during the other years of the review period also should be heavily considered. He pointed out, for example, that from 1946 to 1952, TWA had an actual earnings deficit of \$1.4 million on its domestic operations, while PAA had a net deficiency of \$1.2 million.

► **TWA Rate**—With respect to TWA, the examiner said: "TWA's International Division rate is open from 1946 to the present, while the carrier's domestic rate has been presumed closed for this entire past period since the 'Big Four' mail rate decision in September 1951.

"But the offset decision now requires that TWA domestic profits in 1951 and 1952, and thereafter, be considered in determining the need of the airline for these years. Since there is no discernable difference in the status of TWA's domestic rate for 1946 and 1952, it follows that the domestic losses of 1946 must also be considered in determining its need as an entity for that year."

► **PAA Earnings**—In the case of Pan American, Radcliffe reported: "There would appear to be no question of excess earnings for a division and period for which a rate has been set on the basis of a past period review. Prospective 'final' rates have been in effect for PAA's Latin American Division between Jan. 1, 1946, and April 4, 1948, and for the calendar year 1953; for the Pacific Division, for calendar years 1951 and 1953; and for the Alaska Division, for the last half of 1951 and all of 1953.

"Considering these PAA divisions and prospective 'final' rate periods falling within the past period for this proceeding, it cannot be found that PAA had excess earnings to reduce the need otherwise found proper for the 1946-1952 period."

The examiner said the Post Office—in holding that PAA's Pacific-Alaska Divisions' earnings were in excess of a 10% return on investment for 1951 and 1952—failed to consider that on the basis of indicated results for the carrier's Latin American Division from 1946 through April 4, 1948, "PAA realized essentially no net earnings for this two-and-a-half-year period."

► **No Excess**—On the basis of these arguments, Radcliffe contended that neither airline realized any net excess earnings during the past period to be applied as all other revenue in determining need in trans-Atlantic mail rates.

Effect of the decision cannot be ascertained yet for 1953, said Radcliffe.

ATA Joins Pilot-Engineer Hassle

Air Transport Assn. has entered the squabble between pilots and flight engineers of four-engine aircraft over interpretation of proposed amendments to Civil Air Regulations (AVIATION WEEK Mar. 22, p. 72).

ATA has offered to give Civil Aeronautics Board further clarifying amendments to those under consideration and also asked for an extension of their effective date from Apr. 1 to July 1.

CAB last week denied ATA's petition but was expected before the end of the week to issue proposed changes to the regulations for review by the industry.

► **Problem of Views**—Problem centers on a variety of interpretations of the amendments as to the role of the pilot. It will not be solved by interpretation either by the Board or Civil Aeronautics Administration, ATA claims.

"No regulations which are as important as these and because of their importance are subject to differing opinions and disputes can be cured by interpretations," the association says. "The regulation should be written clearly so that interpretations are not necessary."

► **CAB View**—The Board has interpreted the amendments in question "as conferring on the pilot in command, with respect to matters concerning the operation of the airplane, full control and authority without limitation over all other crew members and their duties during flight time, whether or not he holds a valid certificate authorizing him to perform the duties and functions of such other crew member."

CAB says it "had no desire at the time of the promulgation of revised Part 40 (of CAR) and has no desire now to invade the prerogative of management to apportion the various duties of operating its aircraft among the flight crew members as it may see fit, subject of course, to review by the Administrator of the safety aspects thereof."

► **One Commander**—Eastern Air Lines pilots filed a petition with the Board last month to have the amendments changed so there would be no possibility of doubt that the pilot is in command of the airplane. One of the proposed amendments implies, pilots and ATA feel, a restriction on the pilot's command of the airplane in emergency situations if he does not hold a flight engineer's certificate.

Any division of authority in the cockpit, as is implied, says ATA, would be extremely serious from a safety standpoint. Only one person can be in command of an airplane, ATA states. CAB agrees.

"The aircraft commander certainly should not be placed in a difficult position with regard to the function of his crew merely because he does not have a specialist certificate such as a flight engineer, navigator, or flight radio operator certificate," ATA says. "The duties that the airlines have given the flight engineer in flight are only those which an aircraft pilot, not holding a flight engineer certificate, has handled normally for years. In the airlines' opinion, the pilot's capabilities for performing the flight engineer's duties in

flight are so basic as to be unquestioned."

► **ALPA Arguments**—Air Line Pilots Assn. argues that the amendments prohibit a pilot, without a flight engineer's certificate, from:

- Taking over the flight engineer's controls;
- Directing the flight engineer's handling of the flight engineer's panel except in an emergency.

Flight Engineers' International Assn. maintains that the flight engineer's panel is wholly within their jurisdiction and not subject to the direction of the pilot.

This provides an "unfavorable cockpit atmosphere," ATA contends, and in effect "builds a fence" within the cockpit.

"Airlines cannot assume responsibility" for this "seriously unsafe condition in scheduled air transportation," the airline organization argues.

► **Certificate Need**—ATA believes the amendments, as they now stand, would force pilots to obtain flight engineer certificates—which would be costly to the airlines because of the added training involved. The association recommends an amendment permitting an airman holding a valid commercial pilot's license and qualified on the airplane to occupy the flight engineer's position.

This would not remove the engineer from the cockpit but would make clear that the flight engineer's position can be occupied either by a flight engineer or a person holding at least a commercial pilot certificate.

"The regulation should recognize the desirability of permitting airline management flexibility in determining who is to fill the third crew member position: An airman holding a flight engineer certificate or another pilot who in the opinion of the air carrier, is qualified to perform this function," ATA says.

► **No Abuse**—ATA recommends a provision to the amendments that "check pilots who are approved by the airline and designated by the Civil Aeronautics Administration as competent to check the pilot-in-command or the co-pilot may also flight-check any other member of the flight crew."

"The present provision . . . will make ineffective any report by a pilot-in-command (not having a flight engineer certificate) which reflects on the capabilities of a flight engineer to act as a crew member," ATA adds.

ATA also recommends: "That a flight engineer shall not be assigned to perform duties for which he is required to be certificated as a flight engineer unless within the preceding 12-month period, he has had at least 50 hr. of experience as a flight engineer on the type airplane on which he is to serve or until he has been checked by the air

carrier or an authorized representative of the Administrator."

The original amendment made the period six months. Experience has proven this a wise regulation, ATA states, "and to our knowledge the airlines have not abused the responsibility."

ANDB Team Studies DME, Tacan Dispute

An eight-man committee of the Air Navigation Development Board has been formed to evaluate two systems of short-distance air navigation—VOR/DME and Tacan (AVIATION WEEK Dec. 7, 1953, p. 40; Feb. 15, p. 14).

Milton W. Arnold, vice president-operations, Air Transport Assn., has been appointed chairman. Arnold was sharply critical of the decision by Civil Aeronautics Administration to complete installation this year of 327 DME stations (AVIATION WEEK Feb. 22, p. 18).

"It is extremely difficult for us as users of the airspace to see why the CAA is going full-steam ahead on implementation of DME when there is no urgent operational requirement at this time for DME," Arnold said at that time.

► **Industry Emphasized**—Joint announcement of the new committee was made by Undersecretary of Commerce Robert Murray and Assistant Defense Secretary Donald A. Quarles. The announcement said: "The appointment of Mr. Arnold as chairman emphasizes the extent to which industry is being brought into this problem."

Other members of committee: E. C. Wood, Defense Department representative, ANDB; Peter Caporale, chief, Airways Engineering Division, Federal Airways; Lt. Col. J. L. Wilson, deputy director, Coles Signal Laboratory, Ft. Monmouth, N. J.; H. I. Rothrock, assistant to the head, Air Navigational Aids Branch, Flight Services Division, Office of Naval Operations; Col. H. A. French, chief, Electronics Systems Division, USAF; Cole Morrow, chairman of the board, National Business Aircraft Assn., and J. B. Hartranft, president, Aircraft Owners and Pilots Assn.

► **Report Due July 31**—The committee has been directed to make its final report July 31. Preliminary fact-finding is under way, and the first committee meeting was scheduled for last week.

Military departments are reviewing short distance requirements and Air Coordinating Committee is reviewing common system requirements. These studies will be made available to the committee by May 1. The military departments are evaluating the latest VOR/DME equipment and Commerce Department is evaluating the Tacan system at the CAA Technical Develop-

ment and Evaluation Center at Indianapolis, Ind. The evaluations are to be completed by July 1.

PAA, Eastern, Delta Ask for Mexico Routes

Permission to operate into Mexico City has been asked by three more airlines, which join American Airlines in what probably will be a combined Mexico City route case.

Pan American World Airways, Eastern Air Lines and Delta-C&S Airlines seek Civil Aeronautics Board approval to fly the profitable route. Pan American requests direct nonstop service from New York, as does Eastern. At present, PAA flies between Mexico City and Houston, Tex.

Delta-C&S joined with PAA in a joint petition for an interchange agreement in providing service between Chicago and Mexico City.

► **Negotiations Dropped**—American now is awaiting results of court action on its New York-Mexico City nonstop proposal (AVIATION WEEK Feb. 22, p. 15). Pan American and EAL were successful last February in obtaining court action to prohibit American from beginning the Mexican service under an exemption granted by CAB. Meanwhile, American has ended unsuccessful negotiations with Mexico to obtain approval of its nonstop service. The Mexican government has notified AA that it would permit operation by the airline only on condition that a Mexican-flag carrier be granted a route to the U. S.

That takes the issue out of the hands of the airline and gives it back to the State Department, only agency which can discuss bilateral agreements with foreign countries.

Since no bilateral pact exists between the U. S. and Mexico, State Department gave American only limited authority to discuss the airline's proposed route rights.

► **Equal Terms**—Pan American and Eastern want to compete for the Mexican market on equal terms with American and foreign airlines such as Air France, which recently began Paris-New York-Mexico City service.

PAA also wants New York and Washington added as co-terminal routes to Houston on its current service. In the past, Pan American has sought an interchange agreement with Eastern that would permit through service on the routes of the two companies between Mexico City and New York.

EAL consistently has declined. On the PAA-Delta interchange petition, the airlines are seeking service over Delta's route from Chicago to St. Louis, continuing over Pan Am's route from Houston to Mexico City.



New Air Terminal for Honolulu

Artist's conception of new \$4-million terminal facilities planned for Honolulu International Airport. The setup centralizes the land and sea terminals now handling both sides of the airport and will more than double present overall capacity while serving inter-island and overseas flights. Initially,

"master facilities" will be constructed at a cost of about \$2.4 million. Later plans call for a \$650,000 inter-island terminal, a \$300,000 sky room, a \$400,000 foreign arrivals building, \$235,000 in air conditioning equipment and \$100,000 in miscellaneous construction.

Hopes for Balboa Decision Fade

CAB defers ruling on case, proposes new independent airline to operate through service to South America.

Civil Aeronautics Board again has deferred decision on proposed New York-Balboa through service and now recommends establishment of a single independent airline to serve the routes, pushing final settlement of the three-year-old case farther into the future.

The proceeding, involving through service between U. S. and certain South American points by means of an equipment interchange, concerns Pan American World Airways, W. R. Grace & Co., Pan American-Grace Airways, Braniff International Airways, Eastern Air Lines, and National Airlines.

► **Competition Routes**—CAB's latest action gives the airlines 60 days to outline plans for establishment of an independent operation between Houston and Miami, on the one hand, and points served on the combined international routes of Braniff and Panagra.

The Board says consummation of such an agreement would establish two effectively competitive routes:

- Panagra and Braniff's combined routes, operating primarily on the west coast of South America.

- Pan American's routes on the east coast.

If presented with an agreement envisaging such an independent airline, the Board says it also would consider promptly equipment interchange proposals that would provide access to the northeastern U. S. for the new carrier and thus through services to and from Balboa, C. Z., and South America.

► **New Delay**—CAB's deferred decision affects various proposals involving provision of one-plane service between northeastern U. S. and Balboa and the west coast of South America, as well as service to various points in the Caribbean area.

Voluntary proposals had been submitted for interchange of equipment between PAA, Panagra and Eastern, and the Board also had placed under investigation arrangements that would include National and Braniff. The proposals with respect to Braniff involve extension of that airline's route from Havana to Miami for interchange purposes.

► **Reopened Record**—A previous Board decision against Pan American and EAL was rejected by President Eisenhower last May, with a request that the records be brought up to date. CAB complied, reopened the record, and further hearings were held before an examiner. Late last year additional oral arguments were held.

Since these oral arguments, says the

Board, certain events have occurred with substantial impact on the national transportation policy in South America as well as the Balboa issues. These include:

- Institution of an anti-trust action by the Attorney General against Pan American, W. R. Grace & Co. and Panagra, seeking to divest PAA and Grace of control of Panagra (AVIATION WEEK Jan. 1, p. 92).

- Recent uncertainties with respect to the future of Braniff's routes into Brazil.

- Supreme Court offset decision concerning CAB's authority to support with subsidy funds losses incurred on overseas routes of airlines operating combined domestic-international service (AVIATION WEEK Feb. 8, p. 13).

The Board has re-evaluated the case in the light of these events and has offered a proposal for consolidation of Braniff and Panagra routes into a single, independent system "in order to achieve a substantial reduction in mail pay subsidy requirements and, at the same time, permit competitive U. S. flag carrier services to South America on an economically sound basis."

► **Caribbean Problem**—Solution of the problem of South American service, CAB holds, also affects any decision on Caribbean interchange services, proposed by Pan American and Eastern. Unless its suggested solution can be worked out, the Board says it will find it "most difficult under the circumstances to approve any arrangement which would result in fostering the dominance of any one system in Latin America."

CAB emphasizes its determination to take action that further would reduce airmail subsidy payments, saying it is "especially determined to take every practicable step, consistent with the mandate of our statute, to eliminate uneconomic aspects of our air route pattern and to prevent the establishment of any new situations of that character."

This does not mean authorization of new services will be abruptly halted, says the Board, but points out it does mean special scrutiny will be applied to all new route proposals.

BOAC to Put Comets Back on Four Routes

(McGraw-Hill World News)

London—British Overseas Airways Corp.'s Comet fleet will be back on all routes served by the jet trans-

ports by May 8, resuming full operation four months after the Series 1 liners were grounded by a BOAC crash near Elba Jan. 11.

The airline also plans to inaugurate a new Comet service from London to Nairobi during the first week of June.

► **First Takeoff**—First of BOAC's fleet of seven Comets (six Series 1s and one 1A) to resume scheduled service took off Mar. 23 from London for Johannesburg with more than 50 modifications designed to cope with possible causes of six jet liner crashes (AVIATION WEEK Mar. 15, p. 323).

The de Havilland-built transports also will be put back on the route from London to Colombo, Ceylon, Apr. 7; London-Singapore May 2 and London-Tokyo May 8.

The British airline followed the lead of Union Aeromaritime de Transport, French air carrier that put its two Comets back into service Mar. 15. Air France is scheduled to resume Comet operations Apr. 15.

► **Ghosts Examined**—Meanwhile, experts here are examining three de Havilland Ghost engines recovered from the wreckage of the BOAC Comet that plunged into the Mediterranean off Elba Jan. 10.

The fourth engine, dredged from the bottom of the sea, also will be examined here.

► **Missing Turbine**—Turbine section was missing from the third engine recovered from the crash, but prevailing opinion here holds that the shaft probably was broken by collision impact. General belief discounts the theory of disintegration of the turbine around the shaft.

Public inquiry, still unscheduled, may show otherwise. De Havilland metallurgists will testify at the hearing on their findings in current checks of the Comet 1 and its powerplants.

SHORTLINES

► **Air France** will inaugurate three new services from Denmark and Sweden to Paris this month: Copenhagen-Paris direct, Stockholm-Paris direct and Stockholm-Hamburg-Paris.

► **Northwest Orient Airlines** reports heavy increase in passenger loads and revenues on Honolulu flights since inauguration of DC-6B tourist service. Compared to last year's December-January-February quarter, passenger loads are up 193% and revenue is 142% higher.

► **Oakland (Calif.) Municipal Airport** reports takeoffs and landings totaled 190,104 last year, compared with 187,119 during 1952.

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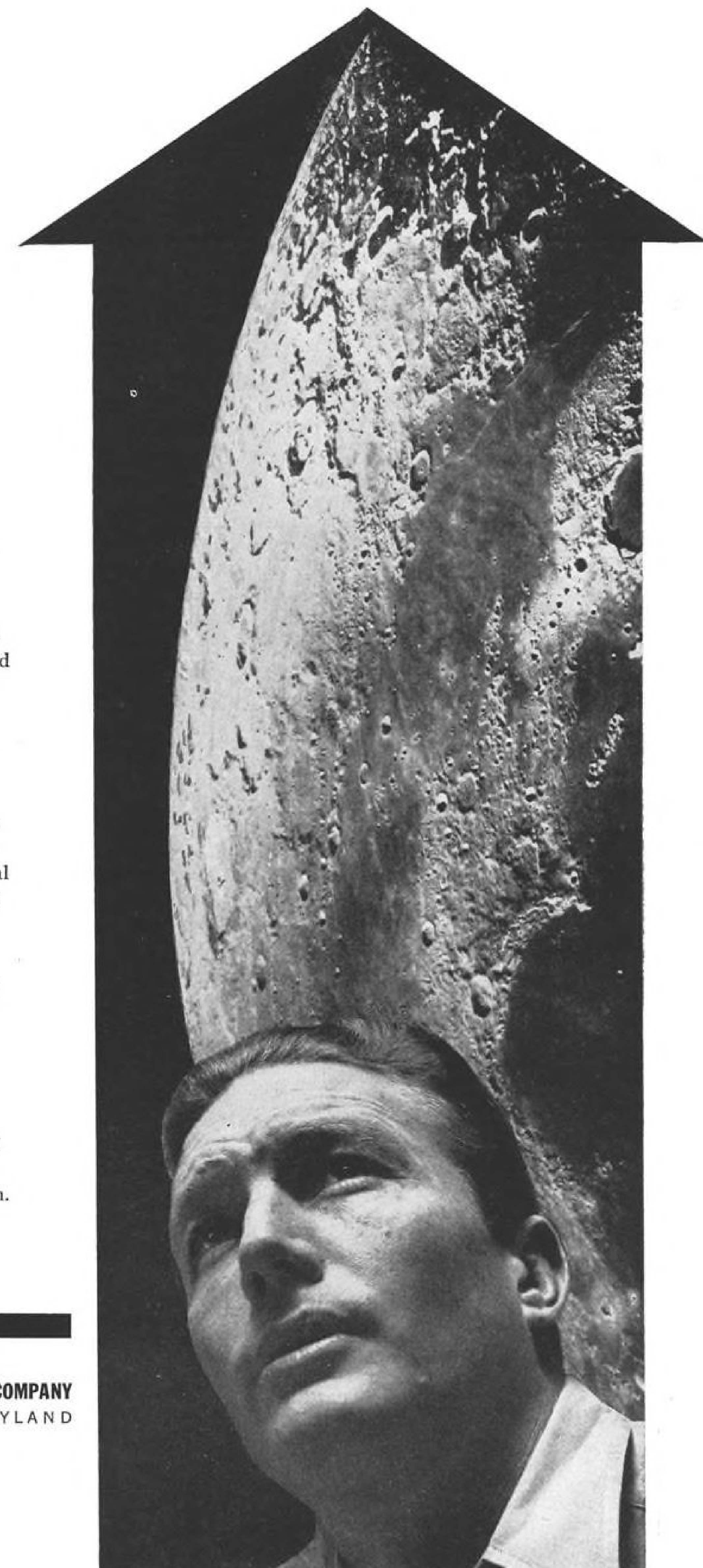
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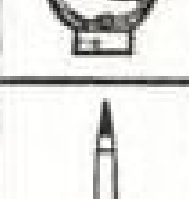


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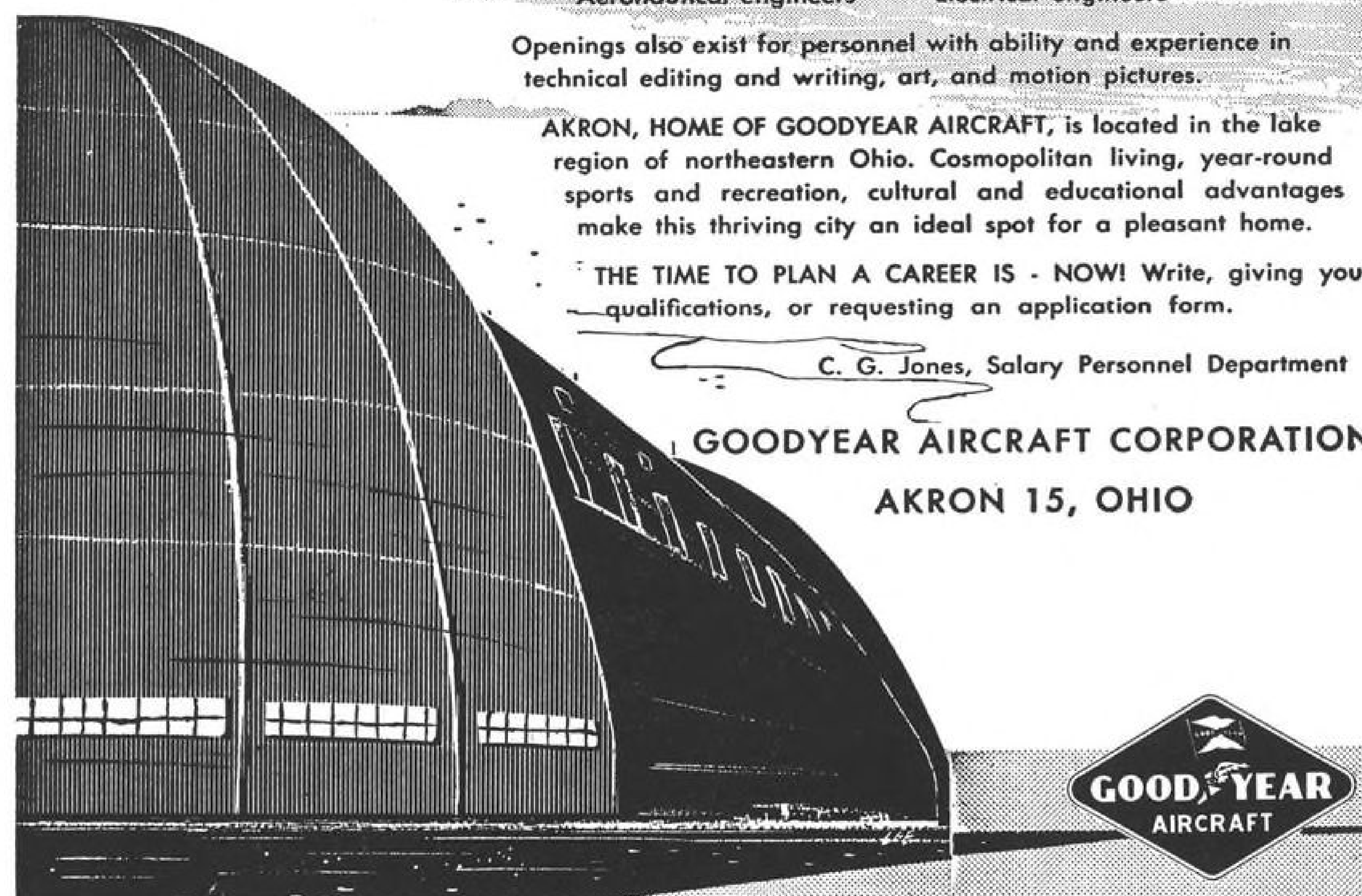
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Post Office Box 482 Fort Worth, Texas

News Sidelights

Society of Automotive Engineers is trying to find companies in the aviation industry that will celebrate their 25th, 50th, 75th or 100th anniversaries in 1955. SAE itself will mark its golden anniversary that year and is anxious not to set up conflicting dates for ceremonies. It also may want to tie in with other such celebrations.

Crash Injury Research is readying a test model of a quick-release shoulder harness for airline pilots that its originators expect to be more comfortable than previous harnesses.

Aviation safety specialists say the need for dynamic testing of seats, seat anchorages, passenger and crew restraining devices and floor structures to measure impact forces experienced in survivable transport crashes is being studied by various companies in the industry.

First Air Force units getting new Republic F-84F Thunderstreak swept-wing fighters powered by Wright J65 Sapphires are the 506th Strategic Fighter Wing, Bangor, Me., and the 27th Strategic Fighter Wing, Bergstrom AFB, Austin, Tex. Both wings are part of Strategic Air Command.

The firm of Marchetti of SAI Marchetti has submitted a design proposal for a twin-jet executive transport to the Italian government. Labeled the SM132, plane would be powered by two Rolls-Royce Avon R.A.3s and would carry 24 passengers. Other specs: cruising speed, 500 mph.; cruising range, more than 800 mi.; theoretical range, more than 1,400 mi.

Trans World Airlines' interest in airborne radar is evidenced by fact the carrier is spending \$140,000 to add necessary provisions and wiring to its 20 Super Constellations, now on order, to permit future radar installations.

Australian authorities have decided that the RAAF should get bigger bombers than present twin-jet Canberras, but the problem is where. Some hope was expressed that British Avro Vulcans might be available, but it appears the RAF has nothing to spare. There also has been speculation over possible purchase or "loan" of Boeing B-47s from the U.S. Present thinking is that a force of "about 24 bombers" is needed.

Air France recently completed flight testing the Eclipse-Pioneer automatic approach couplers. Flights were first tests of this equipment on a commercial model Lockheed 749 Constellation.



MOTORLESS ROTORCRAFT weighing only 85 lb. is seen aloft on a towline during recent trials made by Igor Bensen, president of Bensen Aircraft Corp., Raleigh-Durham Airport, N. C. Designed for pilot training or sport flying, tiny craft can be towed by car or boat and is said to be capable of lifting three times its weight. It can fly as slow as 22 mph. and makes autorotation landings like a copter.

AVIATION CALENDAR

- Apr. 12—Society of Automotive Engineers, second annual Aeronautic Production Forum, Hotel Statler, New York.
- Apr. 14—National Advisory Committee for Aeronautics, symposium on helicopter research for American Helicopter Society, Langley Field, Va.
- Apr. 14-16—Society for Experimental Stress Analysis, spring meeting, Netherlands Plaza Hotel, Cincinnati.
- Apr. 15—Material Handling Institute, third "traveling clinic," Congress Hotel, Chicago.
- Apr. 19-20—Symposium on automatic production of electronic equipment, sponsored jointly by Stanford Research Institute and USAF, Fairmont Hotel, San Francisco.
- Apr. 21-23—Air Line Pilots Assn., second annual Air Safety Forum, Chicago.
- Apr. 22-23—Joint meeting of Radio Technical Commission for Aeronautics, Franklin Institute Laboratories, Institute of the Aeronautical Sciences (Philadelphia Section) and Institute of Radio Engineers (Philadelphia Section), Franklin Institute, Philadelphia.
- Apr. 22-23—American Institute of Electrical Engineers, conference on feedback control, Claridge Hotel, Atlantic City, N. J.
- May 5-7—Third International Aviation Trade Show, managed by Aircraft Trade Shows, Inc., 71st Regiment Armory, New York.
- May 6-8—Institute of the Aeronautical Sciences, first annual West Coast Industry-Faculty Conference and fourth annual West Coast Student Conference, Los Angeles.
- May 7—Ohio State University, first annual Conference for Engineers, including aeronautical engineering, Columbus, Ohio.
- May 11—Daniel Guggenheim Medal Board of Award, annual meeting for preliminary selection of 1954 candidates, Engineering Society Building, New York.
- May 16-19—American Association of Airport Executives, convention, Louisville, Ky.
- May 20—Women's National Aeronautic Assn., 1954 Skylady Derby for stock model aircraft of 300 hp. or less, Raton, N. M. to Kansas City, Mo.
- May 21-22—Operations Research Society of America, second annual meeting, Edgewater Beach Hotel, Chicago.
- May 31-June 11—Canadian International Trade Fair, to be held in conjunction with the National Air Show and Canada's Aviation Day, Toronto.
- June 2-4—Triennial industry inspection of NACA's Lewis Flight Propulsion Laboratory, Cleveland, Ohio.
- June 5-12—Philadelphia Junior Chamber of Commerce, second annual Transcontinental Air Cruise for stock model aircraft of 300 hp. and less, Philadelphia to Palm Springs, Calif.
- June 21-24—Institute of the Aeronautical Sciences, annual summer meeting, IAS Building, Los Angeles.
- June 24-26—American Helicopter Society, 10th annual forum, Washington, D. C. Technical sessions: Mayflower Hotel, June 24-25; copter air show at Polo Field, June 26.

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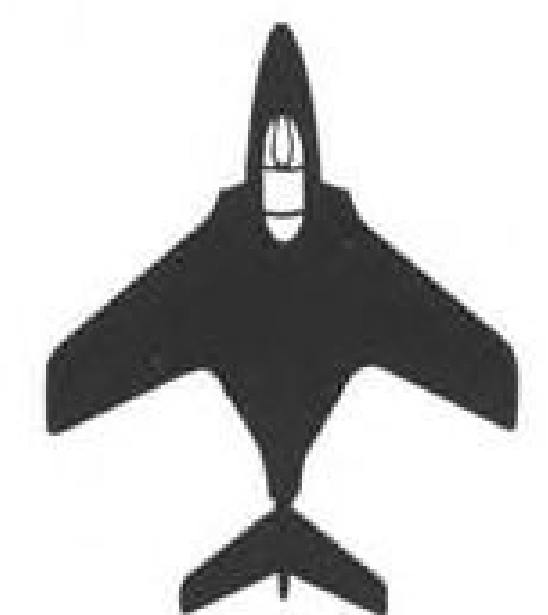
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**GRUMMAN AIRCRAFT
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BETHPAGE • LONG ISLAND • NEW YORK

EDITORIAL

Hydrogen Bombs & the Airplane

To quote the wartime Deputy Commander of the world-wide U. S. Air Transport Command, Gen. C. R. Smith, it is not necessary to be a student of military manuals to realize from the current hydrogen bomb tests that something tremendous is going on.

Recent reports AVIATION WEEK has received from high military and political circles point up one outstanding fact: The more powerful the weapon, the more vitally necessary it becomes for us to have super-speed, heavy-load-carrying aircraft ready to attack the aggressor's homeland.

Much of the current debate over the so-called "new look" military policy ignores this point.

Gen. Smith, both before his military service and since, has been president of American Airlines. He recently described the current military changes as the revolutionary beginning of a concept of national defense that is more suitable to the American technical genius, and to the new set of strategic conditions dictated by mass-destruction weapons that can strike "devastatingly, directly at, beyond, and over deployed military forces of the traditional variety." And he has done it better than anyone else in civilian aviation whose comments we have seen.

Even the atom or fission-type bomb was so powerful that a new word was invented to measure the energy it released—the kiloton, corresponding to 1,000 tons of TNT. Now comes the thermonuclear weapon that required another, newer order of measurement, the megaton—meaning the energy equal to a million tons of TNT. The average explosive power of the Nagasaki and Hiroshima weapons was about 20 kilotons. The 1952 hydrogen explosion has been estimated at four megatons, or equal to 4 million tons of high explosive.

"THIS IS EQUIVALENT IN DESTRUCTIVE CAPACITY TO ONE MILLION BOMBERS OF THE WORLD WAR II VARIETY," GEN. SMITH POINTED OUT, "EACH TRANSPORTING FOUR TONS OF TNT."

"If you and I were to stand out in the open, watching one million bombers passing overhead, at the rate of 100 each minute, we would be on our feet for 166 hours, or nearly a whole week, before the last of the column flashed overhead. That is the meaning of the power of a single thermonuclear weapon—a small one."

Some published reports estimate the power of the Mar. 1 blast as "upward of 14 megatons," and that of the biggest of the current series, yet to be exploded, at about 40 megatons, or equal to 10 million World War II bombers!

This revolution in weapons has conferred upon the bomber a potential destructiveness so vast as to make the effective power of traditional weapons (the infantryman, the battleship, all the surface array of weapons) seem almost insignificant by comparison, C. R. Smith emphasizes.

Decisive actions in another war would probably be

fought and settled in a few months or even weeks, he believes.

"This telescoping of the time element seems to me to teach yet another lesson," he says. "It is that the destructive air battle in a future war would be fought to conclusion long before the traditional surface forces, except those already in position near the enemy's frontier, could be brought into action in sufficient scale to affect the outcome."

This means that the idea of maintaining a huge land army, to be deployed overseas in event of war, seems to have less and less relevance to the new facts of military power as we are coming to understand them. It also would seem to mean that one of the principal missions of the Navy—to transport and support an overseas army—would drop down the list of national priorities.

It probably would mean, too, that the part of the Air Force primarily earmarked for supporting the Army in the field would cease to have as large a claim upon national resources.

"These factors," Smith says, "appear at least to have been given due weight in the new military budget. The recent statements of Adm. Radford reflect the view that basic strategy should be changed, and that force levels should be changed accordingly. President Eisenhower has supported the trend toward a new weapon concept, saying further that the usefulness of these new weapons creates new relationships between men and materials. These new relationships permit economies in the use of men as we build forces suited to our situation in the world today."

Thus C. R. Smith believes we are seeing the beginnings of a new national strategy, based on weapons systems in which our margin of technical advantage is greatest. If that trend continues and the new ideas are given their just play, with a cutting away of those elements not needed in support of the new strategy, we should be able to anticipate a national defense budget within our ability to pay the bills.

It should produce, he says, an actual gain in global military capability and, in due course, a substantial reduction in federal taxes, adding:

"The one thing that seems certain is that the power to retaliate instantaneously and crushingly is the surest restraint upon aggression."

"So long as that retaliatory power is preserved in sleepless readiness, benefiting constantly from the highest technical attention and so dispersed that it could never be overwhelmed or destroyed in a single rush, the peace of the world will be reasonably safe."

"There is no escaping the conclusion being forced upon us. It is that the deterrent force represented by atomic weapons and the capacity to deliver them through the air is also the only sure war-winning force. Science has doomed the old ways."

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Rocket firing jets reach new heights

Air Force and Allison engineers have put their heads together to save the taxpayers' money and get higher-altitude performance from veteran Northrop F-89 Scorpions. They developed a field modification kit which gives the earlier Allison J35 models the performance of the latest production model engines and boosts the Scorpion's ceiling substantially—at only a fraction of the cost of a new engine.



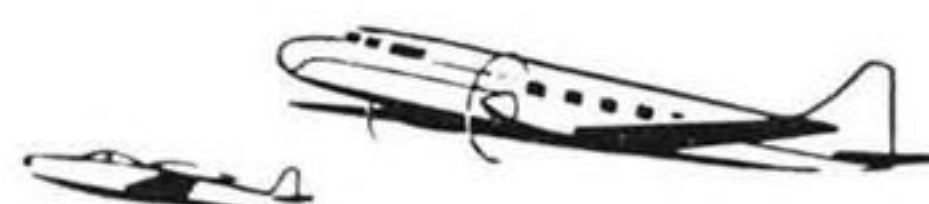
These "retrofit" kits can be installed by Air Force Maintenance Crews on a minor

repair basis *right in the field*. Already well started, the modification program will cover several hundred Scorpions assigned to the Air Defense Command at bases in the United States, and to the Alaskan and Northeast Air Commands guarding transpolar routes to America's heartland.

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