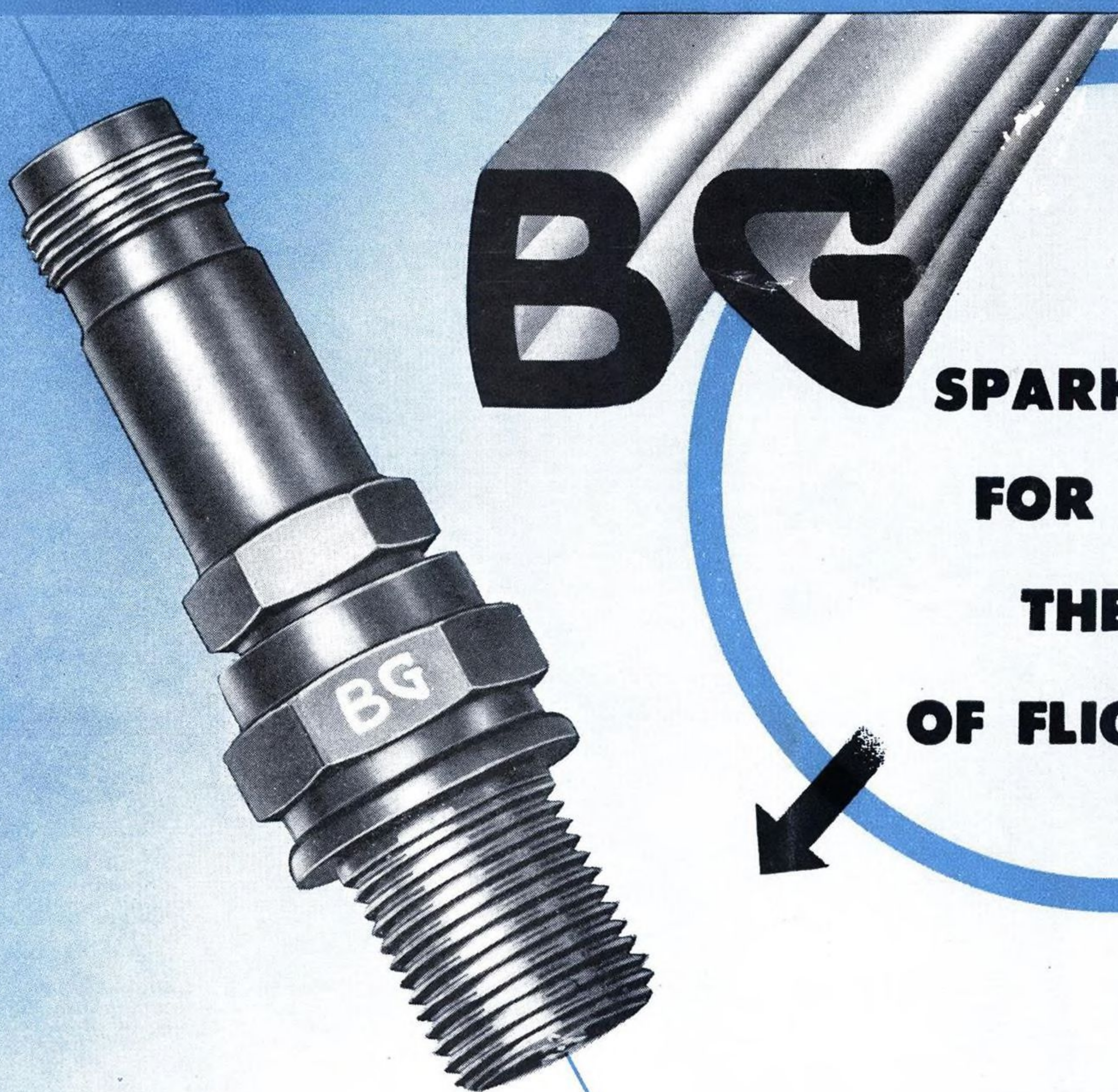


AVIATION WEEK

A MCGRAW-HILL PUBLICATION

OCTOBER 31, 1949



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This new swept-wing fighter is the latest addition to the U. S. Navy's carrier-based striking force. Shipboard operation, high altitudes, and trans-sonic speeds demand utmost performance and dependability from its power plant.

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AVIATION
GAS TURBINES

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HIGH-FLYING planes were having trouble with the seals on their bubble-type canopies. These inflatable rubber seals couldn't take the low temperatures and effects of pressure at high altitudes. They blew out, bursting the bubble at its "seams".

B. F. Goodrich engineers tackled the problem, came up with a new idea for the McDonnell Banshee. They took knitted fabric, rubber-coated inside and out, and cured it to a soft rubber, channel base. Under pressure, this rubberized fabric (slack before inflation) increases the size of

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If you have a sealing problem—in canopies, movable walls, wind-tunnel doors or other projects—get the help of B. F. Goodrich engineers now. Write to *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

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Aviation Week

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Number 18

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Domestic News Bureaus: Atlanta 3, Rhodes-Haverty Bldg.; Chicago 11, 520 N. Michigan Ave.; Cleveland 15, Hanna Bldg.; Detroit 26, Penobscot Bldg., Los Angeles 14, 621 S. Hope St., San Francisco 4, 68 Post St.; Houston, 514 South St. Correspondents in more than 60 major cities.

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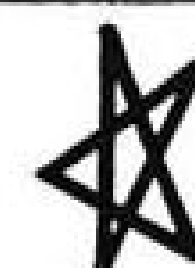
Robert F. Boger
PUBLISHER

J. G. Johnson, Business Manager; R. W. Martin, Jr., Sales Manager; Sales Representative; J. C. Anthony, New York; M. J. Storz, Philadelphia; V. K. Dissette, Cleveland; L. J. Biel, Chicago; W. E. Donnell, St. Louis; J. H. Allen, Dallas; R. C. Maultsby, Atlanta; J. W. Otterson, San Francisco; C. F. McReynolds, Los Angeles. Other sales office in Pittsburgh, Detroit, Boston, London.

Member of Associated Business Publications, Inc., and the Audit Bureau of Circulations

Aviation Week October 31, 1949 Vol. 51, No. 18
McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948), Founder. Printed at 99-129 N. Broadway, Albany, N. Y. JAMES H. McGRAW, Jr., President; CURTIS W. McGRAW, Vice-President and Treasurer; EUGENE DUFFIELD, Senior Vice-President, Publications Division; NELSON BOND, Vice-President and Director of Advertising; JOSEPH A. GERARDI, Secretary; J. F. BLACKBURN, Jr., Vice-President and Director of Circulation. Published Weekly in U. S. A., price 50¢ a copy, 50¢ in Canada. Subscription rates—United States and possessions, \$6 a year, \$9 for 2 yr., \$12 for 3 yr., Canada, \$8 for 1 yr., \$12 for 2 yr., \$16 for 3 yr., payable in Canadian currency at par, Pan American countries, \$10 for 1 yr., \$16 for 2 yr., \$20 for 3 yr. All other countries, \$20 for 1 yr.; \$30 for 2 yr.; \$40 for 3 yr. Address all communications about subscriptions to Director of Circulation, 530 W. 42nd St., New York 18, N. Y. Please indicate position and company connection on all subscription orders. Allow at least ten days for change of address. Entered as second class matter, July 16, 1947, at Post Office, Albany, N. Y., under Act of March 3, 1879. Copyright 1949, McGraw-Hill Publishing Co. Cable address "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL, ENGINEERING AND AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.

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J. W. Miller, president of Mid-Continent Airlines, Inc., entered the aviation field in 1925 as secretary of the Daniel Guggenheim fund for the Promotion of Aeronautics. Joining Mid-Continent in 1936, Mr. Miller has served the company as vice president, general manager and president.



AVIATION PRODUCTS

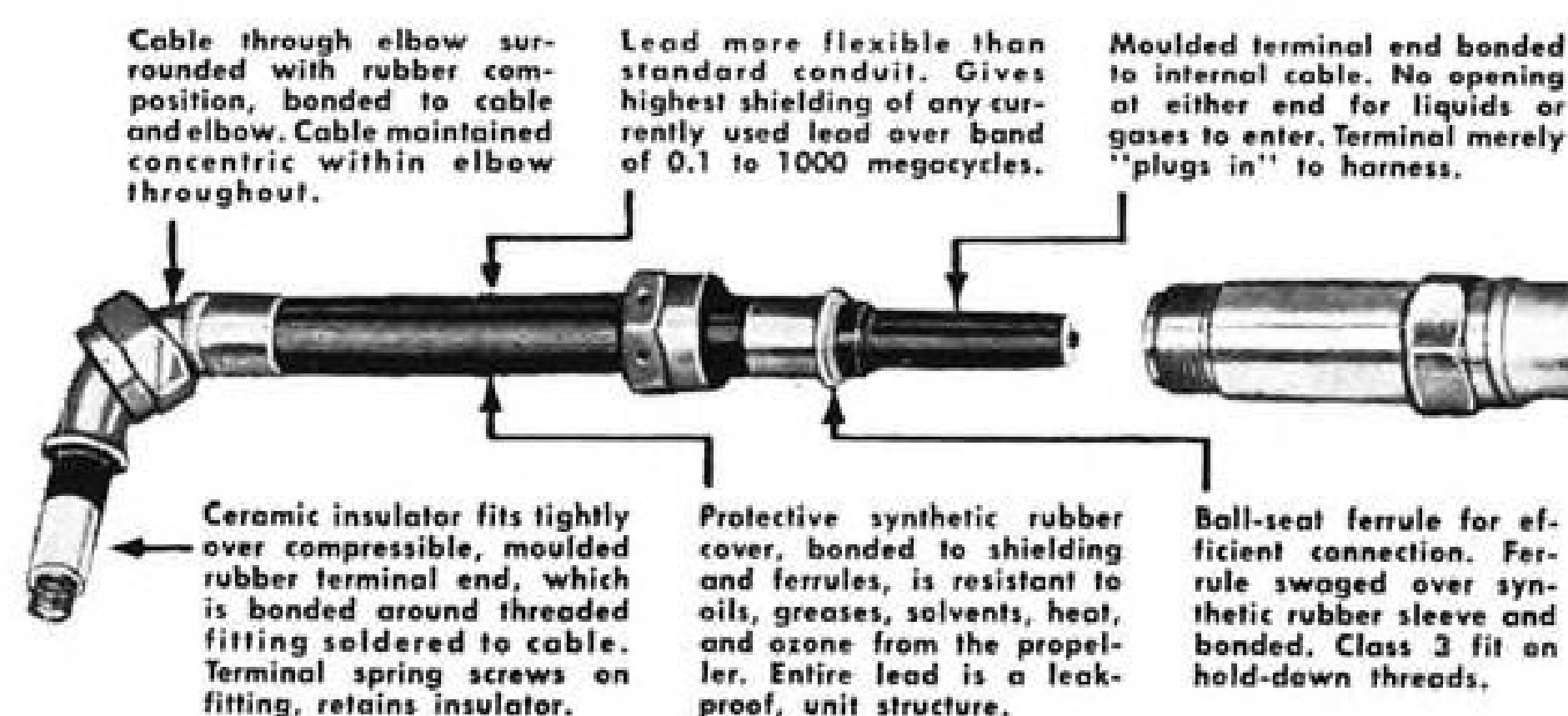
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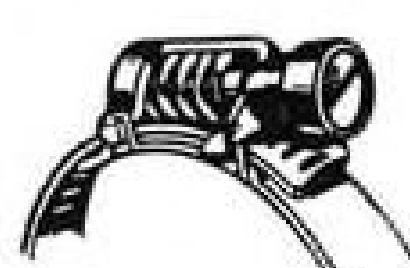
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New Planes in the News . . .



C-97A: First of 37 new model Boeing Stratofreighters seen prior to delivery to MATS. It can carry 53,000 lb.—12,000 more than earlier models. Normal load is 41,400 lb. Range

is 3750 mi., service ceiling 30,000 ft. Up to 134 troops or 83 patients can be flown. New external features are radome under nose and square-tipped Hamilton Standard props.



SWIFT: Unusual flight view of Supermarine supersonic research craft shows the 45-deg. wing sweepback. Spoilers forward of the flaps aid landing approach. The revamped

nose, aimed at providing better air flow into jet-engine intakes on either side of the cockpit, is clearly visible. Power is provided by late model Rolls-Royce Nene 5000 lb.-plus thrust.



LIFTMASTER: With both cargo doors open, the new DC-6A is shown at Douglas' Santa Monica plant. Aft door, partially closed, provides an entrance

78 in. x 124 in. Forward door is 67 in. x 94 in. Craft, now on a cross-country demonstration trip, is five feet longer than DC-6 and can carry 28,000-lb. payload at over 315 mph.

Pittsburgh



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AVIATION CALENDAR

- Oct. 30-Nov. 2—Annual convention, National Assn. of State Aviation Officials, New Orleans.
- Nov. 3-4—SAE national fuels and lubricants meeting, Chase Hotel, St. Louis, Mo.
- Nov. 9-10—Second annual aircraft sprayer and dusting short course, auditorium, Coffey Hall, University Farm, St. Paul, Minn.
- Nov. 9-11—Seventh annual meeting Aviation Distributors and Manufacturers Assn., French Lick Springs Hotel, French Lick, Ind.
- Nov. 16-18—Annual meeting, National Aviation Trades Assn., New Orleans.
- Nov. 28-Dec. 2—70th annual meeting, American Society of Mechanical Engineers, Hotel Statler, New York, N. Y.
- Nov. 30-Dec. 2—Annual meeting, Society for Experimental Stress Analysis, Hotel New Yorker, New York.
- Nov. 30-Dec. 2—Kansas Airport and Aerial Spray Conference, Manhattan, Kansas.
- Dec. 9-10—First Convertible Aircraft Congress, sponsored by Philadelphia chapter of IAS and American Helicopter Society, in Philadelphia.
- Dec. 15-17—National aviation meeting, sponsored by the National Aeronautic Assn., Washington, D. C.
- Dec. 17—Institute of the Aeronautical Sciences 13th annual Wright Brothers lecture, U. S. Chamber of Commerce Building, auditorium, Washington, D. C.
- Jan. 13-15, 1950—All American Air Maneuvers, Miami.
- Jan. 16-19—Plant Maintenance Show, sponsored by American Society of Mechanical Engineers and the Society for the Advancement of Management, Cleveland Auditorium, Cleveland.
- Jan. 23—IAS annual Honors Night dinner, Hotel Astor, New York, N. Y.
- Jan. 23-26—IAS 18th annual meeting, technical sessions, Hotel Astor, New York, N. Y.
- Feb. 18-26—National Sportsmen's Show Grand Central Palace, New York, N. Y.
- Mar. 6-9—47th annual meeting, American Road Builders' Assn., Netherlands Plaza Hotel, Cincinnati.
- Mar. 28-31—National Plastics Exposition, sponsored by Society of the Plastics Industry, Navy Pier, Chicago.
- April 16-20—Annual business meeting, American Assn. of Airport Executives, Neil House Hotel, Columbus, Ohio.

PICTURE CREDITS

7—(top) Boeing Airplane Co., (center) Frederick R. Brewster, (bottom) Douglas Aircraft Co.; 11—Boeing Airplane Co.; 12, 13—Wide World; 14—(bottom) Aeroplano; 16—Topical Press; 22, 23, 24—McDonnell Aircraft Corp.; 25—Natl. Bureau of Standards; 29—Armstrong Whitworth; 40—(Center photos) Flight; 41—(top and bottom) Topical Press, (center, left) Flight, (center, right) Aeroplano.

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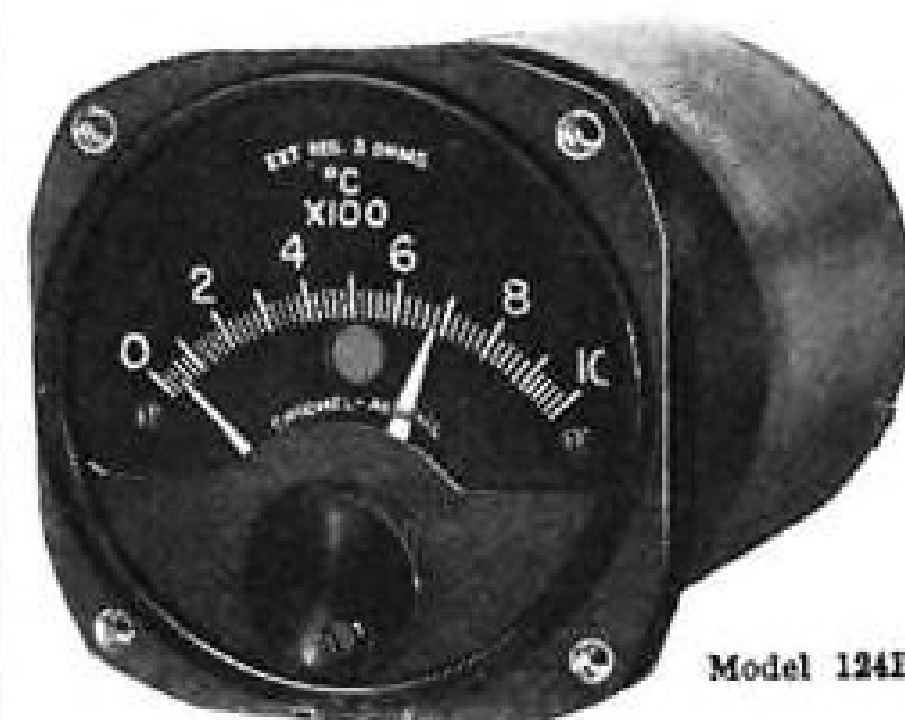
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NEWS DIGEST

DOMESTIC

De Havilland Comet completed a 2978-mi. roundtrip flight from Hatfield Airport, England, to Tripoli, in 6 hr. 36 min., averaging 450 mph. The jet transport made the trip between 6 am. and 3 pm., with a two-hour stopover at Castel Benito Airport. Craft had previously flown 2000 mi. in less than four hours. On the same day, a Pan American Airways Stratocruiser, the Clipper Flying Eagle, flew 3575 mi. nonstop from New York to London in 9 hr. 41 min. Tailwind on the flight was reported to be about 60 mph.

Two Republic F-84 Thunderjets, piloted by USAF colonels, landed at Prestwick, Scotland, last week on a flight from Wright Field, Ohio. Stopping-off points on the flight were not disclosed.

U. S. Supreme Court has refused to review the dispute between Dallas and Ft. Worth, Tex., over development of Midway Airport as the major terminal for both cities. Dallas has been fighting use of CAA funds to help finance Midway, claiming the new field would siphon off much of the traffic now using Love Field, Dallas.

Eastern Air Lines has filed suit against the U. S. government for \$100,000 charging that the Navy plane which crashed into an EAL DC-3 in mid-air last July 30 was being flown carelessly and negligently.

Aircraft industry's production capacity, as indicated by the number of machine tools installed in its plants, has shrunk to less than one-fifth of its wartime facilities, according to a survey by "American Machinist," McGraw-Hill publication.

Aircraft shipments during August amounted to 272 civil planes, valued at \$9.9 million, a decline of 10 percent from the 301 planes shipped during July. Total airframe weight in August was 3,916,900 lb. Total horsepower of aircraft engines shipped in August amounted to 3,733,800, a decrease of 18 percent from the 4,543,000 hp. reported for July. Aircraft plant employment showed little change in August from July.

New hypersonic wind tunnel at California Institute of Technology has given a speed in excess of Mach 10, believed to be the highest value of air flow yet attained in a supersonic facility. Test section, for studying missile models, measures 5x5 in. Operated under Ordnance Department contract, tunnel can function continuously.

Personal aircraft exports of four-placers and under during September

totaled 58 valued at \$244,368, according to the Aircraft Industries Assn. August exports were 48 planes valued at \$194,831. Nine companies reported the data.

Boeing Airplane Co. engineering employees at Seattle have named the Seattle Professional Engineers' Assn., an independent organization, as bargaining agent. The SPEA won in an election conducted by the National Labor Relations Board, by a vote of 1574 out of a total of 2196 eligibles.

"Target: Peace," a motion picture on the Consolidated Vultee B-36 bomber, is being shown on television and in movie theaters throughout the country. Under State Department sponsorship, the film, produced by Convair in cooperation with USAF, will be shown in 23 foreign countries.

FINANCIAL

Boeing Airplane Co. reported net earnings of \$1,117,826 for the third quarter ended Sept. 30, bringing total net earnings for the first nine months of 1949 to \$1,780,175. Unfilled orders as of Sept. 30 totaled \$302,488,787. Company declared a dividend of \$1 payable Nov. 24 to stockholders of record Nov. 8.

Chicago & Southern Air Lines reports a \$509,286 net profit for the first nine months of 1949, against \$449,427 profit in the same period 1948. About \$389,000 of the 1949 profit was earned on the company's domestic routes and \$120,000 on its international operations extending to Caracas, Venezuela.

Northwest Airlines reported a system-wide net profit of \$1,984,104 in the first nine months of 1949, against a \$2,120,251 net loss for the same period last year.

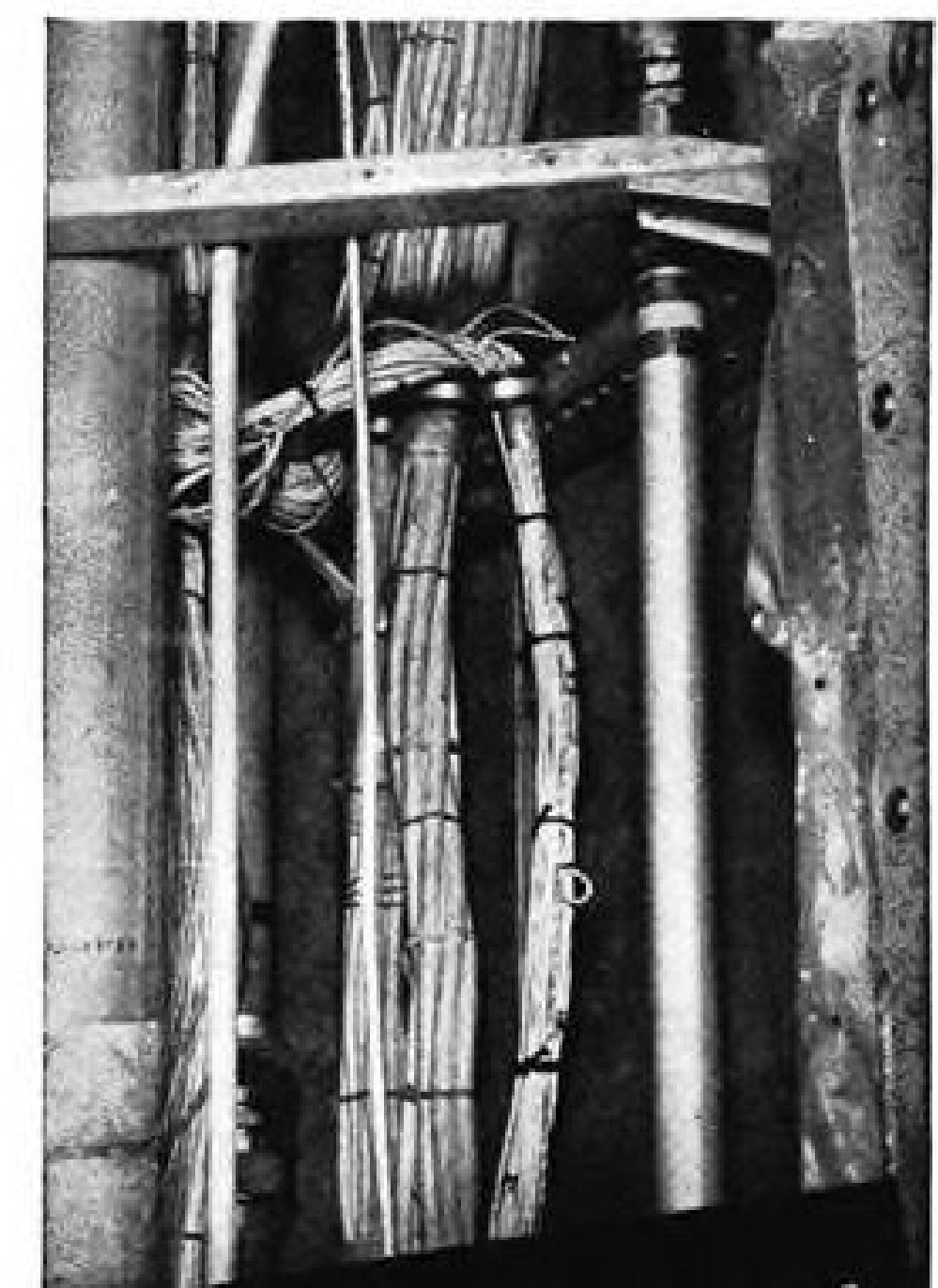
General Electric Co. consolidated earnings for the first nine months of this year make available net earnings for dividends of \$67,612,879, or 19 percent less than the \$83,893,459 earned in the same period last year. Net sales billed during first nine months of this year totaled \$1,190,372,404, a gain of 5 percent over the total billed in the same period last year.

INTERNATIONAL

Cierva Air Horse, British three-rotor helicopter, lifted a record 17,600 lb. in load trials recently.

Australian aircraft operating on international routes flew 4 million miles last year without an accident, according to the Civil Aviation Department.

DELTA BESTON Aircraft Wire



makes the most of
installation space
IS BUILT TO BEAT THE HEAT

Notice the compactness and accessibility of this wiring installation. Aircraft wiring systems such as this demand a wire of small diameter and a sheath that resists abrasion, plus the ability to withstand high temperatures. That's why General Electric Delta-Beston® aircraft wires and cables are used on so many modern airliners.

The famous heat-beating Delta-Beston line includes wires and cables designed for power, lighting, and communication systems, and for instrument wiring. All are constructed to withstand abrasion; to resist intense heat, fumes, and oil; and to be flame and moisture retarding. These lightweight, extra-flexible wires include resin-insulated constructions and the famous silicone-impregnated types.

If you'd like to know more about G-E Deltabeston aircraft wires and cables, or would like help in the selection of the correct heat-beating wire for your specific application, your request will bring a prompt reply. Just write to Section Y35-1092, Construction Materials Department, General Electric Company, Bridgeport 2, Conn.

GENERAL ELECTRIC

Changes

Capt. Leroy C. Simpler, formerly in Navy public relations in Washington, is now on duty with the Atlantic Fleet. Navy spokesmen termed the transfer "routine." . . . Kaiser Engineers, Inc. has changed its corporate name to Kaiser Industries, Inc. The engineering and construction division will continue to do business as Kaiser Engineers, a division of Kaiser Industries, Inc., Kaiser Bldg., 1924 Broadway, Oakland 4, Calif. . . . Bruce H. Atwater, formerly general manager of the Oakland division of Pacific Airmotive Corp., has been transferred to the firm's Linden, N. J. division as general manager. Raymond E. Vail replaces Atwater at Oakland.

Lear Inc. has added Fernand Belanger to its staff as servo engineer and Frederick W. Herr as gyro engineer . . . W. J. Jakimiuk has resigned as chief designer of the de Havilland Aircraft Co. of Canada.

Appointments

Robert T. Kenney has been named director of public relations of the Airplane division of Fairchild Engine and Airplane Corp., effective Nov. 1. He succeeds Warren R. Smith who recently became corporation director of public relations. . . . B. A. Bannan has been appointed general manager of Western Gear Works. He is currently vice president. . . . E. B. Newell, general manager of General Motors Corp.'s Allison division, has been named by GM's board of directors to the corporation's administration committee.

Promotions

Walter J. Herbut has been promoted to the post of chief tool designer of Auto-Diesel Piston Ring Co., Cleveland, Ohio. Herbut has been with the firm for 15 years. . . . Charles E. McCuan, formerly Mid-Continent sales manager for Saval, Inc., has become sales manager for all Saval aircraft products. . . . Roy C. Menzel has been named secretary-treasurer of General Metals Corp.

Education

R. W. McCloy and M. Z. Krzywoblocki have been advanced from associate professors to professors in the University of Illinois' department of aeronautical engineering, according to Professor H. S. Stillwell, department head.

Awards and Honors

Paul A. Azinger and Alex F. Mannella became the first men ever to complete 25 years of service with the Hamilton Standard division of the United Aircraft Corp. . . . Frank T. Tucker, director of advertising of the B. F. Goodrich Co., recently celebrated his 30th anniversary with the company. . . . George H. Rihl, a director of Compania Mexicana de Aviacion, Pan American World Airways affiliate, has been awarded the Emilio Carranza Medal by Mexico for outstanding service in aviation.

INDUSTRY OBSERVER

► It may be news to Adm. Arthur Radford, but the U.S. Air Force has only 103 B-36 bombers delivered or on order. Main point of Radford's criticism of USAF B-36 procurement was that it was all right to order 100 B-36 bombers but that orders for an additional 70 were unwise and involved "putting all our eggs in one basket." Latest figures on the B-36 show that of the 170 now on order 103 are bombers and 67 are RB-36E strategic reconnaissance photo-planes. The YB-36 is also being converted to an RB-36E. USAF plans to buy additional 51 B-36D bombers in fiscal 1950. There has been no criticism of the RB-36E and Radford indicated that the Navy might also be interested in using it for photo-reconnaissance.

► Watch for more fireworks between Naval airmen and the "black shoe" surface Navy over the role of aviation in anti-submarine warfare which is now the Navy's primary mission. More than 500 anti-submarine warfare planes were slashed from the Navy's fiscal 1950 budget before it ever left the Navy Department. Another Navy-imposed cut in aviation research and development funds will seriously hamper development of a highly specialized ASW type plane. Current Navy thinking limits Naval aviation to hunting subs with surface vessels making the kill.

► Naval aviation may not have to absorb \$203 million of the Navy's latest \$353 million fiscal 1950 budget cut. Top Navy officials indicated that Naval aviation procurement was the only place they could make another major cut for fiscal 1950. But Defense Secretary Louis Johnson indicated he does not believe Naval aviation should take such a large percentage of the total Navy cut. He told the House Armed Services Committee he will have to be convinced that the Navy cannot economize elsewhere.

► Aeronca Aircraft Corp. took a look at the West Coast Aero Commander, another twin-engine executive transport prototype about the time Piper Aircraft started warming up to the Baumann Brigadier. But while Piper decided to get into that field Aeronca decided production of the Aero Commander was too involved for the returns to be expected.

► Piper Aircraft Corp. is flying its Sky Sedan four-placer again and studying plans to revamp the all-metal low-wing job into a five-placer for the single-engine feederline market. The 165-HP. Sedan prototype was shelved back in 1947 when the bottom dropped out of the personal plane market.

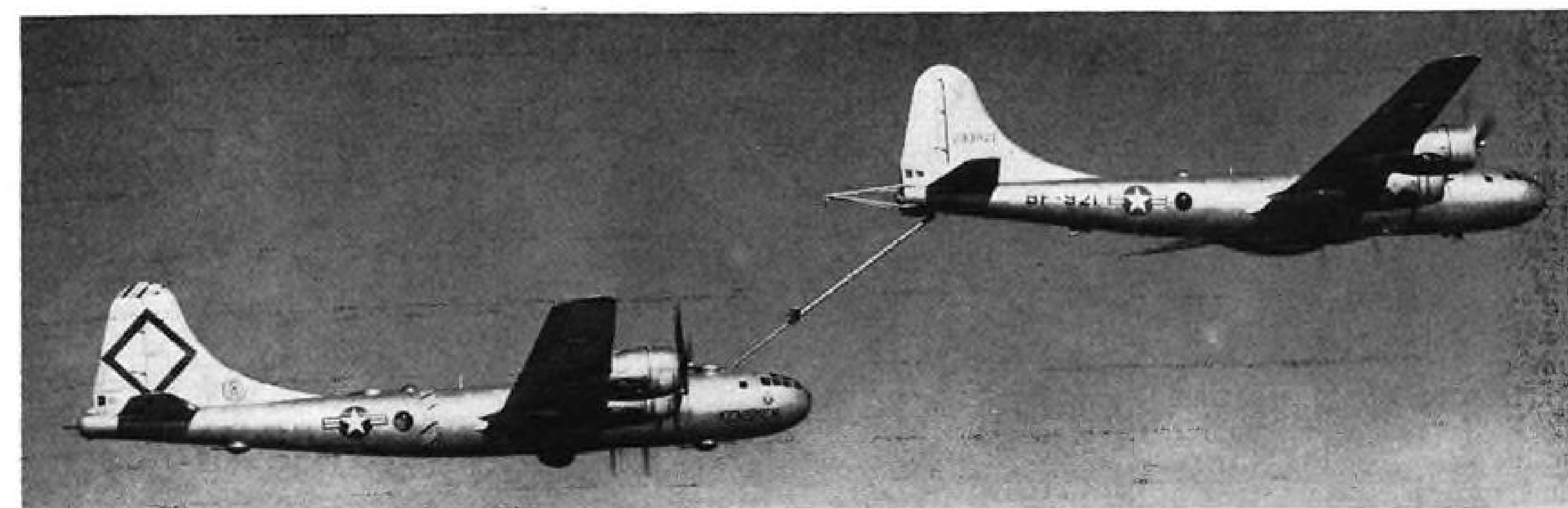
► Handley Page Ltd. has been awarded a British Ministry of Supply contract to develop a new RAF training plane with side-by-side seating. The HPR-2 will be a low-wing monoplane powered by an Armstrong Siddeley Chettah 17 engine delivering 420 hp. at takeoff.

► Australia's Commonwealth Aircraft Corp. is tentatively planning to produce the English Electric Co. Canberra twin-jet bomber and the Hawker P1040 straight-wing jet fighter. CAC is also working on design of a new twin-jet fighter.

► General Electric has modified its J-47 turbojet engine to improve its bad-weather characteristics. An experimental model, now under test, includes hollow passages in the inlet guide vanes, fairings and forward frame struts through which hot air, bled from the compressor casing, is pumped. GE plans installation of the new design on production models at an early date.

► First Northrop RB-35B, jet version of the original propeller-driven Flying Wing bomber, is scheduled for initial flight test this week. The bomber is powered by six Allison J-35 turbojet engines of 5000-lb. thrust each. This increased thrust makes possible a reduction in engines from the eight 4000-lb. units used in the YB-49 bomber. Bench tests on the Northrop Turbodyne, 10,000-hp. turbo-prop engine, await completion before installation in one of the modified B-35s. All of the 10 B-35 planes to be modified will be used for power plant development work only and no production of the type is contemplated.

► The Russians have done it again—this time a perfect copy of the wartime Waco CG-15A. Known as the Ing. P. V. Tsybin glider, the Russian "ringers" were towed in a stick of six across the Kremlin during the recent Moscow air day. Aeroflot reportedly uses such aerial glider trains for cargo tow by its Ilyushin IL-12 transports.



BOEING B-50, with fueling socket above nose, flies below and behind B-29 tanker, and within reach of fueling tube. Operator in . . .



TANKER steers tube to socket in receiver plane and the transfer of fuel can begin.

New Uses for Air Refueling

'Flying boom' system cuts contact time, ups flow rate and offers hope of adding to jet transport range.

By Alexander McSurely

Significance of the new high-volume in-flight refueling system announced by Boeing Airplane Co. is more far-reaching than the purpose for which it was initially developed—to give U. S. bombers added range.

Transport applications of the Boeing system, both commercial and military, offer to extend the range of present-day

passenger and cargo planes probably a third beyond present takeoff limitations. And they promise important new assistance in making longer-range jet transports possible.

► **Dozen a Day**—Boeing engineers indicate that the main limitation on the use of refueling for commercial transport will be the economic obstacle of the cost of maintaining a tanker airplane in operation. If the refueling can

be used on possibly as many as a dozen planes a day at a single station, the tanker's operation can pay off in two ways:

- The plane can takeoff with a small fuel load and larger-than-normal passenger and/or cargo load, and then top off its fuel load after it gains altitude.

- It can rendezvous with a tanker at a half-way point on a very long range non-stop flight, for a second gassing.

► **Advantages**—Three main advantages are claimed for the new Boeing system over previous flexible hose refueling methods:

- Greater fueling flow volume makes refueling time shorter.

- Greater ease of establishing contact cuts total time still further.

- System has been tested at low temperatures and works well.

The new system (first sketched in AVIATION WEEK, Aug. 15) uses a telescoping tube which may be one of several diameters (2 in., 4 in. or larger). The tube is extended from the tail of the tanker down to make a connection in a socket at the top of the nose of the receiving plane which flies behind and slightly below the tanker.

► **Smoother Flying**—This position was finally selected by Boeing for the receiver after studies showed that other positions, above and to either side of the tanker could also be used. It was determined that the low position of the receiver permitted smoother flying with less turbulence from the slipstream of the tanker's propellers.

The fueling boom is fastened close to the tail and extends almost straight back for landings and takeoffs. One end of the boom however can be lowered by controls until it reaches contact point with the receiver.

► **Control Trick**—Trick of controlling the free-swinging end of the boom is accomplished through small airfoils attached to the boom. These, known to Boeing as "ruddevators," are manipulated by an operator in the tail of the tanker. He literally "flies" the free-swinging end of the boom up or down or to either side until he makes contact with the receiver socket.

Experienced operators reportedly become so proficient in this odd variety of flying that they can establish contact with the receiver very quickly, in considerably less than five minutes after the planes get into position.

► **Year's Tests**—A B-29 bomber converted as a tanker is being used in the experimental flights which have been going on for over a year. Receiver plane is a B-50 bomber. In addition to its large fuel capacity and control station for the boom operator, the tanker is equipped with a special pressure pumping system, so that relative positions of the bomber and tanker do not greatly affect rate of flow, which is very comparable to that from large ground refueling tank trucks.

While only one team of planes is now flying, other tankers and receivers are currently being modified for this system. Modification of the receiver plane can be accomplished with minor changes at relatively low cost, another factor pointing toward feasibility of early use of the refueling system for transports as well as military planes.

► **World Flight**—Most spectacular recent use of a refueling system was the nonstop round-the-world flight of Boeing B-50A "Lucky Lady" last February. This plane made the 23,452-mi. circuit with a total fuel consumption of more than 56,000 gal. by refueling in the air four times.

System used was the basic flight refueling system. Tanker and receiver planes make contact in this system by means of a line trailed from the receiver which is grappled by another line shot from the tanker. The receiver plane then hauls in the line and the fueling hose attached to it. Connection is made from the tail of the tanker to a socket at the tail of the receiver plane.

► **Radar Beacon**—The receiver plane carries a radar beacon unit which permits the tanker to "home" on the receiver if making contact in periods of restricted visibility. Fuel flow under this system amounts to approximately 120 gpm. Hose used is 2-in. diameter.

In developing the flying boom arrangement, Boeing went into an elaborate temperature testing program. It also built a mockup of the working parts of the bomber nose section and tanker tail section. These were mounted on scaffolds at the Boeing plant, so fuel transfer was tested in various positions.



VINSON AND JOHNSON: No verbal fireworks but a lot of sputtering.

Johnson's Air Decisions Upheld

Navy's major criticisms get 'no score' as super-carrier cancellation order is endorsed by Chairman Carl Vinson.

An unexpected note of amity marked the end of the House Armed Services Committee investigation into national defense policies.

The committee adjourned until Jan. 3 when it will begin consideration of a report on its conclusions drawn from three months of sifting charges by a group of dissident Naval personnel of political influence, improper procurement methods and unsound strategic planning in the National Defense Department.

Preliminary check of committee sentiment indicated:

- **Strong endorsement** of the principles of unification and the Joint Chiefs of Staff strategy and procedures.
- **Approval of the Air Force's B-36** intercontinental bomber as the best weapon now available for its job.
- **Clean bill of health** for USAF procurement policies and related procedures.
- **Possibly mild criticism** of Defense Secretary Louis Johnson's Pentagon regime.

There was no indication that the Navy had scored with a majority of committeemen on any of its major criticisms.

Highlights of the final session included:

- **Revelation of a \$13 billion dollar** defense budget ceiling already set by the Budget Bureau for fiscal 1951. This contrasts with the \$15.3 billion defense

budget recently approved by Congress for fiscal 1950. Aircraft procurement in the tentative fiscal 1951 budget is set at \$1.8 billion (\$1.2 billion for USAF and \$.6 billion for the Navy) compared with the peacetime record \$2.7 billion voted by Congress for fiscal 1950.

• **Sinking of the super-carrier issue.** Committee Chairman Carl Vinson (D. Ga.) re-affirmed his endorsement last April of Johnson's order cancelling the \$189 million USS United States project that would have provided a 65,000-ton flush-deck aircraft carrier to be used as the prototype for a fleet of six super-carriers.

• **Public dissipation** of the highly-advertised feud between Vinson and Johnson over defense budget policies. Vinson indicated his approval of Johnson's current fiscal policies and Johnson assured the House committee it would be asked to sit in on all major Defense Department budget planning conferences.

• **Strong attack** on the dissident admirals by Gen. Omar Bradley, now the non-voting Chairman of the Joint Chiefs of Staff.

In his crucial appearance before the House committee, Johnson was bolstered by testimony from former President Herbert Hoover and Gen. George Marshall, former Secretary of State and wartime Army Chief of Staff.

► **Just Like Cavalry**—Hoover told the committee that there must be civilian



HOOVER: Same trouble with the cavalry.

control over the military and the Secretary of Defense must be the final authority on defense matters with ultimate approval from the people. He pointed out that he had experienced a similar inter-service wrangling during his administration when the cavalry was abolished in favor of tanks.

Gen. Marshall said that the real wrangling between the services was always over the defense budget and that anybody who attempted to resolve these conflicts was bound to be unpopular. Marshall said there should be some method for an annual public report of the Joint Chiefs of Staff on the military requirements of the country without any relation to their budgetary needs so the people would have some standard for judging how much of those needs they were willing to support with appropriations.

Johnson, as usual, answered his critics bluntly—in a 35-page statement. He frequently departed from the prepared text to make his points and was often interrupted by Vinson and Rep. Dewey Short (R., Mo.) for verbal jousts that threatened to produce the fireworks anticipated by a packed gallery of military brass and civilians. But the fuses always sputtered out in a shower of mutual compliments before reaching explosive territory.

► **"Navy Misleads"** — Johnson also charged that the Navy had given the committee misleading statements regarding future war plans in the event of an emergency.

Johnson stated, "A strawman was built by those who would have you believe we expect to win any war by push-button tactics and atomic blitz. To the extent that an attempt was made by some witnesses to have this committee believe that our war plans contemplate such a sudden victory, I submit that the committee was misinformed by those



BRADLEY: Navy's mission not land targets.

witnesses. I do not know of any competent military man, who thinks we would be able to win a quick and easy victory."

Johnson made it clear that he and not the Joint Chiefs of Staff decide military policy. The JCS does not make decisions by a majority vote but only submits recommendations for final decision by the Secretary of Defense and the President, Johnson told the committee.

► **Johnson Leads**—Clarifying his position on the fiscal 1950 budget, Johnson said he is now engaged in cutting that budget so that the three services will fit into the \$13-billion ceiling imposed for fiscal 1951. He said that this was distinct from the billion dollars in savings he proposed to make in the fiscal 1951 budget.

He said that \$598 million of these savings, as distinguished from reductions, had already been earmarked for the fiscal 1951 budget through elimination of overhead, consolidations, and dropping non-essential services.

Johnson refused to commit himself on whether the defense establishment would spend the extra \$800 million voted by Congress for the USAF in fiscal 1950.

► **Pitch for Funds**—Vinson interrupted Johnson to state that he would make a strong case to President Truman not to withhold the additional money voted by Congress for the Air Force, and expressed confidence that the President would not ignore the 305 to 1 vote of the House on that subject. Johnson offered to present Vinson's views to the President if Vinson was unable to do so personally.

Gen. Bradley bluntly warned the Navy that it had a different role in any future war against a land power than that of its island-hopping days in the Pacific. He emphasized that Naval

aviation had a definite role in anti-submarine operations and even against land targets in an early phase of a future war.

Bradley stated, "Because of this I have agreed that there be maintained a carrier task force whose planes now possess the capability of penetrating 700 miles inland," Bradley said. "However, I believe that except for purely Naval operations, the use of carrier forces against land targets is limited. They would be used temporarily to reinforce Air Force units in hard-pressed areas or in situations requiring employment of air forces for a limited period only."

► **B-36 Endorsed**—Bradley told the committee that Navy presentations to JCS for expanding carrier aviation were not based on requirements for action against a Russian fleet or submarines, but to attack land targets and oppose enemy aviation in limited areas for a limited time.

This, Bradley said is not the Navy's primary mission.

Bradley endorsed the USAF B-36 intercontinental bomber as the best choice for its job and added:

"Along with many others, I believe that the atomic bomb, which has been derided, and the USAF Strategic Air Command which has been denounced, have contributed to the avoidance of war during the last couple of years. This combination has been, in my opinion, one of the greatest deterrents to aggression both here and in Europe."

Now American Goes Skycoach

Cut-rate coach service showed every indication of becoming a permanent and highly-important factor in scheduled air transportation this month as American Airlines, the largest domestic carrier, announced plans for starting transcontinental flights with 70-passenger DC-4s at 4½ cents a mile.

If the Civil Aeronautics Board approves, AA's low-fare operation between New York, Chicago and Los Angeles will begin Dec. 27 with one roundtrip daily. Next spring, American intends to replace the high-density DC-4s with 70-passenger DC-6s.

► **Higher Than Average**—The 4½ cents-a-mile fare scale proposed by American represents a half-cent increase over conventional coach rates. AA would charge \$110 between New York and Los Angeles. Principal nonscheduled carriers on the same run charge \$99—and some \$88 or less. Northwest Airlines' four-cents-a-mile New York-Seattle coach tariff is \$97.

Between New York and Chicago, American's \$35 coach fare would compare with \$29.60 for tourist-type serv-

ices operated by Capital Airlines and TWA.

► **Nonskeds Threatened**—If American's cut-rate fare is approved, it will have a tremendous impact on nonscheduled operators, which have found the New York-Los Angeles run to be their most profitable operation. Even with but one flight daily and a fare of \$110 against \$99 or less for the nonskeds, AA could put a sizable dent in the uncertificated carriers' business.

When Western Air Lines of California started competitive coach service on the San Francisco-Los Angeles run last August, nonsked load factors on the link slumped from between 70 and 90 percent to well under 50 percent. One uncertificated line was forced to stop its intra-California operations because of heavy losses only three weeks after WAL California began cut-rate service.

► **UAL Too?**—A further threat to nonskeds on the transcontinental run is the possibility that American's coach service may force United Air Lines to begin similar operations. UAL president W. A. Patterson has repeatedly expressed fear that too much air coach would completely demoralize the existing rate structure. But he has also called air coach "a worthwhile experiment . . . one we are watching and may go into."

TWA already operates coach service from New York to Chicago and Kansas City to Los Angeles.

American had been studying the economic practicability of air coach even before Capital Airlines became the first certificated domestic carrier to adopt the low-cost service last November. President C. R. Smith still believes the airlines can't afford to lower fares indiscriminately. But he says AA studies have shown that converted 70-passenger planes can earn as much revenue at coach rates as 50-passenger DC-6s at the regular fare.



LATEST GLOSTER METEOR

Flight view of the Gloster Meteor VIII showing the elongated nose housing extra fuel tanks and the re-designed tail aimed at providing greater stability at higher Mach numbers. The Meteor VIII is powered by

Italy Makes Deal For British Jets

(McGraw-Hill World News)

MILAN—The rearmament programs to be carried out in connection with the Atlantic Pact will have important results in boosting the Italian aircraft industry, according to Minister for Defense Piaciardi. Six months ago Italian military quarters in favor of getting jet aircraft from the U.S. had succeeded in securing a majority over those who were in favor of an agreement with British de Havilland enterprises. The Italian government now believes that the best system of securing jet aircraft for the Italian Air Force is through cooperation between the British and Italian aircraft industries.

► **Vampires Chosen**—According to the latest program worked out by the Italian Ministry of Defense, Italy should purchase 50 Vampires from Great Britain, using a portion of the Italian credits in pounds still blocked in London, together with the license to build such aircraft in Italy. The 50 Vampires are to be delivered by March, 1950.

Fiat will build Vampires in their Aeronautica d'Italia Works in Turin and will distribute the orders between the Aeronautica Macchi of Varese, the Breda Aircraft Works of Sesto San Giovanni, and Caproni of Taliedo.

The Goblin jet engines are to be built by Fiat and Alfa Romeo. Two hundred fifty jet aircraft are to be built in Italy as a first part of orders resulting from Anglo-Italian aircraft cooperation. However, it was emphasized by the General Secretary of the Assn. of the Milan Industries that de Havilland is not precluded from using Italian shops to execute orders for foreign countries as well.

In addition to this arrangement, it

two Derwent Mark V turbojets of 3600 lb. static thrust each. Meteor VIII and de Havilland Venom will be the latest standard Royal Air Force fighters placed in quantity production.



HIGH SPEED FACE SHIELD

Northrop X-4 test pilot Charles Tucker designed this face shield attachment to protect the pilot's face and prevent the helmet from being torn off in an ejection-seat bailout at high altitude and velocity. Oxygen mask is built in, with the tube leading through the bib. Face shield is hinged to the helmet and may be removed if desired. Actual use of the helmet in flights await blast tube tests.

has been confirmed that ten Breda BZ-208 civil transports have been ordered by Argentine government for use on Argentine trans-Atlantic lines.

Copter Rules Changes Questioned

Some helicopter industry opposition to a proposed revision of Civil Air Regulations, Part 6, Rotorcraft Airworthiness, has been disclosed to AVIATION WEEK, following circulation of the proposed new draft for comment. Additional comment is expected after a meeting of the Helicopter Council in Washington next week, and after more thorough analysis of the draft revision by helicopter company and Aircraft Industry Assn. technical staffs.

The revision seeks to establish two categories of rotorcraft: transport and normal. Transport would be used in passenger transportation for hire into and over populated areas, while normal category would be for personal aircraft and industrial aircraft uses. Main differences proposed are with respect to fire protection and emergency exits. However allowance is made for other differing requirements in performance, instruments, etc.

First industry reaction is that the division into two categories will not be

helpful to the struggling infant helicopter industry. It is felt that in the early stages, and until more helicopters are in use, many operators will want to use the same machines for both types of operations, and without artificial barriers preventing such dual use.

John M. Chamberlain, director of the CAB Bureau of Safety Regulations has asked that industry comments on the draft release be addressed to his office, Washington 25, D. C.

Comments will be considered in making a final draft of the revision and if sufficient controversial comments are received a joint industry-government hearing will be conducted for further study of the issues.

PAA Local Hit

The international executive board of CIO Transport Workers Union has upheld charges against ten Pan American Airways Local 504 board members.

Michael J. Quill, international president of the TWU, charged the local leaders with "conspiring to bring about destruction of the international union," aided by persons "whose loyalty is to an organization or group antagonistic to the interests of the membership of our union and of our American democracy."

Quill's charges were acted upon by the union, which seized the local's records, funds and property, in action similar to its move taken last July against Pan American Airways Local 500 in Miami.

Trans-Australia Plans Early Jetliner Debut

(McGraw-Hill World News)

MELBOURNE—Trans-Australia Airlines expects to put its first Avro C-102 Jetliner in service by November, 1950.

The craft, which will cost about \$562,000 in Canadian dollars, will be operated purely as a freighter during its trial period. The move confirms an earlier prediction by Edgar H. Atkin, chief designer of A. V. Roe Canada Ltd., that the turbojet transport probably would make its debut on the short-haul inter-city routes of Australia (AVIATION WEEK, Oct. 10).

► **Ideal Test Conditions**—Atkin cited good weather, relatively simple route structures and traffic conditions in Australia as reasons why that country and Canada offer the best areas for working out economic and operational problems of the aircraft.

If a sufficient market for the Jetliner materializes in Commonwealth countries, the craft may be built in Avro's factory in England. Such a move would make payment possible in sterling instead of dollars, a great advantage to prospective purchasers located in the sterling area.



AJ-1 Navy Bomber

First flight view of production North American AJ-1 Navy bomber in smart blue paint job and equipped with wingtip tanks. Tanks mount vertical fins (in contrast to horizontal fins used on F-84 and F-86 installations) to force tanks clear upon release. Wing and fin tip fold up (below) to reduce dimensions to carrier hangar deck stowage requirements. Note jet air intake atop fuselage featuring flush design. AJ-1 is powered by two Pratt & Whitney R-2800 Double Wasp engines of 2200 hp. each plus an Allison J-35 turbojet engine in the lower rear fuselage. Huge 30-ton craft has top speed of 422 mph. and a 1200-mile radius-of-action.





FAIREY 17 carrier-based two-placer, with Double-Mamba, shows design similarity to . . .



BLACKBURN Y.A.5 built to same specification. Note steep dihedral of Y.A.5's stabilizer.

RAF Tests New Anti-Sub Planes

Fairey 17 is powered by Double-Mamba turboprop; R-R Griffon-engined Blackburn is slated for turboprop.

(McGraw-Hill World News)

By Frederick R. Brewster

LONDON—The turboprop is getting the nod for two more of Britain's latest combat planes.

Partially released from the secret list are the two-place Fairey 17 and Blackburn Y.A.5—both designed to meet the same requirements as anti-sub and bomber aircraft operating from carriers. Long range and speed are top requirements for combatting submarines, and the craft are designed to pinpoint the location of undersea craft with a pattern of sono-buoys so that surface-vessel "killer" groups can find and destroy the quarry.

For this dual requirement, the turboprop offers the most economical solution.

Both of the new planes have long bomb-bays, which means that in addition to being able to accommodate a large load of buoys and depth charges, they could, on occasion, carry a torpedo instead.

While no performance estimates for the new naval aircraft have been disclosed or even suggested, probable top

speed for both will be well over 450 mph.

► **Fairey 17**—The Fairey 17, developed by Fairey Aviation Co., Hayes, Middlesex, is the first aircraft to be fitted with the Armstrong Siddeley Double Mamba engine. This power unit is essentially two Mamba 2 axial-flow engines side-by-side, delivering 2540 shp. plus 770 lb. net thrust for full power at takeoff. Combat power is said to be 3500 shp. plus 280 lb. thrust.

For long-range cruising, however, one of the two units can be shut down and the plane can cruise on the other. Similarly, should one of the two engines be put out of action by enemy fire, the plane could still operate using the other.

The two gas-turbine units drive contra-rotating props. The pitch of each is controlled independently of the other.

The Fairey 17 has a gull wing with no sweep-back; tricycle gear with twin-tired nosewheel (the first on a British Navy airplane); and jet exhausts located on each side of the fuselage just aft the wing trailing edge.

► **Blackburn Y.A.5**—The Blackburn Y.A.5, built by the Blackburn division of the recently-merged Blackburn & General Aircraft Co., at Brough, East Yorkshire, is temporarily fitted with a liquid-cooled Rolls-Royce Griffon piston engine. The Y.A.5 (like the Fairey 17) has been designed for a turbo-prop engine and it will be installed later. This will probably also be the Double Mamba.

The Griffon engine now in the Y.A.5 is a more powerful development of the Merlin, delivering 2450 hp. at takeoff, driving a contra-rotating prop.

Structurally, this plane is somewhat slimmer than the Fairey; the gull-break in the straight wing is far more pronounced; there is a marked dihedral in the high-set stabilizer. The fin is rather small.

Exhaust outlets on both sides of the fuselage, at the wing's mid-chord, could be adapted without much change for the gas-turbine jets. The Y.A.5 has a single nosewheel undercarriage.

One-Runway Policy Reviewed by CAA

In light of sharp criticism from airport managers on the new CAA policy on one-runway airports, Administrator Del Rentzel announced he was taking another look at the policy, to see if it needed "clarification."

The criticism was voiced at an airport management conference at Norman, Okla., where two members of the CAA Airports Advisory Committee, Louis Inwood, Kansas City aviation director, and Walter Betsworth, Waterloo, Iowa, airport manager, led the complaints.

Just a week before, the committee had recommended that CAA continue constructing multiple-direction runways until there is proof of the practical value of devices such as the castered landing gear (AVIATION WEEK, Oct. 17).

No opposition was voiced at Norman against the one-runway limitation for Class I airports, and Rentzel indicated this limitation would stand.

The objections involved the ruling for larger than Class I fields. Essentially the ruling said that federal funds for construction of more than one runway at larger fields would be made available only when high traffic volume required it for non-intersecting runways that are either parallel or diverging. Any exemptions to this requirement must be recommended by CAA regional administrator.

Inwood said the new policy sets aviation back 25 years and reduces the safety factor. It was charged that a small Washington group was lobbying for the quick policy change in the face of airports leaders' opposition.

PRODUCTION

WAA Acts on War Plane Plants

Fairchild divisions buy L. I. plants they have been using.
Government agency lists available aircraft factories.

Four divisions of Fairchild Engine & Airplane Corp. have purchased from War Assets Administration and its successor agency, General Services Agency, the plants and land which they have been occupying at Farmingdale, Long Island, for \$1,125,000.

Meanwhile GSA and United Aircraft Corp. are trying to sell another big East Coast aircraft plant, the former Chance Vought factory at Stratford, Conn.

► **Fairchild Purchase**—The Fairchild transaction includes 7½ acres of land, buildings containing 318,716 sq. ft. of floor space, and machinery, equipment, furniture and fixtures. Divisions making the purchase are:

- **Ranger Engines division**, currently making components of the General Electric J-47 jet engine under sub-contract, doing research and development work for USAF, producing power units for Navy guided missiles, and making spare parts for an auxiliary engine and some airframe parts.

- **Al-Fin division** which utilizes the Al-Fin process of molecular bonding of aluminum to steel, in a variety of applications where heat transfer is essential such as diesel engine pistons, timing gears, bearings, housings, dynamic brakes, brake drums, etc.

- **Stratos Corp.** a wholly owned Fairchild subsidiary which develops and manufactures mechanical superchargers and turbines, mainly for use on military aircraft.

- **Pilotless Planes division** which is developing guided missiles.

Fairchild began negotiations for the purchase of the plant and facilities in May, 1947 after they had been declared surplus, and the offer was accepted last March 6. Fairchild President Richard Boutelle announced last week that the purchase had been authorized by the board of directors of the company.

► **Former Vought Factory**—Bids for the former Chance Vought facility are being accepted by the General Services Agency at Washington, until Nov. 21, date for public bid opening. The plant's 43 buildings and 53-acre site are being sold as a unit. Buyer however may operate it as a single plant or lease buildings separately for small business enterprises.

The Chance Vought factory has been idle since its former occupant moved to the big government-owned plant at Grand Prairie, Tex., which had been occupied by North American Aviation in World War II.

► **Other Plane Plants Opened**—Three other aircraft plants listed as surplus but not yet sold are:

- Former General Motors factory at Tonawanda, N. Y.

- Former Fairchild plant at Jamestown, N. Y.

- Former Columbia Aircraft Corp. facility at Valley Stream, Long Island.

Douglas Income Zooms

Douglas Aircraft Co. net income for the first three quarters of 1949 has more than doubled that for the comparable period in 1948, President Donald W. Douglas reported last week.

Earnings for the first three quarters of 1949 were \$5,152,966, or \$8.59 per share of stock outstanding, as compared to net of \$1,950,795 for the same period in 1948.

Sales and net income for the third quarter were up sharply due to accumulation of AD attack-bomber deliveries to the U. S. Navy and to heavy military spares shipments ordered in February for the Berlin Airlift. Third quarter net income amounted to \$2,176,623 and third quarter sales were recorded as \$35,870,630.

Combined first and second quarter earnings were \$2,976,343. Second quarter sales were \$26,254,446 and first quarter sales were \$25,868,484.

Douglas backlog on Aug. 31 amounted to \$223 million, an increase of approximately \$23 million over the backlog of May 31. Increase resulted mainly from seven airlines' re-orders for 12 DC-6 four-engine transports. Deliveries scheduled through the remainder of this year and all of 1950 will bring total DC-6 production to 161, Douglas said.

► **Biggest Share Military**—Military contracts continued to account for major proportion of the company's backlog in a ratio of 94.3 military to 5.7 of commercial business.

Net worth of the company increased from \$121.82 per share at Nov. 30,

1948 to \$124.19 per share on Aug. 31, 1949, the highest figure in the company's history.

Total of \$5,152,966 net income reported was after provision of \$4,220,000 for federal income taxes and profit limitation and also after writing off research and development costs of \$2,922,556.

Working capital on Aug. 31 was \$59 million including cash items of over \$35 million. Ratio of current assets amounting to \$82 million to current liabilities of over \$23 million was in excess of 3.55 to 1. Company employment figure currently stands at 18,773, Douglas reported.

PRODUCTION BRIEFING

► **Weber Aircraft division** of Weber Showcase & Fixture Co., Inc., Huntington Park, Calif. has received prime contracts from USAF for a long range specification pilot seat and for a new 20G crew seat and has started engineering and testing on the projects. Weber also has received a production order for pilot and copilot seats for Consolidated Vultee B-36 bombers and a production order from Lockheed for 20 complete ship sets of passenger seats for new Constellations ordered by TWA.

► **Piper Aircraft Corp.** upped Clipper production to four planes daily to meet increased demand. Previous schedule called for output of 2 planes daily.

► **Piasecki Helicopter Corp.** expects to start assembly on its first production HUP Navy all-metal helicopter in January, in hangars 1 and 2 at Philadelphia International Airport. Some personnel and equipment will move from Morton for the job. Detail parts and sub-assemblies will be made at Morton, with final assembly and delivery from Philadelphia.

► **Firestone Tire & Rubber Co.** is making inflated rubber igloos, large enough to cover a 10-room house, to house USAF ground radar installations. The igloo is made from 2000 yd. of rubber-coated glass fabric which folds into a 1600 lb. package small enough to be carried by a small truck. Weatherproof fabric anchors into an aluminum ring on the ground, with entrance to the igloo through an underground passage with special airlock compartments.

► **Sikorsky Aircraft Division** of United Aircraft Corp. is now in mass production on all-metal rotor blades for main and tail rotors of the S-51, the smaller S-52, the H-5H and other military and experimental rotorcraft. The metal blades had been under development for six years prior to adoption for all Sikorsky helicopters.

Latest USAF, Navy Bid Awards

Air Materiel Command Procurement Division makes available to AVIATION WEEK the latest bid awards, shown on this page. Requests for further information should be addressed to Contracting Officer, AMC, Wright-Patterson AFB, Dayton, Ohio, attention: MCPSPSXB72.

ABSTRACTS

For filter and receptacle (49-1490):
Companies sharing: United Transformer Co., New York, N. Y., on a bid of \$8,300, and Kann-Ellert Electronics, Inc., Baltimore, Md., on a bid of \$97.50.

For books and periodicals (50-83):
W. E. Falk, Cincinnati, O., on a bid of \$100,000.

For chemicals (50-114):
Companies sharing: Conray Products Co., New York, N. Y., on a bid of \$2,124, and Standard Products Co., Philadelphia, Pa., on a bid of \$7,042.75.

For 1126 gun chargers (50-1):
Jerome Engineering, Inc., Worcester, Mass., on a bid of \$17,374.40.

For gasket and packing (50-50):
Companies sharing: Air Associates, Inc., Teterboro, N. J., on a bid of \$35,252.62, and Parker Appliance Co., Cleveland, O., on a bid of \$388.80.

For 3,000 aircraft storage batteries (50-64):
Electric Storage Battery Co., Cleveland, O., on a bid of \$128,850.

For tester assembly (50-66):
Electric Sprayit Co., Sheboygan, Wisc., on a bid of \$2,598.75.

For stand assembly (50-82):
Greer Hydraulics, Inc., Brooklyn, N. Y., on a bid of \$6,650.

For 176 aircraft lifting bag (49-1607):
United States Rubber Co., Mishawaka, Ind., on a bid of \$75,152.

For hose assembly (49-2158):
Companies sharing: John H. Graham & Co., New York, N. Y., on a bid of \$293.08; Binks Mfg. Co., Chicago, Ill., on a bid of \$1,741.05; H. K. Porter, Inc., Somerville, Mass., on a bid of \$1,183; Black Mfg. Co., Parkton, Md., on a bid of \$192.40; Ace Drill Corp., Detroit, Mich., on a bid of \$3,584.48, and Avildsen Tools & Machines, Inc., Chicago, Ill., on a bid of \$324.45.

For portable engine hoist (49-1158):
Jumbo Steel Products Co., Azusa, Calif., on a bid of \$439,897.59.

For stand assembly engine (49-1486):
Jumbo Steel Products Co., Azusa, Calif., on a bid of \$179,900.

For fuel booster pump (49-1164):
Thompson Products, Inc., Cleveland, O., on a bid of \$132,300.

For aircraft starter (50-54):
Jack & Heintz Precision Industries Inc., Cleveland, O., on a bid of \$98,000.

For compressors (50-60):
Davey Compressor Co., Kent, O., on a bid of \$39,400.

For aircraft test stands (50-81):
Greer Hydraulics, Inc., Brooklyn, N. Y., on a bid of \$44,900.

Navy Bid Invitations

The following bid invitations have been announced by the Navy Dept. Aviation Supply Office at Philadelphia. Bid forms may be obtained from the Aviation Supply Office, Oxford Ave. and Martin's Mill Road, Philadelphia. Specifications are not furnished unless requested by number.

Top & bottom fuselage light assemblies, 270 ea., spec. AN-L-12a, dwg. AN3177; invitation No. 8783; bids due Nov. 15.

Flying helmet assemblies, 200 ea., type H-1, spec. att.; invitation No. 8796; bids due Nov. 7.

Pneumatic life rafts, type D, droppable, 185 ea. Mark 2,590 Mark 4,830 Mark 7, NavAer spec. M-3s; invitation No. K9038; bids due Nov. 10.

Maintenance spare parts, 2000 ea. bomb racks, MK51, Mod 12, dwg. BUO-571474; invitation No. 8847; bids due Nov. 15.

Indicators, 414 ea. dual oil pressure indicators, stock no. R88-I-1925; 40 ea. fuel & oil pressure indicators; 30 oil pressure, RR-I-1929-50; 148 fuel pressure, R88-I-1931; 102 oil pressure, R88-I-1935-25; 224 oil pressure, 1935-30; 72 ea. fuel pressure transmitters, R88-T-2035; 1010 ea. oil pressure ditto, 2651-100; 277 fuel pressure ditto, 2651-110; 178 oil pressure ditto, 2651-115; 79 ditto, 2651-120; 138 ditto, 2651-125; 3 sets tools & test equipment lists; 50 ea. pressure transmitters, 2651-105; spec. 88-I-10(Aer), dwg. 49A238SK, spec. 88-T-6(Aer), dwg. 49A237SK; invitation No. 8792; bids due Nov. 14.

Spark plugs, 2000 ea., for Homelite Auxiliary power unit, for PB4Y-2acft.; invitation No. 8887; bids due Nov. 22.

Oxygen regulators, 70 ea. Eclipse-Pioneer No. 2862-B1; 40 ea. 2863-B1; 90 ea. 2862-B1; 140 ea. 2863-B1, spec. M-740 (BuAer); invitation No. 8919; bids due Nov. 23.

Oxygen cylinders, 330 ea., non-shatterable, empty, cl. D, spec. AN-C-73b; invitation No. 8898; bids due Nov. 23.

Maintenance parts, type H-2, oxygen boil out cylinders, 7 items, bushings, springs, cable assemblies, bodies, cap assemblies, AF dwgs.; invitation No. 8862; bids due Nov. 14.

Rubber, 725 ft. syn. rubber bulk section, cl. II, gr. 60; 456 sheets syn. rubber, cl. II, gr. 80; 158 sheets elastomer, cl. I; 867 sheets cl. II, gr. 80; 1200 ft. strips, cl. II, gr. 60; 430 ft. fuel resistant tubing, cl. I, gr. 40, spec. 33-R-14(Aer); invitation No. 8920; bids due Nov. 23.

Hydraulic accumulators, 60 ea. 5 in., AD-2, AJ-1, P4M-1 acft., Pacific, Div. 405525; invitation No. 8770; bids due Nov. 11.

Potentiometers, 275 ea., comp. 3 sections, 2 watts, AN/ARC-5 equipment, Western; invitation No. 8915; bids due Nov. 22.

Tachometer indicators, 49 ea. stock no. R88-I-2385-100; 399 ea. R88-I-2385-100; 4 ea. ditto, spec. 88-I-8(Aer), dwg. SK-1074; bid invitation No. 8775; bids due Nov. 21.

Junction boxes, 2054 ea., radio & electrical conduit, NAF 1128-4; invitation No. 9007; bids due Nov. 25.

Control pulleys, anti-friction bearings, 225 ea., dwg. AN210-14A, spec. AN-P-60; invitation No. 9008; bids due Nov. 25.

Parachute harness assemblies, 180 ea. QFAC, nylon, NAF-602820-2; 1000 ea. rip cord assemblies, Navy type, chest, NAF 310990-1; invitation No. 9028; bids due Nov. 29.

Locking screw assemblies, 23,300 ea., Aircraft Radio 11020; invitation No. 9048; bids due Nov. 28.

Millimeters, 100 ea., DC, flush, Western Electric part nos.; invitation No. 8884; bids due Nov. 14.

Ammeters, 425 ea., RF, flush type, range 0-2 amps, 2 1/2 in. dia., Weston Electric; invitation No. 8908; bids due Nov. 22.

Aluminum & aluminum alloy sheets & plates, 7500 lb. sheets, AL-52, cl. a, 1/4 H; 1000 lb. plates, .250 x 48 x 144 in., spec. 47-A-11c; invitation No. 8961; bids due Nov. 25.

Aluminum alloy, 42,500 lb. plates, AL-61, cl. A; 52,500 lb. sheets, spec. 47-A-12b; invitation No. 8965; bids due Nov. 25.

Zinc rod, 5000 lb., type IV, round, .875 in. dia., spec. 47-Z-6c; invitation No. 8967; bids due Nov. 23.

Manganese bronze bar, 3000 lb., 1 1/4 in. dia., half-hard, round, cl. a, spec. 46-B-15e; invitation No. 8968; bids due Nov. 23.

Stainless steel bar, 2 sizes, 3500 lb., round, cl. 6, type A, Navy spec. 46-S-18e; invitation No. 8969; bids due Nov. 28.

Pressure sensitive masking tape, 7440 rolls, 60-yd. ea., 2 in. wide, type I, spec. UU-T-106; invitation No. 9004; bids due Nov. 28.

Services & materials to regain & place in first class condition 2 items zinc plates; invitation No. 8818; bids due Nov. 17.

Copper wire, 2500 lb., soft-solid, 99.9 percent pure, .0319 in. dia., Navy spec. 22-W-9b; invitation No. 8820; bids due Nov. 15.

Drafting machine, 24 ea., 30-in. arms, Bruning Co.; invitation No. 8821; bids due Nov. 15.

Wing nuts, 7 sizes, 12,000 ea. size, threaded, brass, NCTS, Parker-Kalon Corp.; invitation No. 8797; bids due Nov. 15.

Generator tachometers, 471 ea., AN 5547-2, spec. AN-G-34; invitation No. 8801; bids due Nov. 14.

Rayon cloth lining, 5500 yd., type I, cl. B, 40 1/2 in. wide, spec. JAN-C-368; invitation No. 8811; bids due Nov. 14.

Cellulose tape, 672 rolls, adhesive back, 3 in. wide; type TS, spec. 53-T-7; invitation No. 8814; bids due Nov. 10.

Vacuum gage testers, 10 ea., 0-30 in. graduations, Manning Maxwell & Moore 1332; invitation No. 9054; bids due Nov. 28.

Radial type hose clamps, 3 items, steel, detachable, spec. AN-C-140a, dwg. AN-737; invitation No. 9064; bids due Nov. 28.

Relays, 180 ea., single pole double throw, AN3324-1, spec. AN-R-20b; invitation No. 8870; bids due Nov. 17.

Manganese-bronze bar, 20,000 lb., round, 1-1/4 in. dia., cl. a, spec. 46-B-15e; invitation No. 8872; bids due Nov. 18.

Stainless steel bar, 500 lb., 1/2 in. dia., cl. 6, type A, round, Navy spec. 46-S-18e; invitation No. 8874; bids due Nov. 21.

Seamless aluminum pipe, 6 items, Navy spec. 44-T-19c, -30b; invitation No. 8875; bids due Nov. 21.

Dynamometers, 70 ea., input 28 volts at 2 amps, output 250 volts at .120 amps, Elcor as used in AN/ARW-19 equipment; invitation No. 8914; bids due Nov. 23.

Insulation items, 1000 yd. synthetic resin insulating sheets & plates, type EC, form S; 7000 ft. insulating sleeving, type A, clear; 20,000 ft. electrical insulation, form U, type A, white syn. resin; 60,000 ft. insulating sleeving, spec. JAN-I-631; invitation No. 8912; bids due Nov. 22.

Mica pigment, 60,000 lb., type II, Navy spec. 52-M-3a; invitation No. 8921; bids due Nov. 23.

Transparent plastic, 3 sizes, flame-resisting, gr. I, spec. AN-P-44a; invitation No. 8924; bids due Nov. 23.

Trichloromonofluoromethane, 12,000 lbs., (Freon 11), 200-lb. nonreturnable drums, East coast dest.; invitation No. 8929; bids due Nov. 23.

Aluminum alloy sheets, 150 ea., .04x36x96 in., perforated, cl. A, 1/4 H, spec. 47-A-11c; invitation No. 8933; bids due Nov. 22.

Transparent plastic, 767 ea., 0.30x20x50 in., spec. AN-P-84; invitation No. 8956; bids due Nov. 23.

Direct current relays, 216 ea., AN3352-1, spec. AN-R-20B; invitation No. 8772; bids due Nov. 14.

Screws, 48 items, machine, truss hd., headless set, alloy steel, specs. AN-S-52a, FF-S-91; invitation No. 8837; bids due Nov. 14.

Screws, 26 items, fillister hd., self-tapping; set, spec. FF-S-91, dwg. AN500; invitation No. 8838; bids due Nov. 14.

Steel, 775 lb. chrome molybdenum plate, cond. A; 365 lb. sheet steel cond. E-2; 50 lb. carbon sheet steel; 615 lb. chrome molybdenum plate; 1180 lb. corrosion resisting sheet steel, specs. AN-QQ-S-685, -772a; invitation No. 8841; bids due Nov. 17.

Screws, 50 items, fillister hd., machine, specs. FF-S-91, AN-S-52a; invitation No. 8843; bids due Nov. 16.

Seamless copper-nickel alloy tubing, 300 ft., 10.75 in. OD, annealed, spec. 44-T-40b; invitation No. 8846; bids due Nov. 16.

Bearings, 18 items, ball, single row, radial types, both rings same width; invitation No. 8927; bids due Nov. 23.

Ball bearings, 15 items, single row, radial types, loading & nonloading groove; invitation No. 8928; bids due Nov. 23.

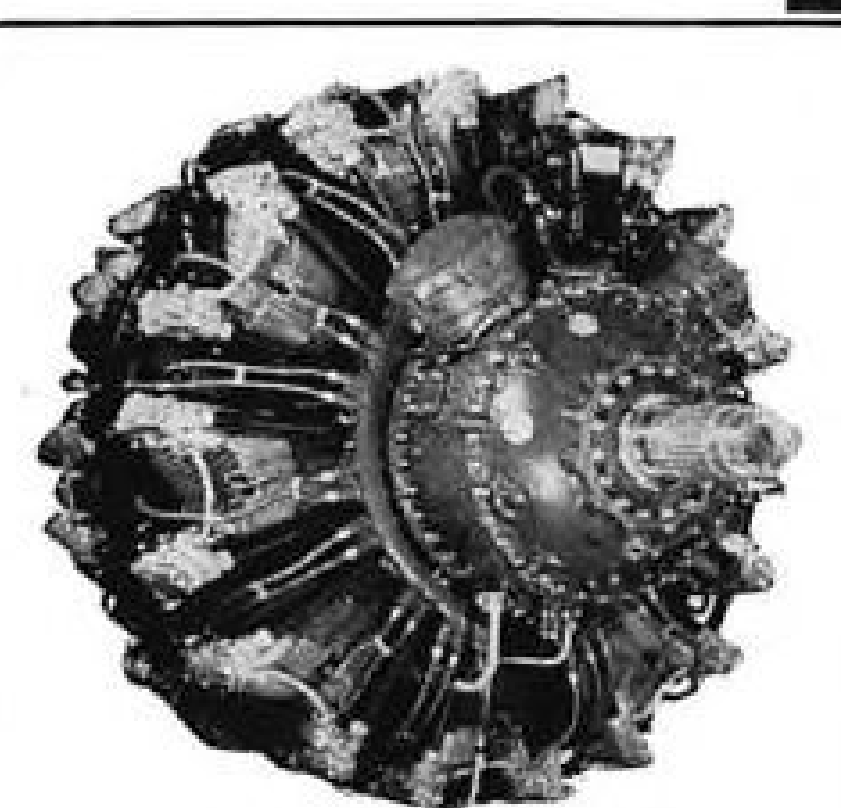
Test meters, 40 ea., type CRV-60058 cord, 2 conductor, 6 ft. long, 2 lb. weight; invitation No. 8954; bids due Nov. 25.

Cable, 2 items lighting & power, types DCOP & PCOP; also 95,000 ft. interior communication & fire control cable, type MHFF-7, Navy spec. 15-C-1j; invitation No. 9022; bids due Nov. 25.

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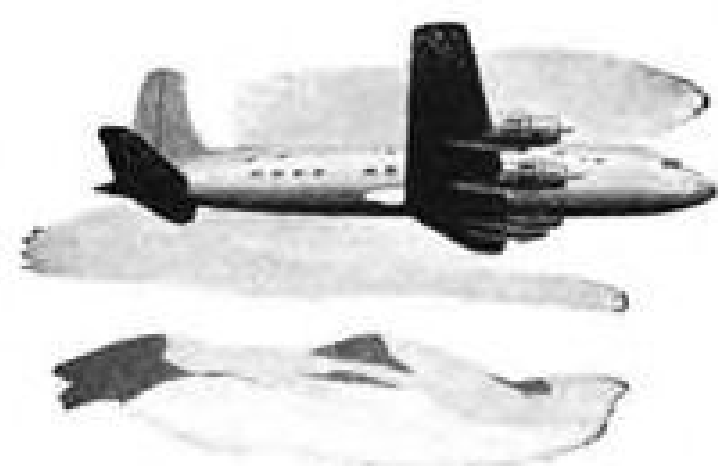
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Developing McDonnell Banshee

F2H, initially conceived as larger version of Phantom, emerged a completely new plane, with the greatest fuel load of any Naval jet.

By Robert McLarren

The ink was barely dry on the contract for quantity production of the McDonnell FH-1 Phantom, when an additional agreement was signed for construction of its successor—the larger XF2D-1 jet fighter.

Evolution of the FH-1 (AVIATION WEEK, June 21, 1948) into the XF2D-1, later designated XF2H-1, was straightforward. Increased performance required additional power and reduced drag. Increased combat effectiveness required additional fuel and added firepower. These, in essence, were the major factors in development of the Banshee.

► **Design Approach**—First step was selection, for the prototype, of the Westinghouse 24C (Navy J-34-WE) axial-flow jet engine, which had a design power output of twice that of the 19B used in the Phantom. The J-34-WE-22 produces 3000 lb. thrust at 12,500 rpm., and weighs 1168 lb., compared to only 809 lb. for the 19B.

This added weight, diameter and power obviously meant a larger airplane and the major design problems encountered with the Banshee have been the result of this size increase.

The original approach was a simple scale increase in the layout of the Phantom. While this served as a use-

ful first approximation, design had not proceeded very far before a wholly new craft emerged.

Except for retaining the FH-1's powerplant placement arrangement, the F2H Banshee fighter is a separate and independent aircraft design. But the many lessons learned from design, production and flight service of the Phantom have been incorporated.

► **Drag Reduction**—With the problem of added power solved, the next factor was drag reduction. McDonnell engineers chose a thinner profile for the wing and empennage, and fabrication techniques were employed that produced a skin much smoother than on the Phantom.

This reduction in drag has proved so effective that at 35,000 ft. the pilot can fly at the critical high speed with the throttles pulled back to the idling position. (Idling thrust is approximately 80-85 percent maximum thrust.)

One of the early problems in wing design is selection of the root section. The J-34-WE-22 engine is 24 in. in diameter, 120 in. long, and this cylinder had to be accommodated within the root section.

Since critical Mach number decreases rapidly with increasing wing thickness, the only feasible way to plan this thickened wing root was to increase its chord as much as practicable. The wing root

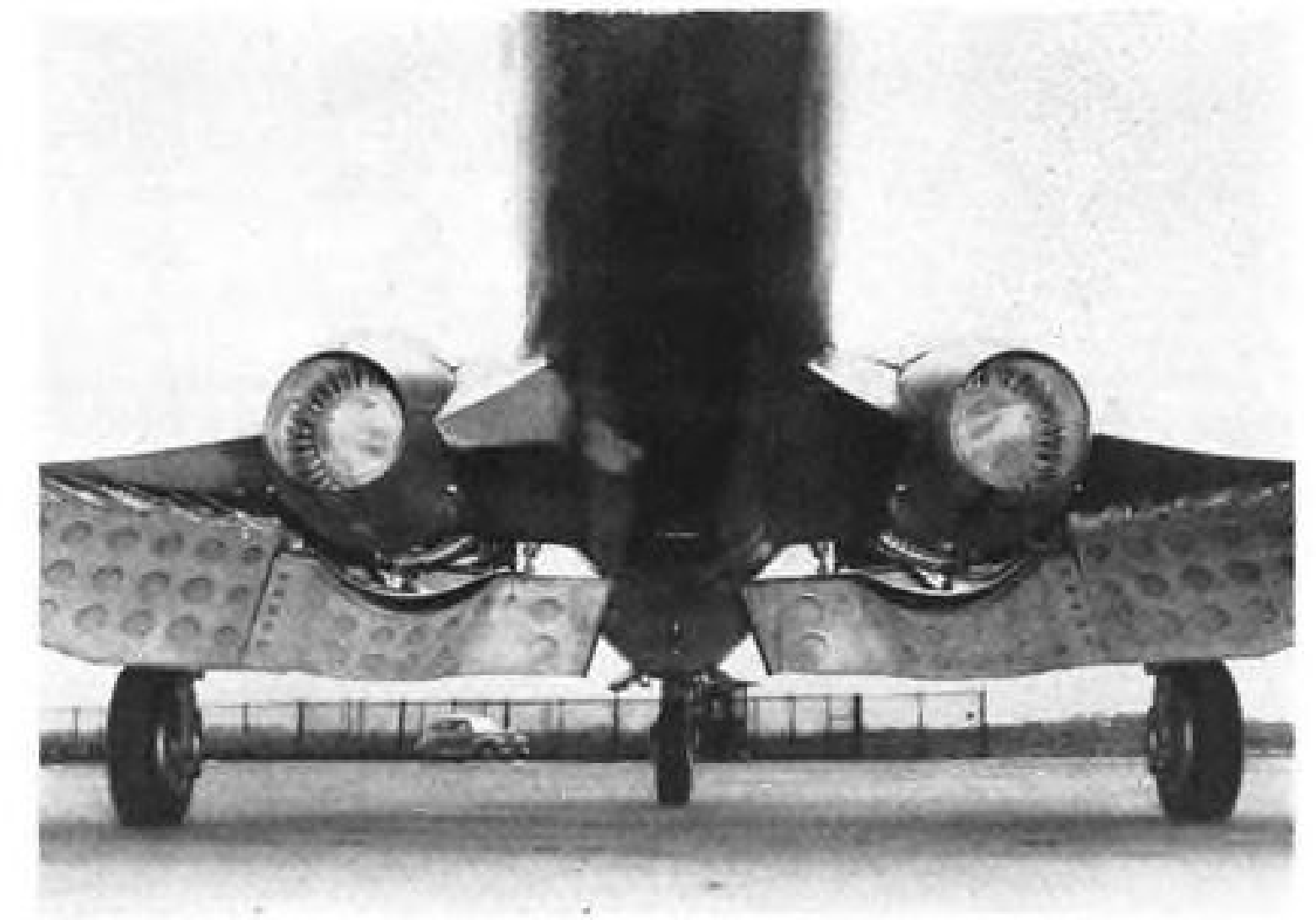
of the Banshee is about 18 ft. long and has sharply tapered leading and trailing edges. This long chord produces a root section that, despite its numerical height, has a thickness ratio of substantially less than 20 percent. Use of a high inlet-velocity ratio intake in the wing leading edge at the root actually provides a reduction in drag over the basic section. Thus, the critical Mach number of the wing root section is actually higher than the super-thin outer panels.

► **Airfoil Selection**—An NACA 65-212 airfoil using a uniform-load mean line was chosen for the wing root at the wing fold. This section has its maximum ordinate at 50 percent of the chord, a design lift coefficient of 0.2 and is 12 percent thick. While the laminar-flow profile has a low value of minimum drag coefficient of about 0.004, this low drag is obtained at a penalty in range of lift coefficients over which it may be obtained. This value is less than 0.1 above and below design lift coefficient, indicating that the craft's drag increases sharply at low speeds, such as takeoff and landing, overload gross weight, etc.

The outer panel tapers to an NACA 63-209 profile, also with a uniform-load mean line. This section is only nine percent thick, has a design lift coefficient of 0.2, but has its minimum



ACCESS DOORS on underside of wing aid in engine removal.



FLAPS under engines are formed to fit curves of fairing.



KNEELING GEAR on nosewheel simplifies problem of stowage on carrier deck.



ENGINES are supported in cut-outs in spars.

pressure point at 0.3 chord, instead of 0.5 chord as at the wing break. While engineering practice might have logically dictated a 63 section at the root and a 65 section at the tip, McDonnell engineers reversed this, apparently in order to "unload" the ailerons. (They followed this same practice in the FH-1 Phantom.) This combination produces a "sweep forward" effect which minimizes the dangers of spanwise flow, particularly in combination with the straight leading edge used.

In order to keep the height during folding down to within that of the Phantom, the wing fold line on the Banshee was placed at about 73 percent of the semispan. There also were important aerodynamic reasons for this shift: it "unloads" this folding portion of the wing; and since it is the low-drag portion of the wing, affords substantial drag gains. The outer panel being smaller relieves its bending moment, resulting in lighter structure. However, this original gain has been nullified largely by addition of tip tanks in the new F2H-2, forcing a structural "beef-up" of the outer panels.

► **Empennage Redesign**—Despite this excellent work in wing layout, McDonnell aerodynamicists ran into stability difficulties, particularly in the empennage. The prototype Banshee featured five degrees wing dihedral and three degrees stabilizer dihedral but flight tests early indicated instability with this arrangement, even though exceptionally generous dorsal fin area was provided.

A Navy design change specified additional fuselage fuel tankage requiring lengthening the fuselage 12 in. near the cabin. This added length plus stability troubles dictated an entirely new arrangement of dihedral angles and design of a new stabilizer. The production F2H-1 Banshee features only three degrees wing dihedral and one degree stabilizer dihedral. Stabilizer span was increased about one foot which, with a constant root, resulted in increased horizontal surface area. Portions of the dorsal fin area were removed by refairing of the lines.

► **F2H Features**—Further design features differentiating the Banshee from the Phantom are:

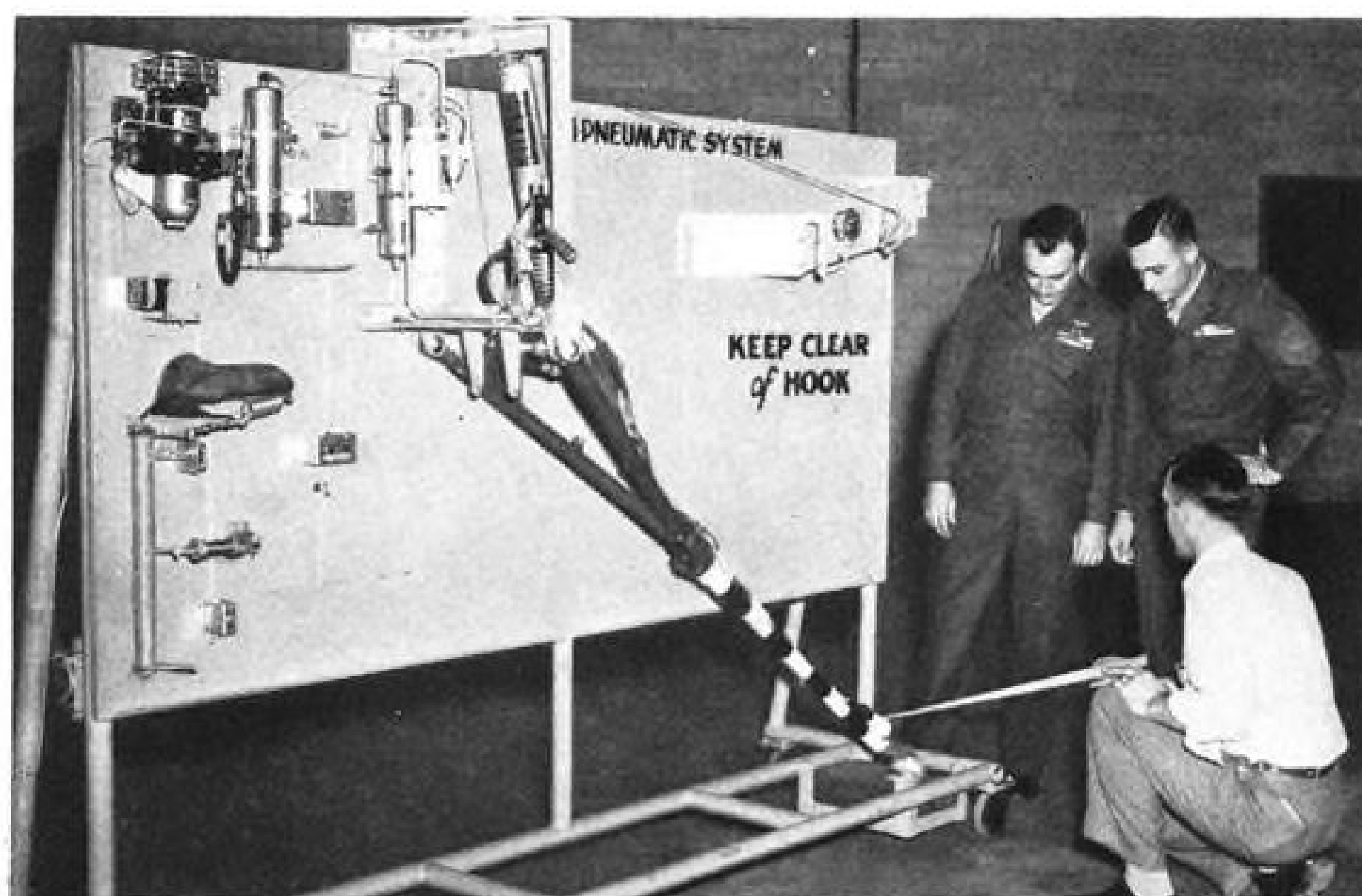
• **Revised wing folding hinge**, which

permits the wings to fold past the vertical and to touch above the fuselage.

- **Outboard instead of inboard** retracting main gear.
- **Armament location** in the lower instead of upper nose.
- **Increased fuselage tankage.**
- **Nose-kneeling equipment.**
- **Revised flap panel arrangement.**
- **Smoother skin surfaces.**
- **Thinner sections.**
- **Heavier armament.**

In addition, the F2H-1 is broken down into a greater number of assemblies for easier production.

► **Wing Structure**—Basic structural unit of the Banshee is the wing center section, continuous from fold-line to fold-line and is built-up of heavy forgings, heavily-stiffened webs and pressed-flanged ribs and intercostals. Engines are supported in a hollow cutout in the two main spars with removable tie-beams on their underside. Engines are removed by detaching access doors on the underside of the wing, then the tie-beams, and lowering the engine to a cradle. This system not only simplifies the amount of equipment necessary for



ARRESTING HOOK, indicated by pointer, is new type that is rotated hydraulically to disengage wires. Entire gear, however, is raised and lowered electrically.

McDonnell F2H-1 Banshee Basic Data

Two Westinghouse J-34-WE-30.....3150 lb. thrust

Span	41 ft. 6 in.
Length	39 ft. 11½ in.
Height	14 ft. 5½ in.
Span (wing folded)	18 ft. 4½ in.
Height (wing folded)	13 ft. 7½ in.
Wheel Tread	13 ft. 6 in.
Weight (empty)	8400 lb.
Weight (Max. gross)	14,000 lb.
Weight (max. overload)	17,000 lb.
Speed (max. sea level)	575 knots
Speed (max. critical altitude)	500 knots
Speed (40,000 ft.)	428 knots
Rate-of-climb (sea level)	9,000 fpm.
Time-to-climb (40,000 ft.)	7½ min.
Ceiling	56,000 ft.
Radius-of-action (20 min. combat)	600 mi.
Range (ferry)	2250 mi.

the job but preserves the critical upper surface of the center section. Outboard portion of the center section houses fuel tanks.

Outer wing panels are built up on a conventional two-spar box beam with separate leading and trailing edges. Ailerons are all-metal and carry trimming and balancing tabs. Electrically-operated dive brakes are mounted flush in the outer panel trailing edge just inboard of the ailerons. Flaps are in six segments; one in each outer panel, two in the outboard portion of the center section, and one under each engine formed to fit the compound curves of the lower wing surface and the engine fairing panels.

► **Landing Gear**—The landing gear is short and rugged. Nose wheel tire is 22 x 7.25-11.50 five-ply Nylon and carries 80 lb. of air. Main tires are 26 x 6.6 and are 12-ply Nylon. Bendix struts are used on all wheels. The nose wheel is mounted in a heavy forging with the axle supported aft of the strut axis to minimize shimmy. The nose gear may be retracted on the ground to permit the airplane to "kneel", simplifying the problem of compact stowage on the carrier hangar deck since the nose of one aircraft can be placed directly under the tail of another. Carrier deck arresting hook is mounted under the lower rear fuselage and is electrically operated. It is a new rotating "self-

freeing" type with the hook hydraulically operated from the cockpit, thereby freeing the arresting cable. This device is a long-sought solution to the problem on which many engineers would welcome additional details. Electrically retractable catapult and hold-back fittings are mounted in the wing lower surface.

► **Tail Surfaces**—All-metal rudder and elevators are statically balanced and carry trimming and balancing tabs. Elevator travel is free and fixed fairing on the rudder telescopes into elevator fairing.

► **Cockpit and Armament**—The F2H-1 cabin is pressurized, has air conditioning, a jettisonable canopy, and an ejection seat.

Also, A-N standard cockpit layout has been followed insofar as practicable. Flat panel windshield is used with curved side panels. Single blown canopy is electrically operated for fore-and-aft movement. Standard Navy fighter instrumentation, including radar controlled armament, is included. Armament consists of four .60 cal. machine guns mounted in the lower nose. This location introduces slight sighting complications but greatly simplifies gun servicing and the ejection of cases and links.

Like the Phantom, the Banshee is basically an all-electric airplane with wing folding, landing gear retraction, wing flap operation, deck arresting hook and catapult hooks being operated by electric motors. Only wheel brakes and hook-freeing mechanism are hydraulically operated.

Vacuum for gyro-operated instruments is obtained from the engine air system, and a pressure system for cabin conditioning is bled from the compressor.

► **Fuel Supply**—This is entirely automatic and contains approximately 1600 lb. of fuel.

Tanks empty automatically, require no attention from the pilot. Tip tanks on the F2H-2 add another 3000 lb. of fuel, giving the airplane the largest fuel capacity to be found in any Navy jet fighter.

The Banshee's two Westinghouse J-34-WE-30 turbojet engines in the production model develop 3150 lb. static thrust each at 14,000 rpm. Each engine is 120 in. long, 24 in. diameter and weighs 1200 lb. basic, although the complete installation with all accessory equipment weighs about 2000 lb. There are 11 stages axial compression, two turbine stages and an integral oil cooler. It recently completed the new A-N MIL-E-5009 qualification test of 150 hours, the first engine of any make or model to do so. This new type test requires 2½ times more military rating operation than the former test. It also

requires 6 times as many rapid accelerations from idling to full speed as earlier requirements.

► **Banshee History**—Contract for the design, construction and flight test of prototype XF2D-1 was awarded McDonnell Aircraft Corp. in March, 1945. Al Utsch was appointed Project Engineer and the design proceeded rapidly with the first flight made by McDonnell test pilot, Robert M. Edholm, Jan. 11, 1947 at Lambert-St. Louis airport where the company is located. A production contract was awarded for 56 airplanes in May, 1947.

R. M. Degen was appointed project engineer on the production airplane and the first craft rolled off the assembly line Aug. 13, 1948. Prior to delivery of the first production F2H-1, the Navy awarded McDonnell an additional contract in May, 1948 for 179 F2H-2 Banshee fighters. In May, 1949 the production F2H-1 completed its carrier qualification trials aboard the U.S.S. Franklin D. Roosevelt and was declared fit for combat service. Production on the original contract for 56 F2H-1 proceeded rapidly and the last airplane was delivered according to schedule in August, 1949.

First F2H-1 assignment was made in May, 1949 to Air Group 17 located at NAAS Cecil Field, Jacksonville, Fla. Two full squadrons are now in service. Banshees are also located at NAS Atlantic City, N. J. and NATC Patuxent River, Md.

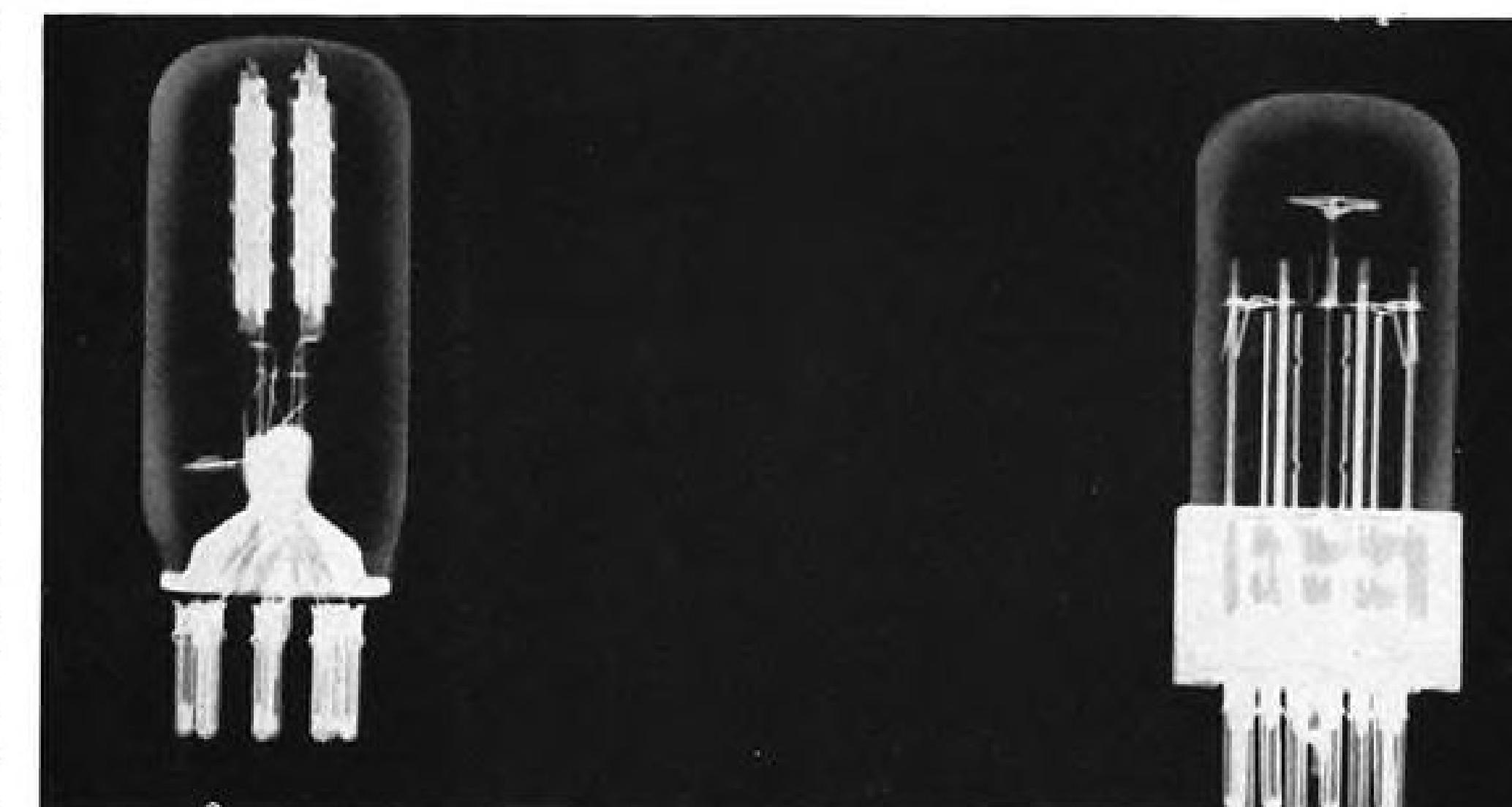
► **Banshees in the News**—Following a lengthy period of strict Navy security the Banshee recently has been revealed in several spectacular performances. Late in August, 1949 (while the B-36 investigation was going full blast in Washington) an F2H-1 Banshee climbed to 52,000 ft., the highest altitude officially reported for a U.S. jet fighter. Aerial pictures of Washington, D. C. were taken from an altitude of 48,846 ft.

The plane figured prominently in the 1949 National Air Races: four F2H's from Air Group 17 took off from the carrier U.S.S. Midway off New York City and covered 432 mi. to Cleveland Airport in the American Steel & Wire Navy Jet Race. Winning time of 47 min., 12.9 sec. was set by Lt. R. S. Laird, an average speed of 548.978 mph.

In another noteworthy performance, a Banshee fighter climbed to 40,000 ft. in 10 min. as a special Westinghouse-sponsored demonstration at the Races.

McDonnell Aircraft Corp. is currently working on a \$1 million Navy contract covering preliminary design, wind tunnel test and installation studies of the XF3H-1, on which no details have been revealed.

AVIONICS



Radiograph comparison of two Type 6SN7GT electron tubes. Narrow, regular unit is seen at left. "Ruggedized" version, right, exhibits heavy, rigid internal structural makeup.

Stronger Tubes for Harder Usage

"Ruggedization" program stresses test methods to aid in developing more durable electronic components.

Designers and manufacturers of avionic equipment will benefit from test and development data now being accumulated in a comprehensive electron tube "ruggedization" program at the National Bureau of Standards.

Because rugged tubes are essential for electronic devices subjected to severe conditions of vibration, shock or acceleration, test methods for determining sturdiness and durability are key factors in development of these units. These methods are now being studied and developed as one phase of the ruggedization program under the direction of I. L. Cherrick of the Bureau's electron tube laboratory.

► **Defects Influence Design**—Part of the project consists of a survey of the actual operating conditions for electron tubes in various commercial and military applications, to provide a practical basis for design of test equipment to simulate the hazards of actual use.

And in addition to test methods, the Bureau is developing new types of rugged tubes. Their design is based on an analysis of how ordinary tubes fail under test or in service. Thus, a detailed knowledge of operating conditions and tube failures is an important guide to the design of tubes that will be strong enough to operate properly under severe mechanical abuse.

Some tubes may have to withstand great extremes of temperature as well, but, in any case, mechanical design of a rugged tube is strictly governed by re-

quired electrical properties.

► **Equipment, Procedures**—The Bureau's facilities for testing tube ruggedness now include vibration apparatus, mechanical resonance testers, high-impact shock machines, and high-speed centrifuges.

Some tests are conducted with typical electrical potentials applied to the tube elements so that noise modulation, short circuits, and other effects can easily be studied. Destructive field conditions can be reproduced through proper choice of vibration, resonance, impact, and acceleration tests.

After receiving various ruggedness tests, tubes are examined for structural failures. X-rays sometimes are used to reveal the extent of structural changes without opening the tube envelope. Materials for some tube elements are examined spectroscopically to determine exact composition and impurities that might weaken the tube structure.

This determination of the real causes of tube failure is an important part of the program. Out of these studies will come recommended specifications for materials best suited for specific rugged conditions. In some cases new materials and new methods of fabrication must be developed to meet unusual requirements.

► **Mechanical Vibration Tests**—Vibrations produce the most common mechanical stress encountered by electron tubes under service conditions. Continuous and intermittent vibrations are

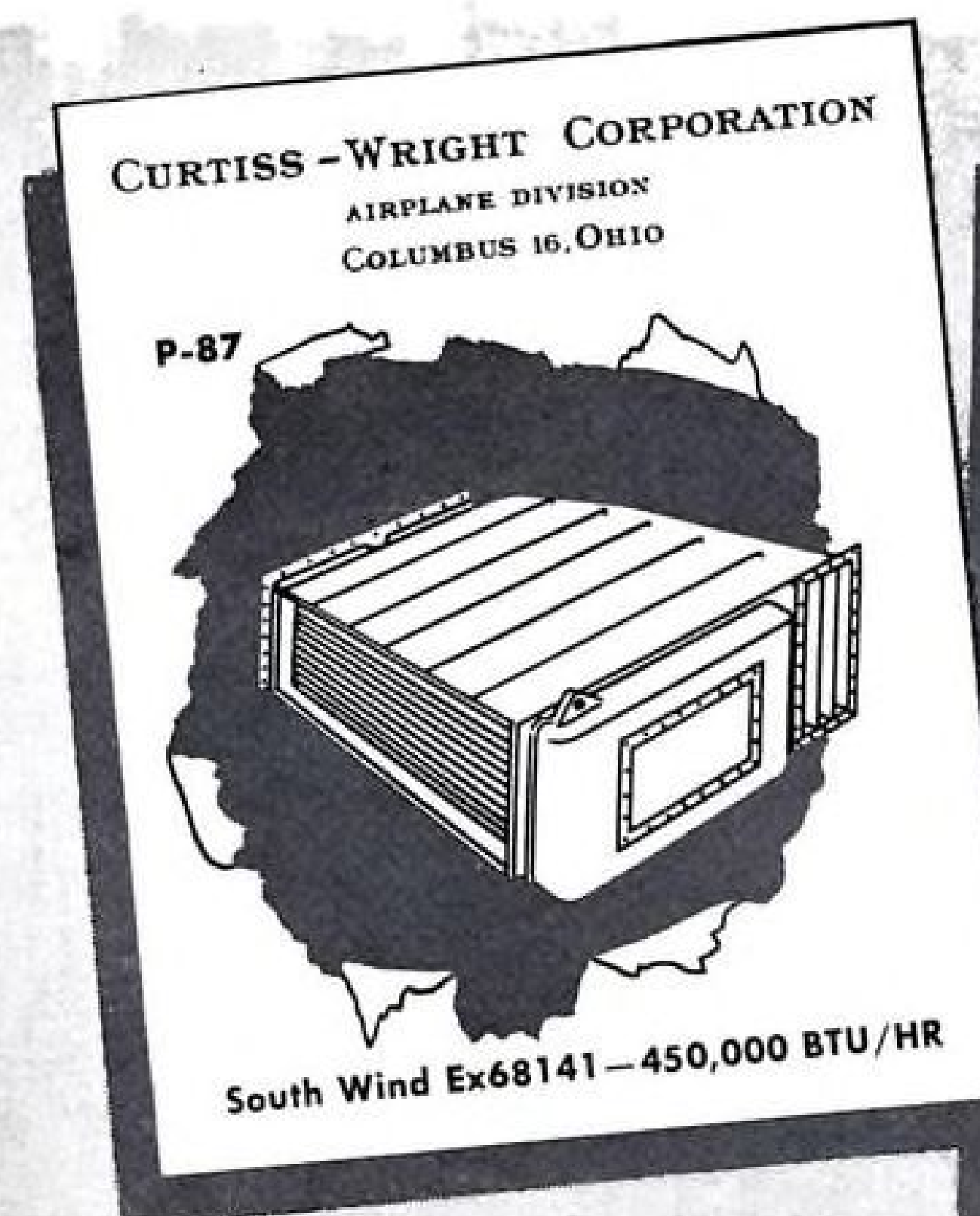
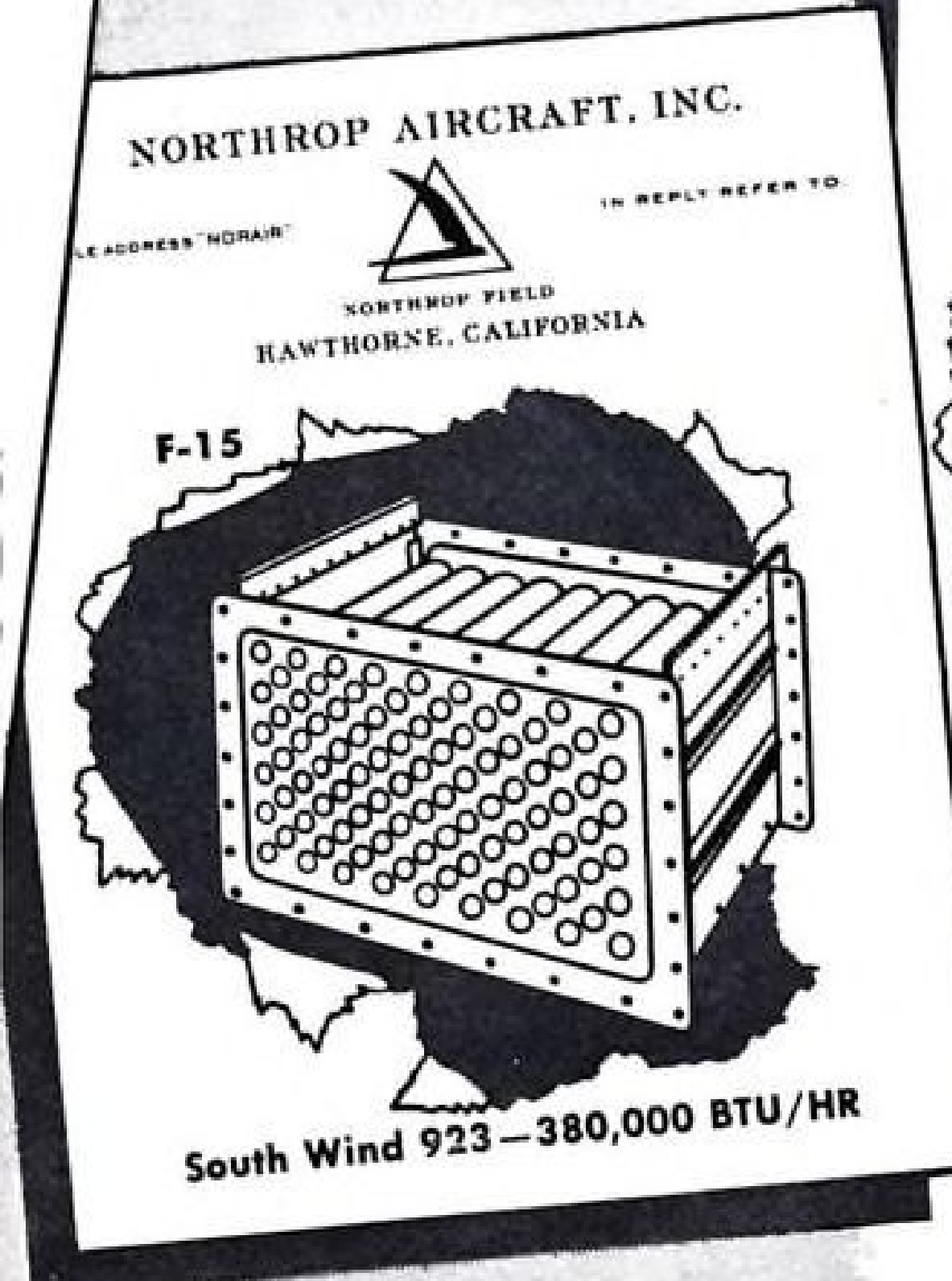
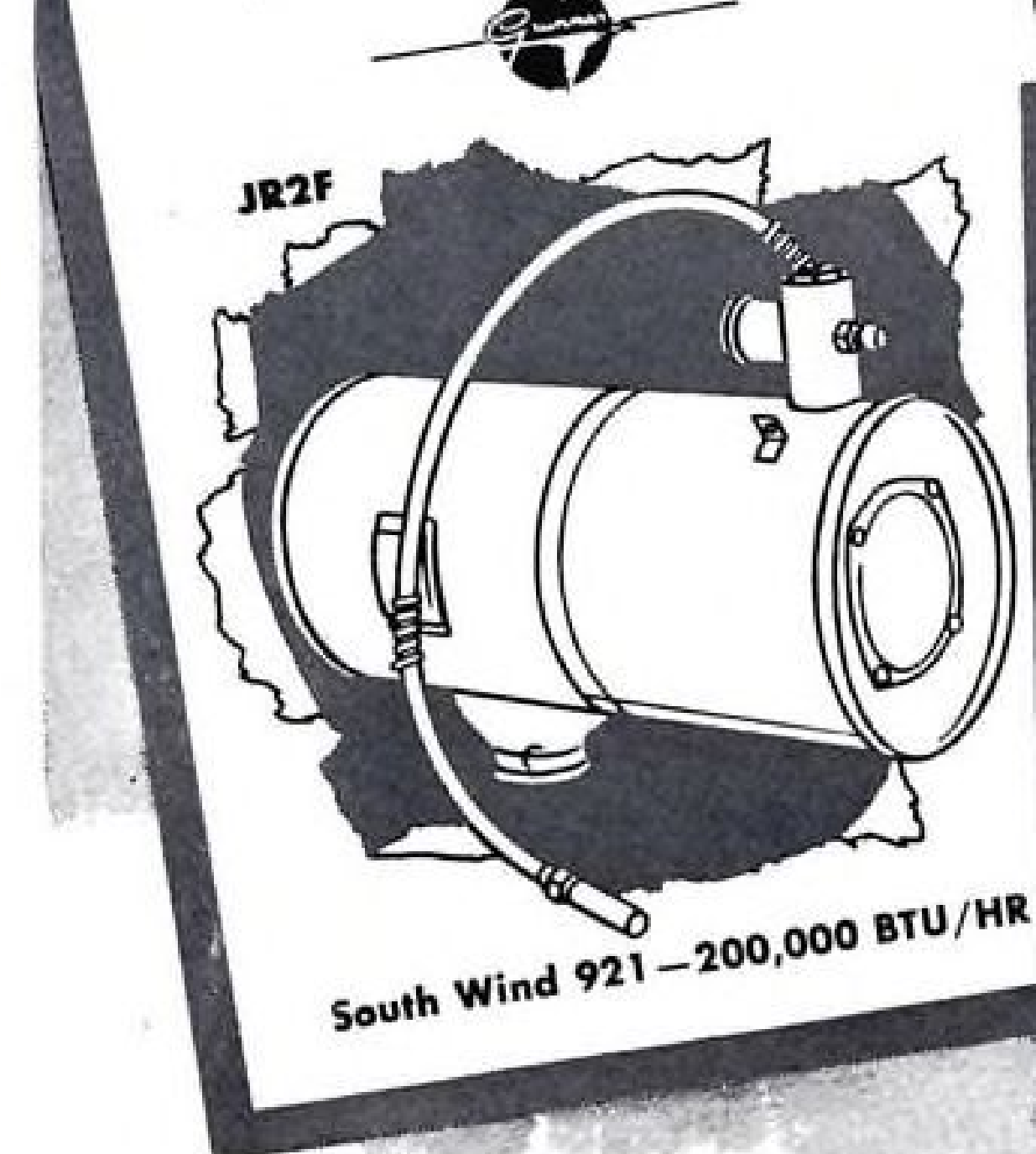
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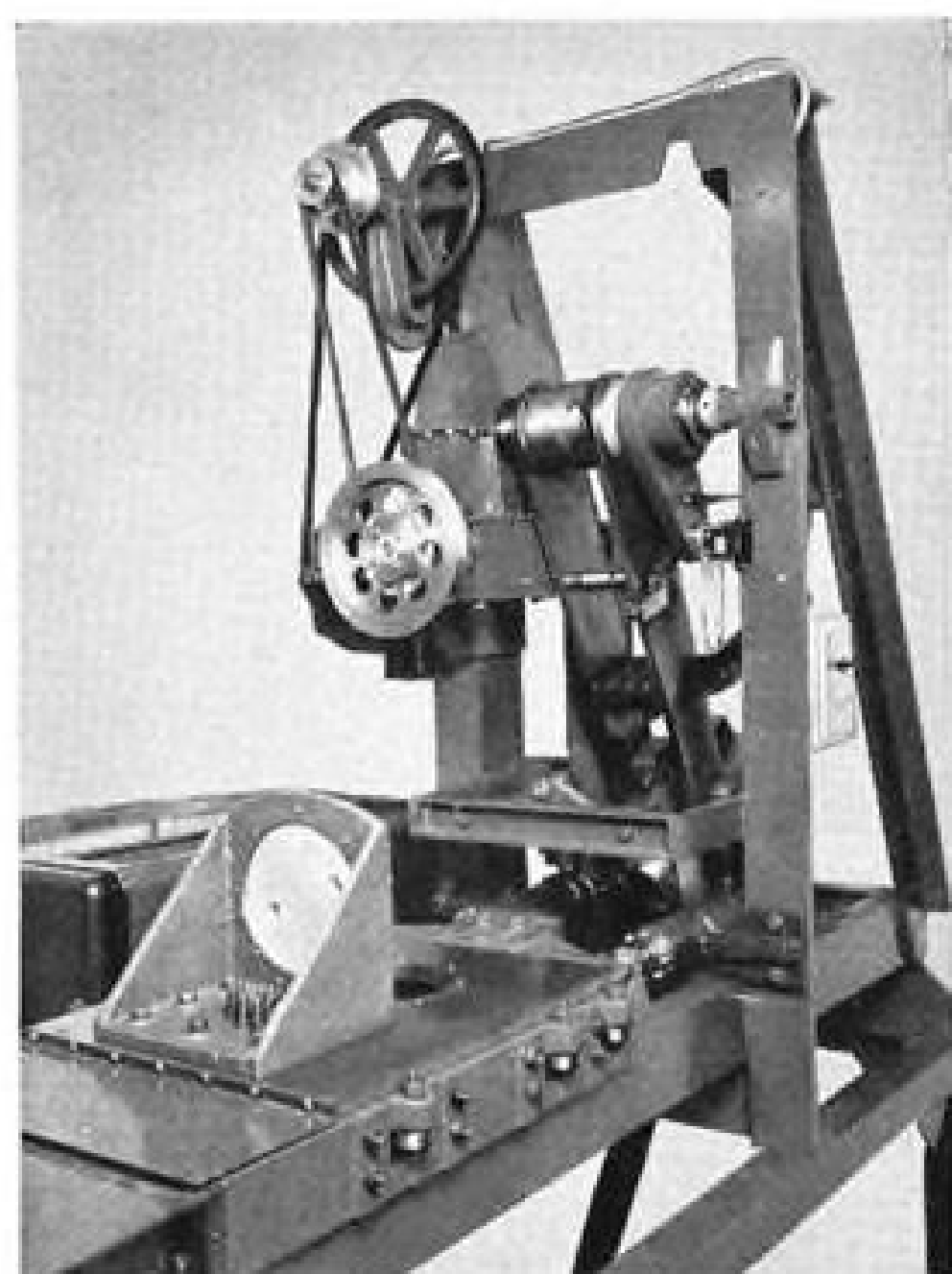


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AIRCRAFT HEATING and THERMAL ANTI-ICING EQUIPMENT





High-impact machine is used to deliver severe shock in testing tubes for ruggedness. Energy imparted to table carrying the tube depends on angle of hammer release.



The motor-driven centrifuge is used to produce continuous acceleration of thousands of Gs for tube test. This procedure gives good overall quality check for ruggedness.

tinuous and intermittent vibrations are present in aircraft, other vehicles, and in industrial applications.

A survey of the actual vibrations in each type of service shows that there are definite, characteristic vibration frequencies—a noise spectrum—associated with each application. In motor vehicles the vibrations are usually of rather low frequency, but in aircraft they may range up to 10,000 cps.

The Lab's mechanical vibration machines employ electric-motor drives so arranged that motor speed can be adjusted to vibrate the driven element at any selected frequency between 7 and 60 cps. Vibration equipment of this type can, of course, be designed to produce higher frequencies, but this is not usually advisable because of lack of precision in frequency control, excessive wear on moving parts, and the appearance of unwanted harmonics.

In some cases it may be useful to construct a vibration machine to work at a particular fixed frequency up to several thousand cycles per second, although it would be necessary to limit the amplitude of vibration to prevent self-destruction of the machine.

► **Vibrators**—Several different types of low-frequency vibration apparatus are used at the Bureau. One vibrator employs an unbalanced flywheel suspended on leaf springs. Frequency of vibration depends on the speed of rotation, and amplitude depends on spring stiffness. Also used is a vibrator which converts circular motion of a flywheel to linear vibration of a test table through simple mechanical linkage. Vibration amplitude is approximately 0.2 in. peak to peak.

Electron tubes are often tested by

continuous vibration for periods of several days to produce fatigue failures at the points of weakness. These tests are usually conducted at a fixed frequency representative of field conditions. In shorter runs, frequency is usually varied cyclically to study effect of a range of frequencies on tube performance.

► **Trouble Sources**—Mechanical vibrations have many effects on the operation and life of electron tubes.

Fatigue failures from vibration are very common in ordinary tubes—especially likely to occur in tube elements made of crystalline materials, such as filaments and cathode coatings. Improperly welded joints are another frequent source of trouble. When the tube is operated under vibratory conditions, flashovers between electrodes may occur, and mica contacts often will chip or split if they are placed against a glass envelope.

Grid wires and the plate of an electron tube, however, seldom exhibit fatigue failures. High-amplitude resonance vibrations in the tube structure may occur at particular frequencies, and the vibration of elements may affect tube operation by introducing microphonics. Noise modulation results from vibration of tube elements and consequent variation in inter-electrode spacing.

► **Mechanical Resonance Tests**—Most severe effects are encountered in cases where the vibration applied to the tube contains components of a particular frequency corresponding to the natural frequency of vibration of some tube element or structure. Electrical noise in the output of the tube will then have a sharp peak at this resonant frequency which may be large enough to

completely override the desired signal.

Microphonic effects are a major problem in applications where the normal mechanical vibration occurs over such a broad frequency spectrum that the natural resonant frequency of a particular tube element is excited by some component of the incident vibrational energy.

Mechanical resonance apparatus differs from vibration equipment principally with regard to size—resonance testers are smaller and involves lower energies.

The mechanical resonance testers used at the Bureau are loudspeaker-type vibrators. The vibrator is excited via an audio oscillator and amplifier which produce an audio-frequency signal that can be varied from low frequencies up to more than 20,000 cps.

This vibration is monitored by means of a magnetic-type moving-coil vibration pickup attached to the tube mounting. Proper electrode potentials are furnished by a battery power supply to minimize extraneous noise effects.

In testing for microphonism, a special mount is used to transmit the vibrational energy directly to the tube, and a cathode-ray oscilloscope is connected to the plate circuit of the tube so that noise modulation corresponding to a given mechanical vibration frequency will appear as a deflection on the oscilloscope screen.

► **Resonance Effects**—At certain critical frequencies noticeable resonances may occur in any tube. The vibration of the plate itself may be sufficient to produce an objectionable noise effect. In some cases the mechanical resonance vibration may be sufficient to cause fatigue failure of tube elements. For example, oxide coatings of cathodes often will flake off as a result of resonance vibrations.

Best preventive for resonance conditions is to design the tube so that the natural resonant frequencies of the various tube elements are higher than the vibration frequencies met in practice.

It is important to use stiff materials for structural parts, to shorten the tube structures, and to design the cross sections of elements for greatest rigidity.

In general, mechanical resonance can be reduced by isolating the tubes from sources of low and high frequency vibration by rubber mountings of suitable design and by making the tube structure as rigid as possible to avoid resonance with high-frequency vibrations.

It is extremely important to employ low-strain designs at all points of glass-to-metal contact and to eliminate brittle materials. It is often useful to carry out a theoretical analysis for an idealized structure approximating the make-up of the tube under consideration. In

this way, the designer can achieve a rough guide to the resonant frequencies of each tube element and an indication of whether a proposed design will be satisfactory.

► **High-Impact Tests**—These determine the ability of electron tubes to withstand rough handling and dropping. Shocks of this sort occur in shipment of tubes, in vehicles, in military operations, and in industrial equipment. Impact shocks result in tube failures of the same general type as those produced by vibration and resonance, but shattering of the glass envelope and breaking of brittle metal parts are more frequent.

The high-impact machine used consists of a test table, on which the tube is mounted, and a pendulum-type hammer so that energy imparted to the table will be a function of the angle from which the hammer is released. Table and hammer each weigh about 75 lb. and the machine can test tubes weighing up to 25 lb.

Tubes may be mounted in any plane, and normal operating potentials or shorting indicators can be connected to the tube elements. Instantaneous accelerations up to several hundred times the acceleration of gravity and down to 50G may be selected. Duration of impact is less than a millisecond. Impact accelerations are meas-

ured with a quartz-crystal accelerometer and verified by streak photography.

► **Centrifugal Acceleration Tests**—High-acceleration conditions are met principally in electronic equipment in high-speed devices, where tubes receive large continuous forces for relatively long periods of time compared to the brief, transient-force conditions under impact. To withstand high acceleration, a tube must have great structural rigidity to prevent shifting and bowing of the various electrodes.

A motor-driven centrifuge now in use at the Bureau's laboratory can produce accelerations up to several thousand times that of gravity. Its rotational speed, as measured with a tachometer or with a stroboscopic pickup, ranges up to 18,000 rpm. It can be modified to increase the acceleration by evacuating the chamber so that the driven element will not be opposed by the resistance of the air. Speed can be closely and easily controlled, making it possible to reproduce particular test conditions on different centrifuges.

Objects weighing up to several ounces—including almost all miniature and subminiature tubes—may be tested in the present centrifuge, and as many as 12 tubes can be placed in the chamber simultaneously. Tubes can be oriented at various angles to the direction of acceleration to study differences in

rigidity of components in different directions.

► **Centrifuge Advances**—Newer centrifuges permit connection of typical operating potentials to the tube elements so that the electrical performance can be studied during high acceleration. And some have been designed to give very high accelerations—the Beams type is notable in this respect. Such a high-acceleration centrifuge will be operating soon.

Centrifuge acceleration tests provide a good over-all quality check for electron tubes. The most common tube defects revealed by acceleration tests are high bending moments, inability of the glass envelope to support the internal structure, breaking of welds, bowing of elements, and interelectrode shorts. Taken together, the vibration, resonance, impact, and acceleration tests provide a useful picture of tube behavior when subjected to mechanical forces.

► **Testing and Design Teamed**—Development of rugged electron tubes is a good example of the interdependence of testing and design. In a sense, the creation of rugged tubes is brought about through a series of successive approximations.

Development of a rugged tube might begin by applying appropriate mechanical tests to an existing commercial type

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whose electrical characteristics suit the intended application. Results of these tests would show in what way this tube type fails to meet the ruggedness requirements.

A preliminary revision of the tube design could then be made with the test results as a guide, and a handmade model constructed. The same tests could then be repeated for this experimental tube. Usually the tube would turn out to be a vast improvement over the commercial type, but in some respects it might not yet fulfill the necessary ruggedness requirements.

At this point the designer would probably have a clear idea of the direction to take in order to achieve a satisfactory rugged tube. It might involve a search for better materials for use in

some tube elements, new methods of fabrication adapted to eventual mass production, or better geometrical configurations and alignment of tube elements for maximum rigidity. And influence of each structural element on the over-all strength of the tube would be carefully considered. Thus, through a succession of several trial designs a suitable rugged tube would undoubtedly be evolved.

Cost of rugged tubes is about three or four times more than conventional tubes. But it is not unreasonable to expect that as more is learned about production methods and materials applicable to rugged tube types the cost will be much less, and that all preferred tube types will eventually be available in ruggedized form.

ENGINEERING FORUM

Upholds Prop Influence In Races

High-speed performance of aluminum airscrew seen giving 4-mph. boost over '48 speed with wood unit.

I have just finished reading Mr. McLaren's article, "Workmanship Pays Off in the Races," appearing on pages 17 and 18 of AVIATION WEEK, Sept. 12. His comments on the Goodyear event ignore completely the introduction of the McCauley racing Met-L-Prop used on eight of the ten finalists, and which was on the winning plane owned by Steve Wittman and flown by Bill Brennand.

There are two statements in Mr. McLaren's article on which I would like to comment. Both appear in column 3, page 17:

(1) "In the Goodyear event, in which all racers were restricted to stock engines, fast takeoff assumed important proportions with many heats being won by the pilot first in the air. This required low-pitch propellers which sacrificed high speed performance."

While good takeoff performance was important in such a race, there were still 21 mi. between start and finish, and high speed performance was still of prime importance. The high speed performance of the McCauley racing Met-L-Prop was not in any way sacrificed to obtain takeoff performance.

Actually, these Met-L-Props operate at maximum efficiency between 3400 and 3700 rpm., which most of the engines turned during the race. It is interesting to compare the speeds attained in the 1948 and '49 Goodyear events. The air speeds attained during qualification run for three of the planes appearing in both these events are listed to show that there was no sacrifice in high speed performance:

Plane	Pilot	1948-Mph.	1949-Mph.
1	Wittman	171.907	176.490
5	Downey/Ast	158.120	177.941
20	Brennand	166.033	174.443

Of the three planes listed, Nos. 5 and 20 were equipped in 1948 with wood propellers and in 1949 with the new racing Met-L-

Prop. No. 1 was equipped both years with Steve Wittman's own "scimitar" wood prop. The 4½-mph. increase shown by No. 1 can be attributed to a general "cleanup" of the design, including the addition of wheel pants.

These same improvements were made in Steve Wittman's other ship, No. 20, and from this it can be concluded that the racing Met-L-Prop at least accounted for a 4-mph. speed increase, as the total improvement shown by No. 20 was 8½ mph. There should be no doubt that this 4 mph. improvement due to the Met-L-Prop was a deciding factor which helped No. 20 to win the Goodyear finals.

(2) "Steve Wittman and his associate, Bill Brennand, swept the field with simplicity of design and high engine speed in the two airplanes that have placed high in all the mid-season races. Only modification for the 1949 Goodyear Trophy event were some additional clean-up of engine cowling and propeller whittling, the latter consisting of cross-grain lamination."

I do not quite understand the reference to "propeller whittling" and "cross-grain lamination." The first thing that Bill Brennand did when he arrived at the contestants' hangar after his cross-country flight from Oshkosh was to remove his cruising propeller and replace it with his aluminum alloy racing Met-L-Prop. I can assure you that there is no "cross-grain lamination" here.

I think that many of the racers showed noteworthy improvement this year, particularly in the design of little details which seem to escape the casual observer.

Mention should certainly be made of the well-designed exhaust stacks on K. Sorenson's 2nd place winner (No. 39). I believe that

the excellent performance of his ship was due in a great part to the "jet-assist" that was obtained from these stacks.

Art William's "Estrellita" (No. 34) was certainly worthy of a second look. Here, the engine cooling was improved by exhaust induced cooling air which, in turn, was jetted out behind the engine to provide additional thrust.

It is developments such as these and the racing Met-L-Prop which are of value to the lightplane industry as a whole and which really give meaning to the Goodyear Trophy event.

S. M. GAMSU, Chief Engineer,
McCauley Corp.,
Dayton, Ohio.

(Engineer Gamsu apparently overlooked a note on page 43 of the same issue: "Brennand used one of the new McCauley aluminum thin-blade racing propellers. . . ." Coverage of the 1949 National Air Races by an AVIATION WEEK staff team required division of the mass of facts into separate stories; thus, the accent on Wittman's propeller in one staff writer's story and recognition of the role of the McCauley design in another's. There is no question in the mind of either writer that the special McCauley racing propellers were an important factor in the generally higher speed timed in the Goodyear Trophy event this year, compared to previous years.—Ed.)

Holds Speedsters Not Competitive

After reading the article on the "Skyrocket" in the Oct. 3 issue of AVIATION WEEK, I am forced to comment. Mr. McLaren states the "Navy-Air Force competition becomes keener, with the Navy finding itself with the fastest airplane in the world. Before this, the Air Force had it."

I'd like to correct the feeling that the Skyrocket is an aircraft in competition with the F-86, as Mr. McLaren states, or infers. The F-86 is designed for combat and is a service-type. The Skyrocket is strictly a research type, unable to carry guns, bombs or rockets over a given combat range.

It would be much better to compare the X-1 with the first Skyrocket (D-558), the former far surpassing the Navy design; and to compare the new Bell X plane with the D-558-II, where again you will find the Air Force project the faster of the two.

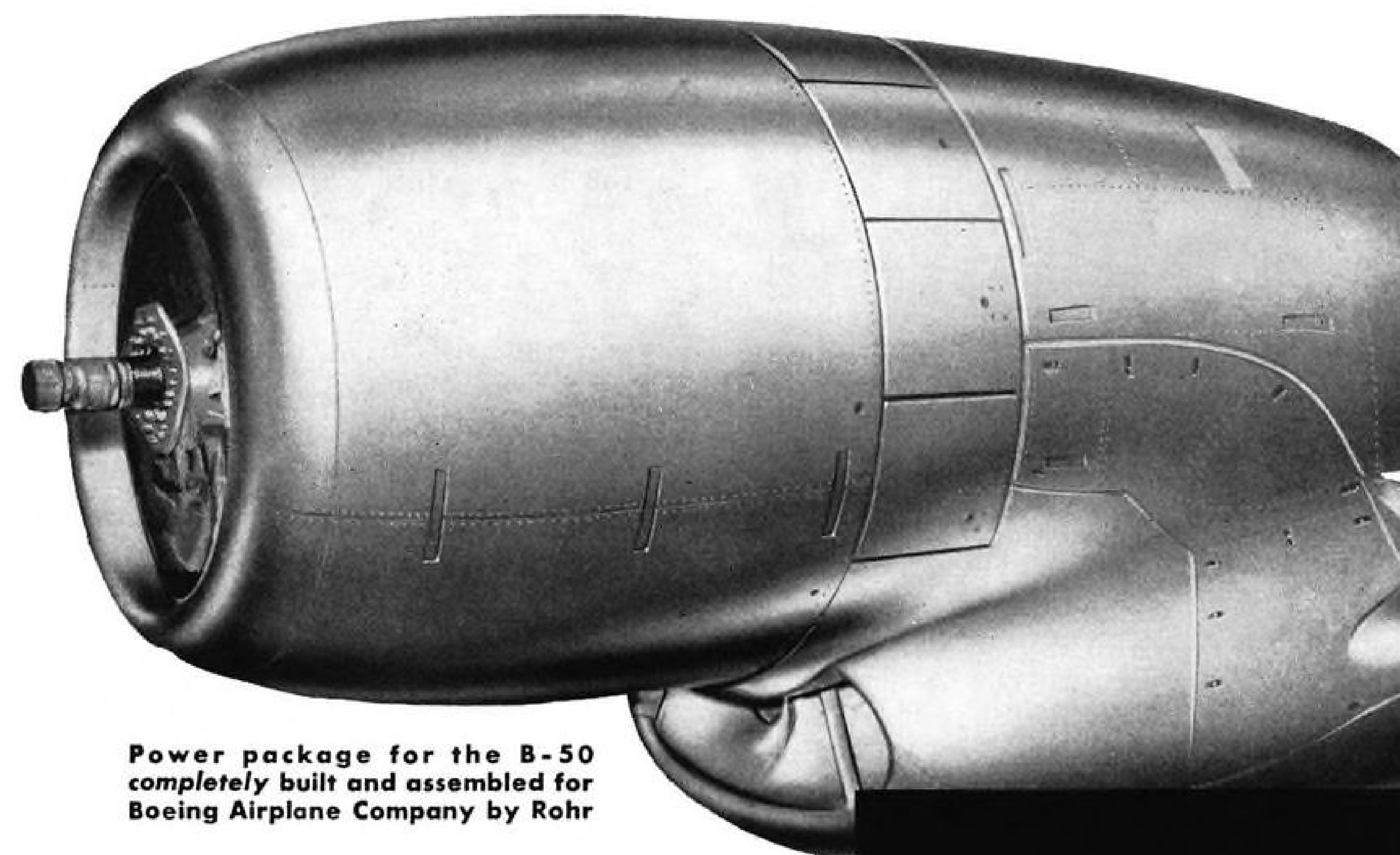
The Navy-Air Force situation is too touchy at this time to credit one service at the expense of the other. If, after all, we come down to brass tacks, we might wonder where the Navy would use such an aircraft type. It would take many billions to construct an aircraft carrier on which this type could take off, let alone land. Caution, or else the House might investigate and give the Navy's piloted-research program over to the Air Force.

In closing, I would like to say that AVIATION WEEK has always been the best in aviation, an excellent magazine.

DOUGLAS MELZER
900 El Campo Drive
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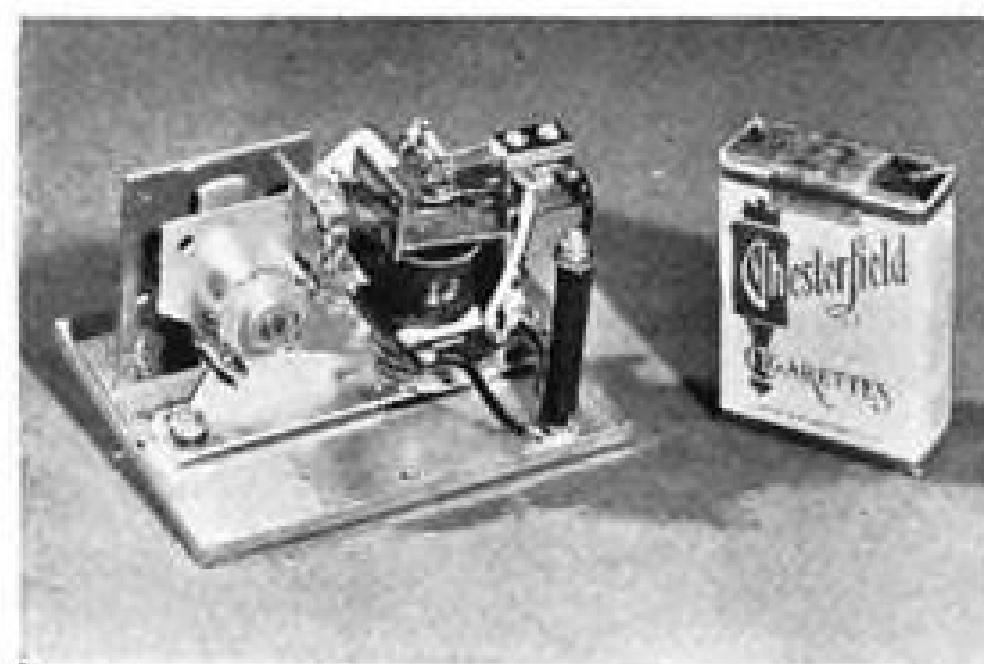
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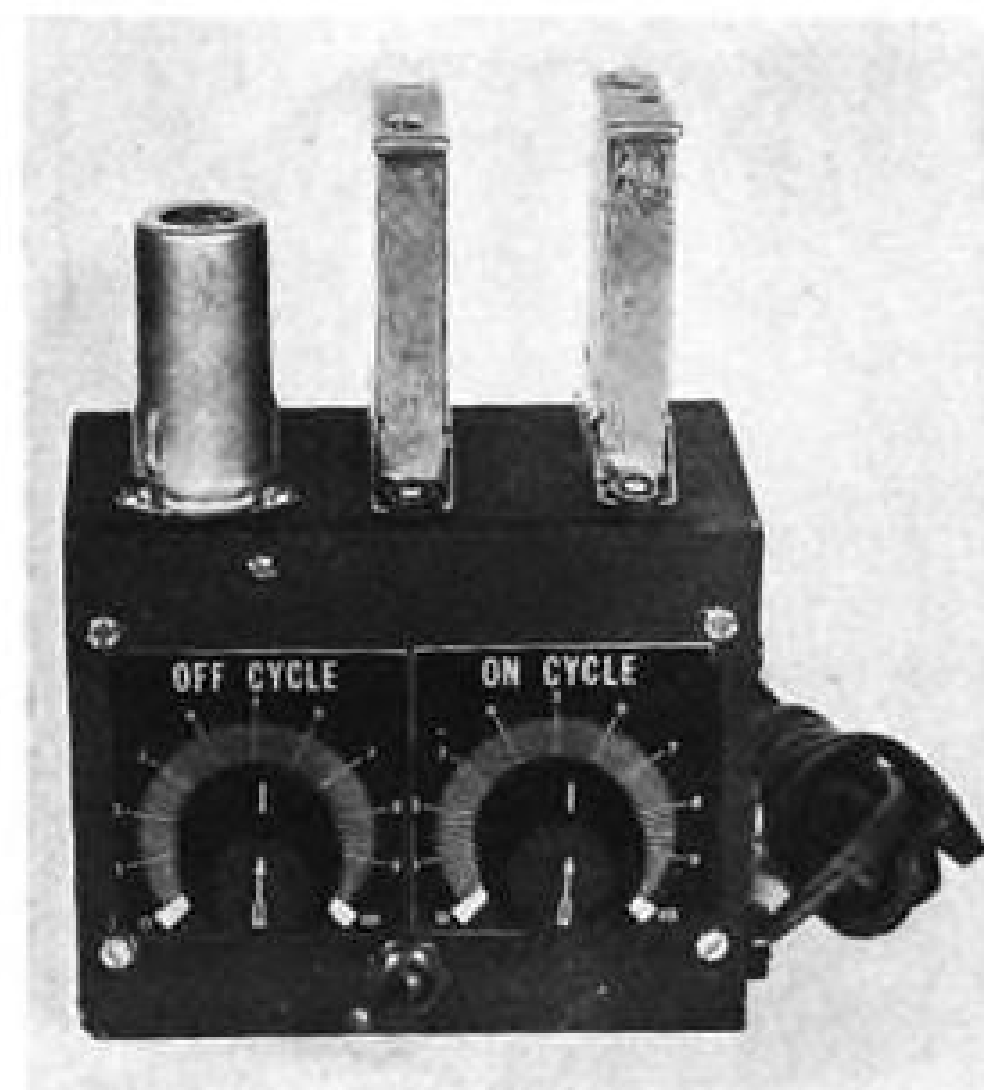
NEW AVIATION PRODUCTS



Light Flasher

For installation on all types of aircraft using single circuit for navigation lights, CAA-approved position light flasher, offered by Signet Development Co., 188 W. Randolph St., Chicago, Ill., is designed to alternately flash wing and tail lights so that craft is not dark at any instant.

Weighing only 1 lb., unit flashes lights 40-60 times per minute through magnetic hysteresis control. Device is represented to be unaffected by temperature and altitude changes and to give at least 100 hr. of trouble-free operation (maker advises replacement of unit at this time). Total battery drain for device plus flashing lights is claimed to be less than current required for steady lights. Flasher is shielded against radio interference, is inexpensive and easy to install. It comes in four models for operation on 6, 12, 24 and 36v. d.c. With Model 1000S three-way switch, flashing lights can be changed to steady burning.



Electronic Timer

To eliminate manual operation of foot switches or other controls where intervals between work operations can be determined, G. C. Wilson & Co., 2 N. Passaic Ave., Chatham, N. J., offers Cyclo-Flex electronic timer.

Device may be operated as single interval unit with manual initiation, or as repeat cycle timer with adjustable intervals occurring successively for indefinite period. Converting from single interval to repeat cycle operation merely involves clockwise rotation of "off" cycle control to desired "on" operate time. "On" cycle knob is for adjusting interval time space. Device has provisions for connection of foot switch for manual operation. Specifications: Power supply, 60c., 110-125v. a.c.; time intervals, on— $\frac{1}{2}$ to 3 sec., off—9 to 20 sec.; single pole-double throw relay with contacts rated at 3 amp., 115v. a.c.; chassis dimensions, 3x4x5 in.



Gages Die Contours

Pant-O-Scriber die checker is designed to provide fast, accurate and inexpensive visual method of gaging contour profiles, flash and striking surfaces for forging dies and punches.

Developed by Engineers Specialties Division of Universal Engraving & Colorplate Co., Inc., 980 Ellicott St., Buffalo 8, N. Y., machine is represented to offer these advantages: Fast semi-automatic operation; permanent inspection record of die sets; and periodic quality control check for die wear. It checks master or duplicate die set, or wear, in relation to master chart, and shrinkage between die and forged part.

Machine also permits operator to view simultaneously entire cavity, flash or gutter profiles and striking surfaces of any desired cross-section of dies and punches. Finishing operations or modification of dies can be made without removal of part from device.



For Test Work

Designed for complete control of all SR-4 gages and similar instrumentation, BA-1 bridge and amplifier, offered by Ellis Associates, Box 77, Pelham 65, N. Y., also drives any standard cathode ray oscilloscope.

Complete package of bridge elements, signal chopper, calibration system, amplifier and power supply, the BA-1, with SR-4 gages and cathode ray oscilloscope, makes up versatile system adaptable for measuring practically any mechanical reaction. Other resistive instrumentation in the form of displacement, load, and pressure pickups also are stated to be handled effectively.

Device is designed to cover wide range from static to high frequency. It calibrates at any time during test.

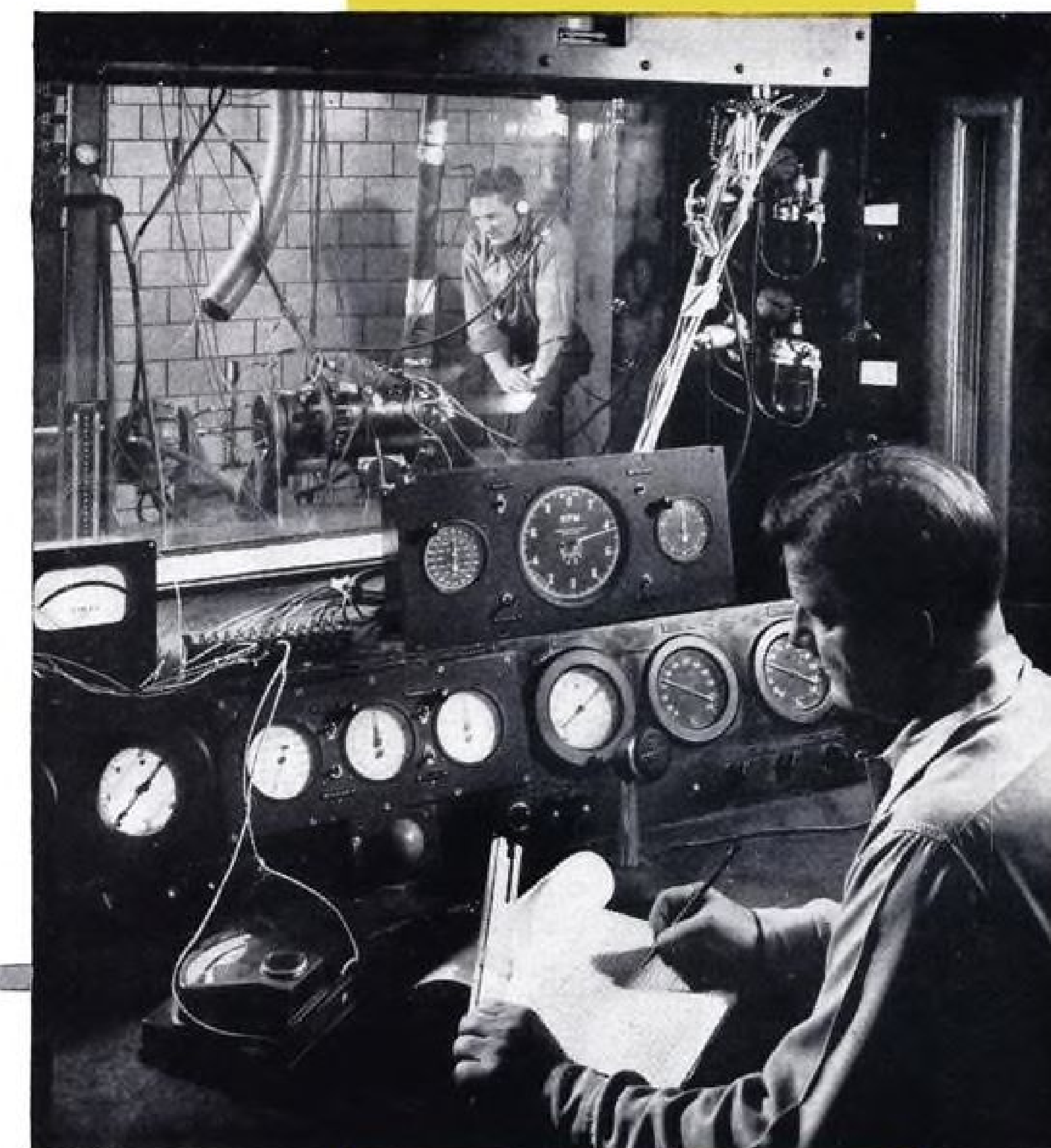


Radio Package

Deluxe transmitter-receiver, Model LTRA-5, offered by Lear, Inc., 110 Ionia Ave., N. W., Grand Rapids 2, Mich., combines VHF Omnimatic navigating equipment with VHF/LF radio reception and VHF transmission in one compact package.

Weighing only 6 lb. 1 oz., unit incorporates four receivers providing reception on all VHF facilities, low frequency radio ranges, 75mc. marker beacon and entertainment broadcast. Equipment includes 2w. VHF transmitter, is designed to permit simultaneous reception on VHF and LF stations. Dimensions are 5 $\frac{1}{8}$ x6 $\frac{3}{4}$ x7 $\frac{1}{8}$ in.

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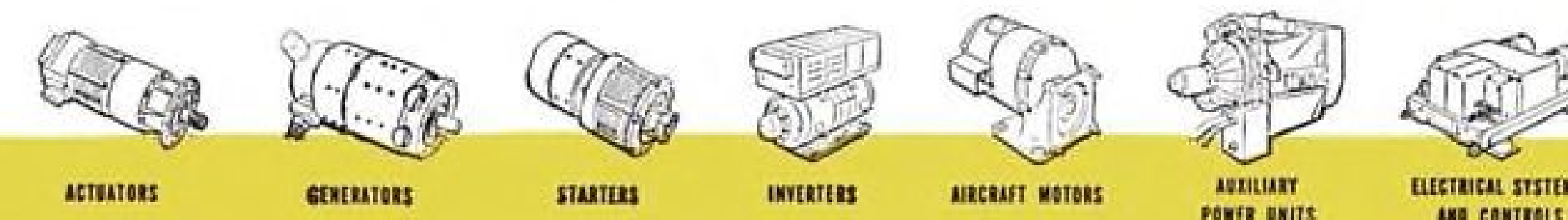
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FINANCIAL

Capital Seeks Financial Freedom

Airline proposes new \$7.4 million recapitalization plan to buy new equipment and offset debt restrictions.

Capital Airlines may soon complete its long desired recapitalization. The company was plagued with financial difficulties as a direct outgrowth of the issuance of a \$10 million issue of 3½ percent debentures in October, 1945.

This financing, sponsored by White, Weld & Co., was ill-conceived as it placed the company in a strait-jacket and denied it any flexibility to meet subsequent problems. While sold as a bond, this issue assumed more of the characteristics of a convertible preferred stock. Nevertheless, the indenture for these bonds so confined the operations of the company as to preclude any additional permanent financing.

These circumstances are ironical in that at the time of this past financing, market conditions would have readily permitted the sale of a convertible preferred issue. Having sold preferred stock, Capital would have retained the freedom to embark upon additional financing as circumstances dictated.

Interest on this debenture issue was paid on schedule during 1946. However, as deficit operations were sustained for that year, it became impossible for the company to pay the interest when due during 1947. The same condition prevailed for 1948. Early in 1947, repeated attempts were made by White, Weld & Co. to recapitalize the company's finances. None of these plans succeeded, largely because they would take valuable rights away from the debenture holders without giving anything in return.

► **Banks Aid**—In the meantime, a group of banks loaned the company a total of \$4 million late in 1946, intended as short-term financing with the original maturity scheduled for May 1, 1947. Unable to pay this loan when due, Capital was forced to seek repeated extensions from the group headed by the Chase National Bank. The banking group maintained a consistently constructive attitude toward Capital, granting periodic extensions of the loan and refrained from pushing the airline into receivership. This confidence proved well justified.

Far-reaching management changes were effected about a year and a half ago which led to a sweeping economy drive and a new sense of direction.

These changes revitalized the company and it was able to record an astounding recovery in operations largely as a result of its own efforts. The Civil Aeronautics Board also took cognizance of the changed circumstances prevailing and granted the company increased mail pay, on a current and retroactive basis.

► **Loans Repaid**—As a direct consequence, Capital was able to pay all back interest and return on a current basis on Apr. 1, 1949. Further, all past deficiencies in the sinking fund requirements on the debentures were cured. In fact, in the debenture retirement this year, by acquiring such bonds through tender at a discount the company realized a net profit of almost \$800,000. The debentures were accordingly reduced to an outstanding issue of \$7,685,000.

The banks also were remembered. Early this year, \$1.5 million of the bank loan was repaid. Continuing improvement in the company's finances permitted a further re-payment of \$2,125,000 of the bank loans on Sept. 19, leaving \$375,000 of the original \$4 million loan outstanding. This balance will be paid by Jan. 31, 1950.

► **Seeks Full Freedom**—Despite this startling financial comeback, Capital was still denied the flexibility with which to meet competitive conditions in acquiring badly needed new facilities. It remained necessary for the company to remove the shackles of the restrictive provisions of the outstanding debentures.

After an abortive attempt earlier this year, under new investment banking sponsorship, Capital is now advancing a recapitalization plan which it hopes will grant the management the desired freedom of action and be equitable to all classes of security holders.

This plan proposes to create two new series of debentures to replace the issue presently outstanding. The new issues would be called Series A and B, each in the authorized amount of \$3.7 million. It is obvious that these two series aggregate \$7.4 million or \$285,000 short of the total amount of outstanding issues of the present bonds. The company has been anticipating the sinking fund payment of about \$500,000 due by May 1, 1950, and has been

acquiring bonds in the open market and presumably would hope to complete such purchases concurrently with the implementation of this plan.

If the entire sinking fund payment were to be exhausted, about \$650,000 principal amount of the present debentures could be acquired at present market prices, thus reducing the outstanding issue to slightly more than \$7 million. On this basis, the new Series A and B may actually be issued to the extent of only \$3.5 million each.

► **Type of Bonds**—The new bonds would both carry 4 percent interest and have the same maturity as the present debentures, Sept. 1, 1960. The Series A, however, would have a fixed interest rate, cumulative, and not contingent upon earnings of the company. A sinking fund of up to \$500,000 annually would also be made available to this issue, after certain adjustments providing for any requirements on the remaining present 3½ percent debentures to be outstanding.

The new Series B debentures will pay interest, cumulative, only if earned. Further, each \$500 principal amount would be convertible into 45 shares of common stock or at the rate of \$11.11 per share.

The terms of exchange provide for \$500 principal amount each of the new Series A and B for \$1,000 principal amount of the present 3½ percent issue outstanding.

In return for this more attractive arrangement, the present debenture holders are being asked to unfreeze the various restrictive features now surrounding the indenture. The company is seeking the right to incur total debt not to exceed \$13.5 million. With such additional borrowing authorization, the company will then enjoy greater flexibility and be able to finance required new equipment.

► **Orders Planes**—A very unusual arrangement has been made in acquiring three Constellations from Lockheed Aircraft Corp. under a lease-purchase contract (AVIATION WEEK, Oct. 24). These planes are to be delivered to Capital in June, July and August of 1950. A rental of \$17,500 per month per aircraft is to be made for an 18-month period. All rentals will be applied toward the purchase price of \$684,000 per aircraft.

Capital also plans to modernize its twin-engine fleet by introducing the Super DC-3 over its system. Thus far 3 of these planes have been ordered with indications that an additional 17 will be acquired during 1951 and 1952.

The earnings recovery demonstrated by Capital is expected to provide an effective backdrop with which to effect the present recapitalization plan.

—Selig Altschul

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"The tremendous reserve power of the Convair-Liner's two 2,400-horsepower engines provides an extra margin of safety," says WILBUR L. MORRISON, vice-president, Latin American Division. "This is the first thing Pan American World Airways demands of any new Clipper for its Latin American routes, where an enviable record of almost two and a half billion accident-free passenger miles has been chalked up in the past four years."

"The Convair's extra passenger capacity helps PAA bring air travel within the pocketbook reach of a still wider group of potential travelers, in line with the company's long-established policy of making the benefits of air travel available to the common man."

"PAA—America's first and largest international airline—has always added the best in new equipment as soon as it was available, and we are proud to welcome the Convair to our Clipper fleet."

"Ideal for Shorter Hauls"

"From an operational standpoint, the Convair-Liner is an ideal airplane for PAA's shorter hauls," says OLIVER J. STUDEMAN, operations manager, Latin American Division. "Its performance reserve, flight characteristics, and advanced design give it outstanding flexibility. This is reflected in more 'on-time' operations because of improved route patterns, ease of maintenance, ground handling and overall superior dependability."



WORLD AIRWAYS CONVAIR* -Liner

"Profitable Payloads from Shorter Runways"

"Pan American World Airway's 20 new Convair-Liners admirably solve our short-haul problems," says HUMPHREY W. TOOMEY, manager, Latin American Division. "We needed a twin-engine Clipper with increased seating capacity and four-engine speed. The Convair provides this much more efficiently than four-engine equipment for flights under 500 miles."

"Even on short flights it can climb quickly above unstable tropical air for smooth, over-weather flying. Its 30,000-foot ceiling enables it to clear the highest mountain ranges encountered on PAA's 70,000-mile network of Latin American routes. With the Convair we can also operate with a profitable payload from shorter runways than with four-engine equipment."



"Truly a Pilot's Airplane"

"PAA pilots have found the Convair-Liner ideal from an airman's viewpoint," says LEWIS C. LINDSEY, chief pilot, Latin American Division. "It is maneuverable and easy to handle. They are enthusiastic about its pilot-designed cockpit and its automatic-feathering, reversible-pitch propellers, which greatly decreases the landing run, with less wear and tear on brakes and tires."

"Our pilots also like the Convair's pressurized cabin, which maintains low-altitude pressures even when cruising at over-weather altitudes, thus eliminating the anoxia which is mainly responsible for pilot and passenger fatigue."

"The Convair-Liner is truly a pilot's airplane."



**Consolidated Vultee
Aircraft Corporation**

SAN DIEGO, CALIFORNIA
FORT WORTH, TEXAS

SALES & SERVICE



SKIMMER'S neat layout provides initial customer-appeal valuable in sales campaigns.

Colonial Builds Light Amphibian

New York firm to produce 2-3 place pusher tentatively priced at \$9750. Plane has crash safety features.

A neat little 2-3 place pusher amphibian designated the XC-1 Skimmer has been produced by the newly formed Colonial Aircraft Corp. of Huntington, L. I.

Price of the tricycle-gear craft is tentatively placed at \$9750 fly-away-factory, and first production units are expected to be ready for delivery by June 1950. AVIATION WEEK was told that the company now has 50 firm orders on hand and production is planned at two Skimmers weekly.

► **Crash-Resistant Cockpit**—A prime feature of the new plane is a crash-resistant cockpit, which follows the recommendations laid down by Crash Injury Research group.

The cockpit has:

- Seats built into the plane's structure.
- A control wheel designed to gradually bend forward if the pilot's body places an impact on it of approximately 6 Gs.
- Instrument panel located so that head clearance is ensured when the body pivots about the safety belt.
- All body crushing structure and protrusions cleared away.

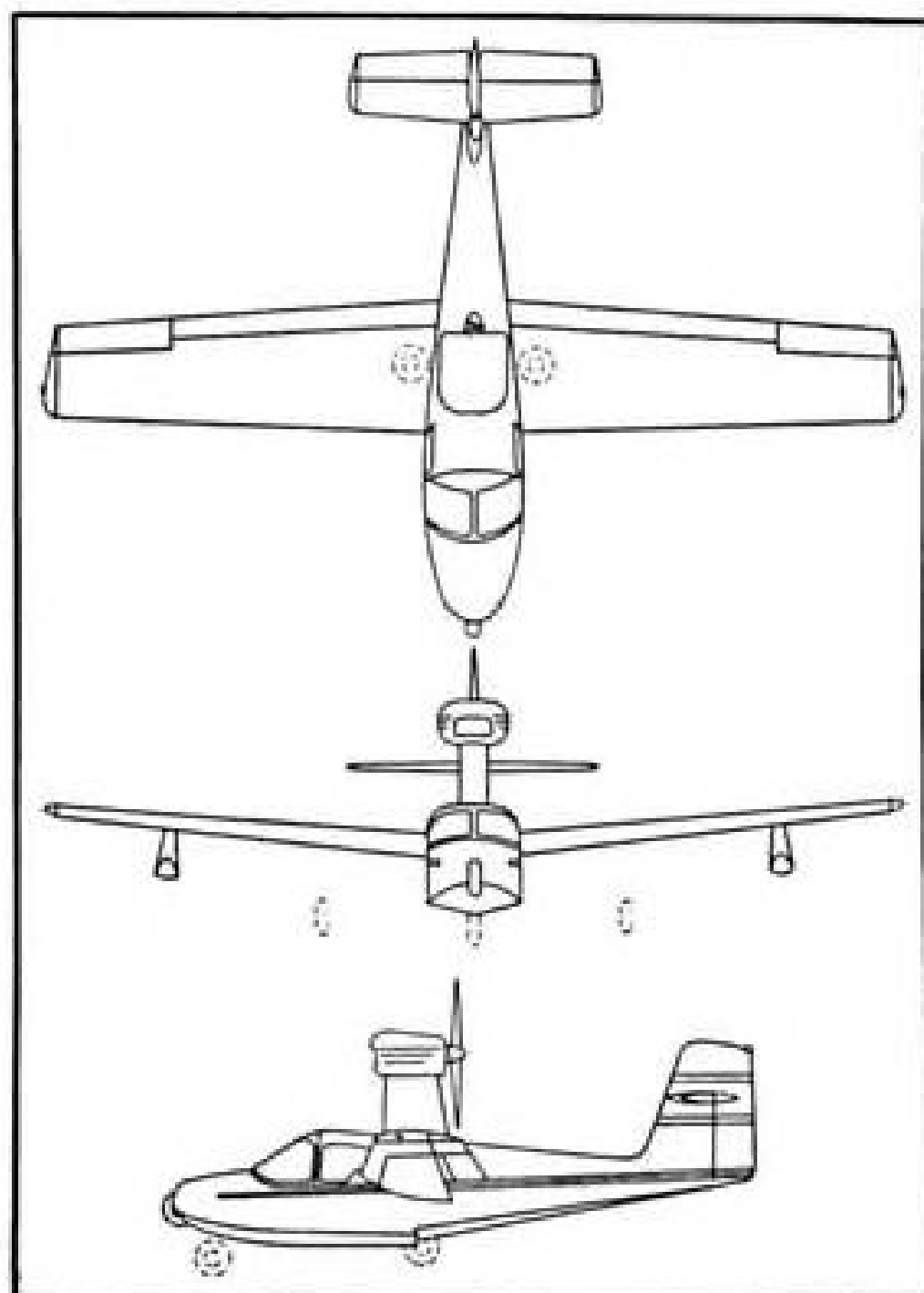
In addition, the engine mount, located just behind the cabin, is stressed for an impact of 20 Gs.

► **Good Stability Claimed**—The Skimmer is of all-metal construction, with fully cantilevered wing and single-strut braced horizontal tail surfaces. The wings are located just behind the cockpit, affording good visibility. Slotted flaps extend 80 percent of the span, and the wings have two degrees of aerodynamic and geometric washout, which combined with differential aileron control (40 deg. up and 5 deg. down) are stated

to give good roll control up to and through stall conditions. When properly trimmed, the Skimmer is designed to take off and land on water by itself. Flaps are hydraulically controlled by means of an electrically driven pump.

Span is 34 ft., length about 23 ft., height overall approximately 9 ft. Wing area, including ailerons, is 156 sq. ft.

► **Performance**—Powerplant is a Lycoming O-235C-1 of 115 takeoff hp., fitted with a 73-in. dia. Aeromatic automatically variable pitch prop. Performance revealed thus far in flight tests shows the Skimmer has a 600-fpm. climb at a gross weight of 1900 lb. (650-lb. useful load). When cruising at 110 mph., with this weight, range of 600 mi. is



claimed, with one-hour fuel reserve. Fuel capacity is given as 40 gal. Top speed is said to be about 120 mph., and landing speed, 55 mph. Stalling speed is approximately 48.

If landing gear is removed and openings faired over, a slight gain in performance can be expected, and useful load is upped about 120 lb.

Landing gear on the prototype was built by Electrol to Colonial Aircraft design and is hydraulically retractable. When up, the forward wheel forms a nose bumper. Wheels and brakes are by Goodyear and use 6.00x6 tires. Tread is approximately 12 ft.

► **Background**—Colonial Aircraft Corp. is composed of a group of engineers and personnel employed by several local aviation firms. They started design of the Skimmer during December 1945 and began construction of the prototype during their spare time in September 1946. The first flight was made July 1948. Future plans, in addition to putting the Skimmer in production, include seeking of NACA contracts for lightplane research. The company believes that its small overhead would make it possible profitably to take on small research deals that have been bypassed by larger concerns.

Fair Air Strip

More than 200 planes used the new air strip opened at the Kansas State Fairground at Hutchinson, Kans., on Flying Farmer Day at the fair, recently. The 2200 ft. by 300 ft. sod strip used a CAA mobile control tower unit for the big day's traffic. One of the country's largest air markers with letters 40 ft. high is directly west of the strip on the fairground grandstand roof. Strip was used by fair-going personal plane pilots throughout the week, with 40 planes a day recorded. It is believed to be the first landing facility at a state fair grounds.

Copter Operator To Aid Survey

A. F. Helicopters, Inc., Burbank, Calif., has been awarded a contract to provide helicopter transportation for mapping survey parties in Death Valley, Calif., for U. S. Geological Survey. Contract calls for use of two helicopters for a 30- to 60-day period, and the use of one helicopter for an additional 50 to 120 days. Helicopters are required to operate in altitudes from sea-level to 7500 ft. with occasional landings as high as 9,000 ft. under favorable conditions. Knute Flint, operator of A. F. Helicopters, has recently completed a similar contract for survey mapping with four copters in the Alaska area.

AIR TRANSPORT



LOW DRAG design made possible by turboprop engines is apparent in head-on view of Apollo, with nacelles hardly thicker than wing.

British Turboprops Threaten U.S. Market

Six transport planes now being developed with two—Apollo and Viscount—already at order-taking stage.

By Robert Hotz

LONDON—American transport manufacturers are likely to encounter stiff competition in the international market from at least two of the six British turboprop airliners now under development.

Leading the British turboprop pack by a wide margin is the Vickers-Armstrongs Viscount. The Viscount prototype recently became the first turboprop airliner to receive an airworthiness certificate that also insures meeting the new ICAO transport requirements. It has logged more than 300 hours of test flying with Vickers test pilot Jock Bryce at the controls, and is the closest of the sextet to production and delivery for airline service.

► **Apollo Prototypes**—Next in line is the Armstrong Whitworth Apollo which now has more than 30 hours of prototype test flying with a second pressurized prototype in final assembly.

Other two turboprop transports now being flight-tested are two Handley Page products—The Hermes V and the Marathon II. Neither is considered by British observers to have a very promising commercial future. The Saunders Roe 155-ton Princess flying boat and the Bristol Brabazon II will both be powered by the Bristol Proteus turboprop which is still in the final development stage.

British manufacturers and airline operators agree that the turboprop transport will have a permanent place in future airline operations as a medium-haul transport taking over from the

turbojet at ranges under 1000 miles. They see the turboprop and turbojet power plants as complementing each other rather than competing in the transport field.

After a detailed study including flights in both planes, the Viscount and Apollo seem to offer the following basic attractions for airline operators:

► **Passenger Comfort**—Vickers sales manager Robert Handasyde assures prospective passengers in the Viscount that once they have flown in a turboprop airliner they will be reluctant to return to piston-power planes. This is literally true. Noise level in the Viscount and Apollo is so low that only aerodynamic noise, which is squelched by engine thunder in conventional airliners, is noticeable. Lack of noticeable vibration in both cockpit and passenger cabin gives a sensation of floating through space and a deceptive impression of both speed and engine power for those used to the powerful surge of piston power.

Flying in the Viscount, the now traditional demonstrations were made with: a glass of water filled to the brim sitting on a folding table for passengers and not spilling a drop; a two-shilling piece (size of a quarter) balanced on edge on the same table without falling over; and the same coin balanced on the throttle pedestal and remaining upright through 30-degree banks in both directions.

With the Viscounts scheduled to begin service in 1952 on British Overseas Airways' West Indian routes, it is likely that the word will spread fast

Viscount 700

Span—94 ft.
Length—81 ft. 2 in.
Height—26 ft. 9 in.
Max. take-off gross—50,000 lb.
Max. landing gross—47,500 lb.
Gross wing area—963 sq. ft.
Wing loading at max. gross—51.9 lb.
Average cruising speed—316 mph at 25,000 ft.
Tentative sales price—\$467,000 (£167,000)
Fuel capacity—2160 gal.
Oil capacity—22.5 gal.
Engines—four Rolls Royce Dart turboprops (1400 shp. plus 295 lb. thrust)
Propellers—4 bladed, 10 ft. dia. Rotol
Max. range—1200 mi.
Passenger capacity—40-53

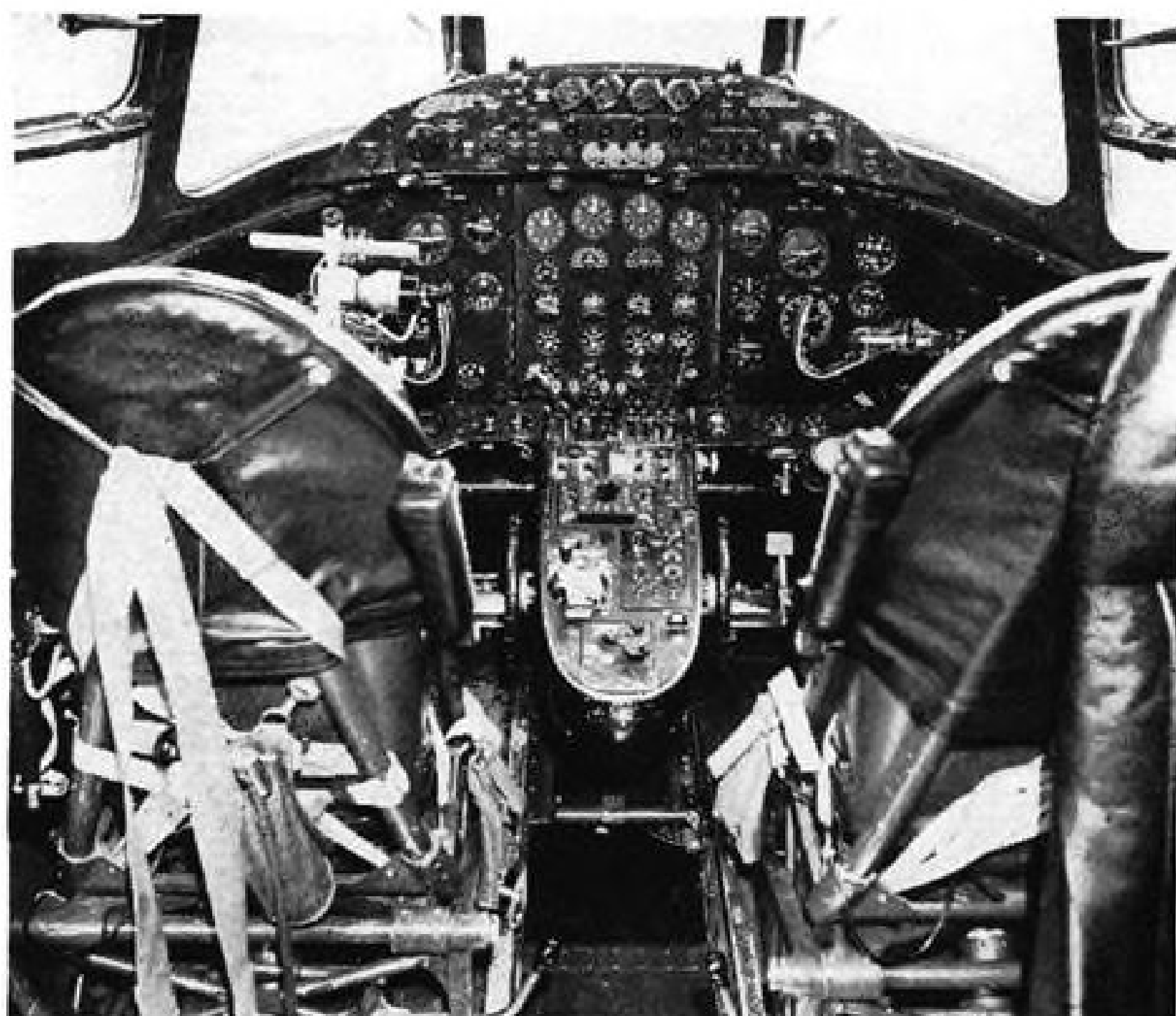
Apollo

Span—92 ft.
Length—71 ft. 11½ in.
Height—26 ft.
Max. take-off gross—43,000 lb.
Max. landing weight—39,500 lb.
Gross wing area—986 sq. ft.
Wing loading at max. gross—43.6 lb.
Average cruising speed—266 mph.
Engines—4 Armstrong Siddeley (shp. plus 384 lb. thrust) Mamba II turboprops
Tentative sales price—\$392,000 (£140,000)
Max. payload—10,000 lb.
Passengers capacity—28-40
Max. range—1,000 mi.
Fuel capacity—1660 gal.

Turboprop Transports Show Their Advantages—



TWO-ENGINE CONTROL of Viscount, both props on same side feathered, is indicated by amount of rudder needed to fly straight.



VISCOUNT PANEL has all the engine instruments in center.



LONG NACELLES of Viscount have tailpipe at base.

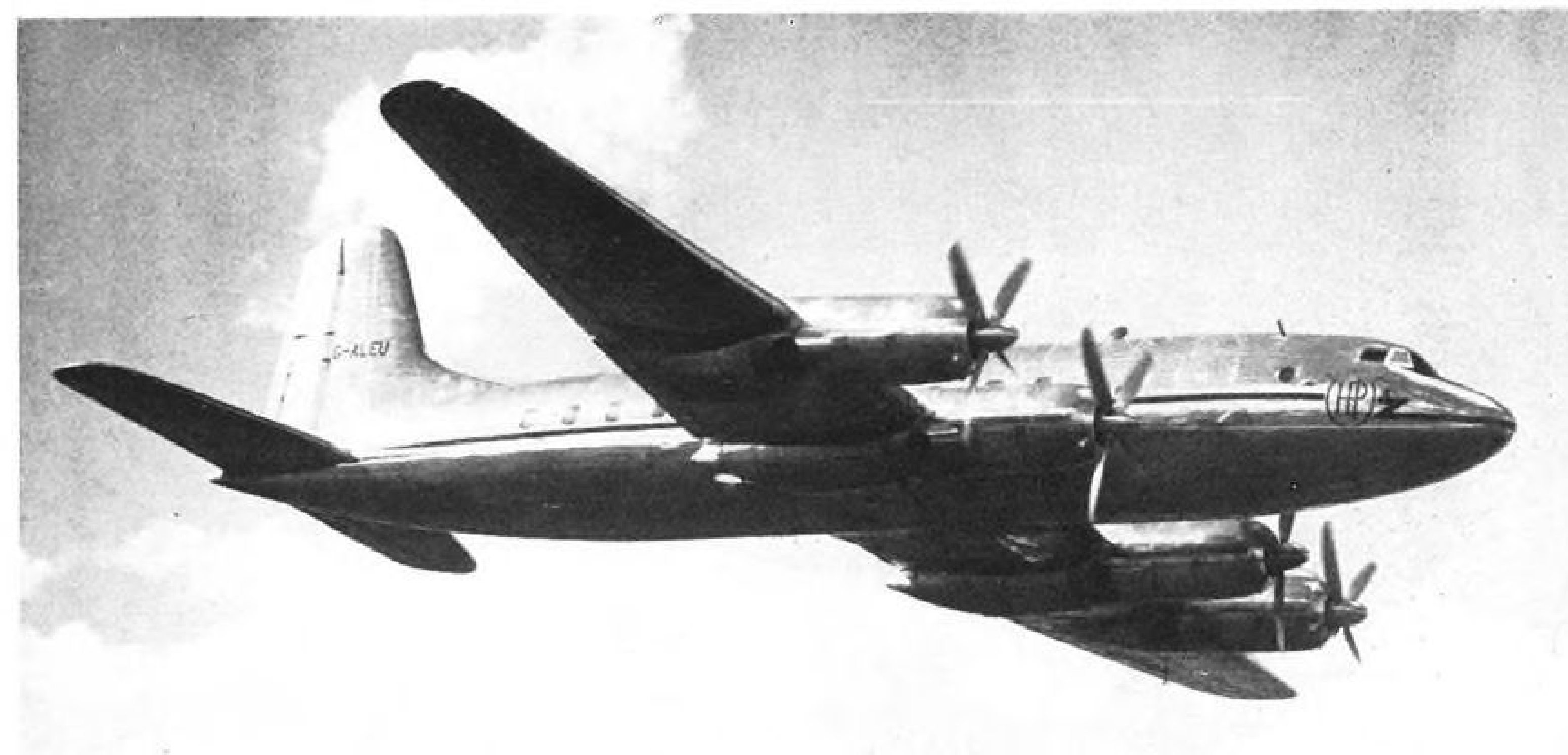
among American vacationists in the Caribbean area of the comfort of turboprop airliner flying. It is also likely that Vickers may bring one of the early production Viscounts to the United States since it is hard to appreciate turboprop travel without a practical demonstration. ► **Speed**—Both the Viscount and the Apollo offer speed increases over their piston-engine competition. The Viscount's 316 mph. average cruise at 25,000 ft. is faster than all of the current U.S. airliners except the Boeing

Stratocruiser. Apollo's 266 mph. average cruise is 16 mph. higher than the Douglas Super DC-3 with which it is competing as a regular DC-3 replacement.

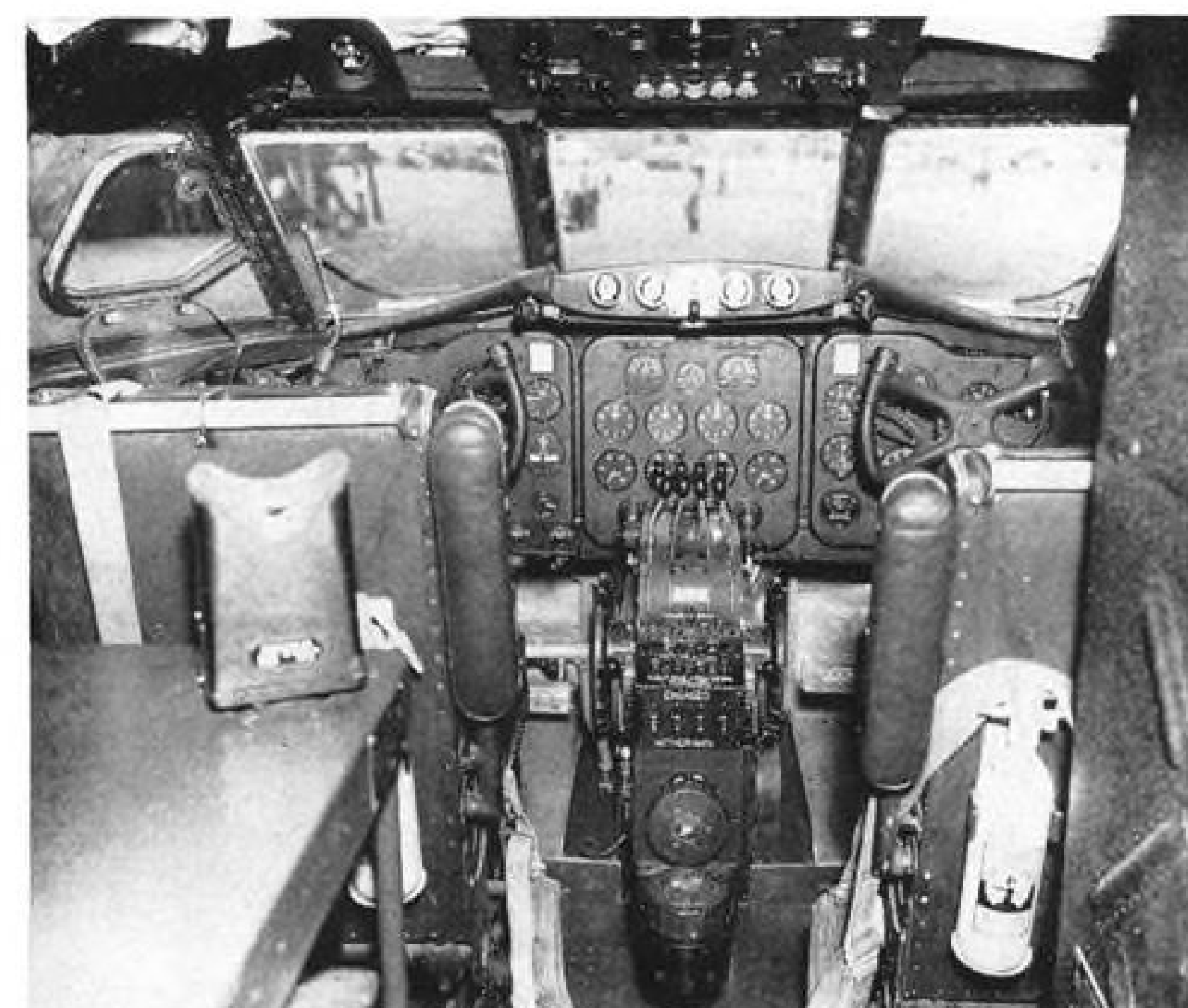
► **Maintenance Costs**—The turboprop, like the turbojet, seems to be paving the way for some radical shifts in airline economics with the possibilities it offers in reduced maintenance costs. Both the Rolls Royce Dart and Armstrong Siddeley Mamba expect to begin airline service with a minimum of 500 hr.

overhaul intervals. Test runs of 500 hr. indicate that very little maintenance is required even now for this interval. Lack of moving parts makes engine maintenance relatively simple, while the lack of vibration will be reflected in less airframe and instrument maintenance. Instrument maintenance now is a particularly irksome and expensive headache for the airlines.

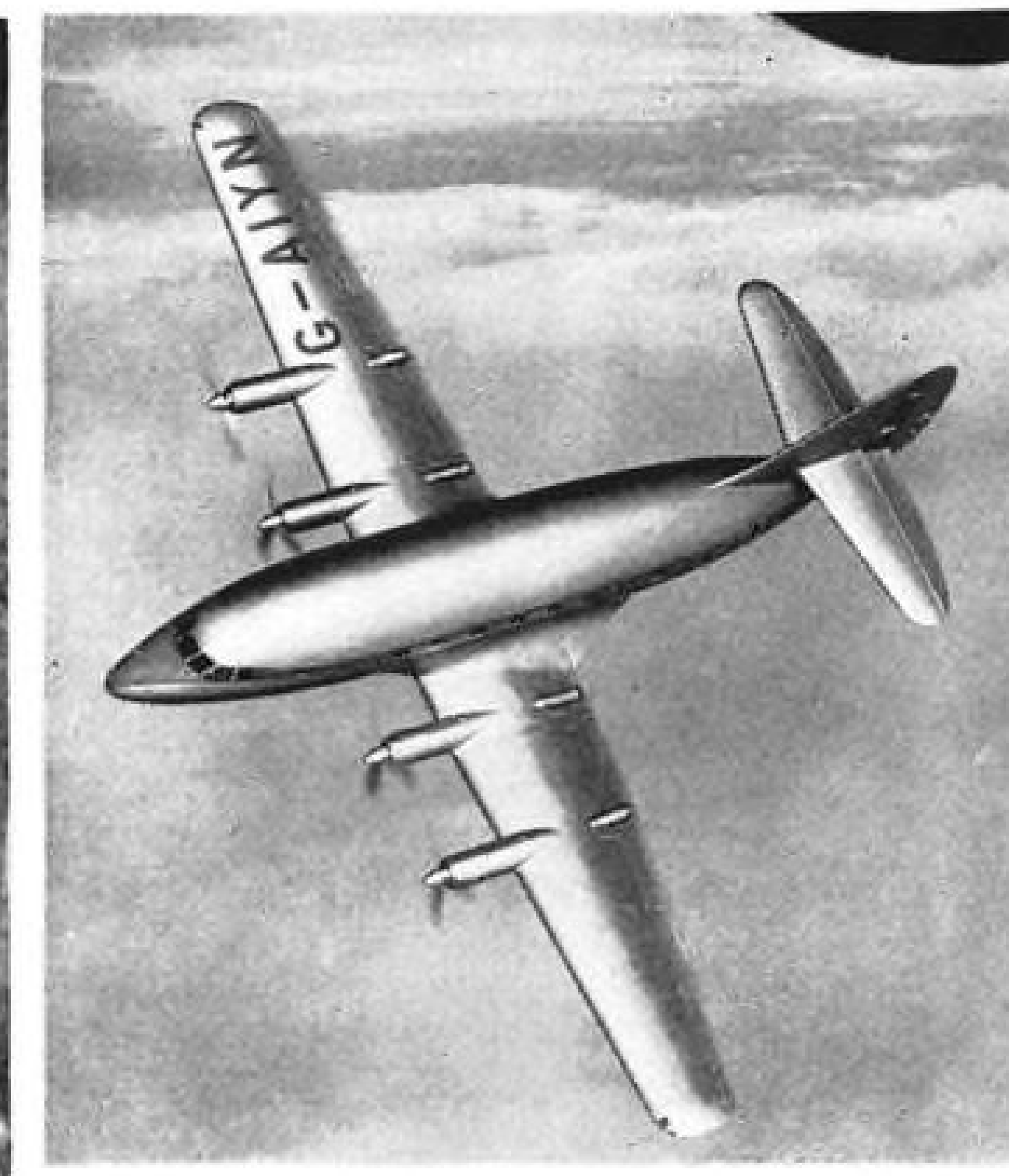
► **Price**—Devaluation of the British pound has brought the price of British aircraft into a sharply competitive focus



HERMES V is Britain's largest and—with its four Bristol Theseus engines of 2200 hp. each—most powerful turboprop transport now flying.



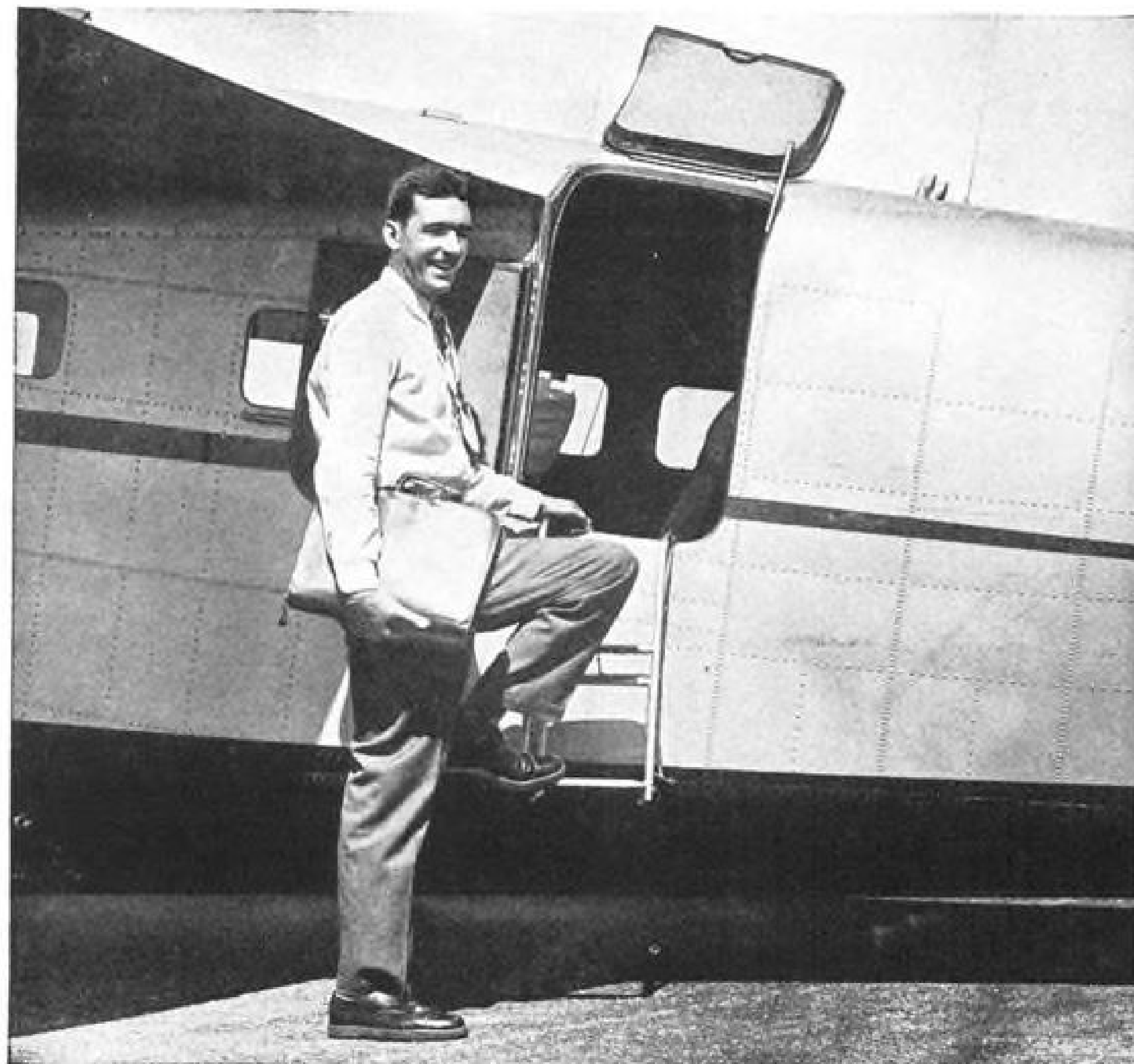
APOLLO PANEL shows how few engines instruments are needed.



APOLLO TAILPIPE emerges from top of wing.



APOLLO LOADING of its 28-32 passengers can be accomplished easily and quickly through doors located both fore and aft of wing.



"...best in the field"

—says Chief Pilot John Stam, of
NORTH CAROLINA PULP CO., about

RCA'S PAIR OF CHAMPIONS

With two years of installation-proved performance behind them, RCA's "49" Transmitter and "22" Receiver are providing dependable air-to-ground communication between the pulp mill in Plymouth, N. C. and the home office in Camden, N. J.,—as well as the 24 widely separated plants of the parent company (Kiekhefer Container Corp.). These units enable the pilot to get weather data promptly at any time while aloft—provide rapid, trouble-free communications with airport towers and range stations.

Says Chief Pilot Stam, "For consistently reliable communication, I rate the RCA '49' and '22' best in the field. I like the saving in space and weight they give me. And I like the fact that they don't require much battery current. During one flight, when my generator failed, I maintained normal communication for several hours by operating the radio off the plane's battery until I landed."

Engineered specifically to airline standards, the RCA "49" and "22" have passed the type tests for CAA certification. Call your RCA distributor for complete data. Or write Dept. 9J, RCA Engineering Products, Camden, N. J.



AVIATION SECTION
RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N. J.

In Canada: RCA VICTOR Company Limited, Montreal



**RCA "49"
TRANSMITTER**

- 50 watts output, voice or cw
- Automatic band-change
- 4 independent frequencies
- Completely self-contained
- Weighs only 42½ pounds
- Fits any standard airline rack
- Available for 12- or 24-volt operation
- Complete remote control



**RCA "22"
RECEIVER**

- Continuous tuning over weather and range, standard broadcast, and aircraft communication bands
- Instant switching to either of four crystal-controlled frequencies between 2.83 to 13 Mc—plus airport tower frequency
- Can be used for accurate homing and position-finding with any RCA loop antenna
- Provision for interphone and side-tone transmission
- Weighs only 21 pounds
- Fits any standard airline rack
- Available for 12- or 24-volt operation
- Complete remote control

with American planes both in the United States and abroad. The Viscount production version will now be priced at about \$467,000 complete with radio equipment and auto-pilot, while the Apollo will cost about \$392,000. (A Convaire-Liner costs about \$500,000.)

The Viscount and Apollo are designed to meet slightly different airline requirements and offer an interesting contrast in British sales philosophies.

► **Aim at U.S.**—Vickers is aiming strongly at the American market. Sir Hew Kilner, Vickers' managing director, told AVIATION WEEK he was most certainly going to have a crack at the American market. Earlier he sent his chief designer, George Edwards, on a six-week tour of U.S. airlines to study their requirements. As a result, the production versions of the Viscount (Model 700) have been redesigned to offer increased passenger capacity, added range and an air coach version for high traffic density, short-haul routes.

Sir Hew is planning an initial production of 100 Viscounts and has negotiations under way on contracts for about 50 from British and Australian airlines. First production version of the Viscount is now under construction at Vickers' Weybridge plant with a production rate of about 5 per month planned. Initial deliveries to customers are scheduled for 1952. Vickers has moved slowly into production with about a year's flight-testing of the Viscount prototype before plans were set.

The Viscount 700 will be produced in three variations:

- 40-passenger version with a galley midway in the cabin dividing it into two compartments. Payload ranges from 9000 lb. over 700-mi. blocks to 6000 lb. over 1200-mi. blocks.
- 40-passenger version without galley utilizing the space for additional freight capacity in an aft compartment. Payload ranges from 10,000 lb. over 600-mi. blocks to 6000 lb. over 1200-mi. blocks.
- 53-passenger air coach version for use on short hauls with high traffic density. Payload ranges from 10,000 lb. over 600-mi. blocks to 6000 lb. over 1100-mi. blocks.

The range-payload figures include 230-mi. diversion to alternate airport and 45 mi. stacking time at 220 mph. at 5000 ft. These figures indicate that the Viscount will fit into the present traffic control systems without any undue difficulty. Cruising flexibility is obtained by varying the number of engines in operation rather than reducing power on all engines as in piston-powered transports.

Vickers officials indicated that the Viscount 700 would be most economical over a 400-mi. block but could carry 40 passengers over a 1000-mi. block. Maximum range is 1800 mi. with a 4000-lb. payload.

Armstrong Whitworth had plans for a 40-passenger Apollo but after an international market survey settled on the 28-32 passenger version aimed at DC-3 replacement as a more saleable item. However fuel capacity and range will be increased in the Apollo production version.

NAL Buys Two DC-6s

National Airlines has bought two new DC-6s as another step in its program to win a larger share of the rich East Coast passenger traffic.

NAL also disclosed it is negotiating for the lease of several other four-

engine planes. Its present fleet consists of 2 DC-6s, 7 DC-4s and 11 Lockheed Lodestars.

Airworthiness CAR's To Get Yearly Change

Starting Jan. 1, the Civil Aeronautics Board will introduce a systematic procedure of annual revisions covering Civil Air Regulations pertaining to airworthiness of engines, propellers and appliances—presently designated under CAR Parts 1 to 16.

Promulgation of CAR's in the past has been accomplished at intervals when

National AIRCRAFT FASTENERS



**Castle Nuts
AN-310**



**Plain Nuts
AN-315**



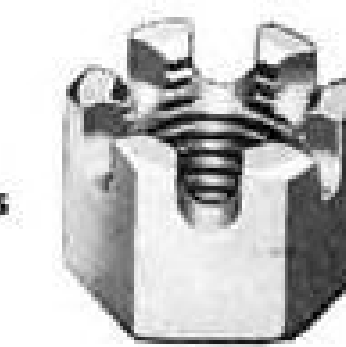
**Check Nuts
AN-316**



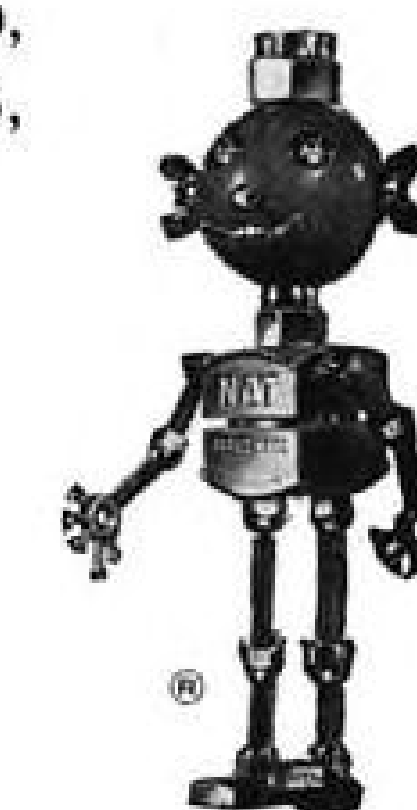
**Shear Nuts
AN-320**



**Slotted Engine Nuts
AN-355**



**Plain Engine Nuts
AN-360**



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FOR EXAMPLE, "National" Aircraft Nuts are furnished in the full range of sizes through each of the following series: AN-310, 315, 316, 320, 325, 330, 335, 340, 345, 350, 355, 360.

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KOLLSMAN AIRCRAFT INSTRUMENTS
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 ELMHURST, NEW YORK GLENDALE, CALIFORNIA

specific problems affecting the regulations presented themselves. Increase of these problems in recent years has confronted the Board with a sizable work load which has resulted in a relatively irregular flow of amendments designed to solve only the urgent issues.

Early next year, CAB's Bureau of Safety Regulation will circulate to the public a release which will review briefly the status of all important issues involving CAR Parts 1 to 16. The release will request all interested parties to submit to the Board by May 1 all desired comments and specific proposals for deletions, additions or amendments to any of the airworthiness parts.

CAB said it believed the annual revision setup will tend to stabilize the CARs.

Sabena Buys DC-6s

Sabena has purchased two more DC-6s to be delivered next May. The Belgian airline's present fleet consists of 3 DC-6s, 6 Convair-Liners, 9 DC-4s, 17 passenger and 11 cargo DC-3s, 7 Lockheed Lodestars and 3 British de Havilland Doves.

Uphold City's Right To Enforce CAA Rule

A municipal magistrate has held that the New York City Police Department has jurisdiction to enforce Civil Aeronautics Administration low-flying regulations governing the approach to New York's airports.

The decision came after attorney for Northeast Airlines Capt. George R. Newhauser raised the issues of constitutionality and jurisdiction of municipal ordinances covering low flying. Newhauser had received a summons for allegedly landing his plane in violation of the established traffic pattern at LaGuardia Field.

The magistrate has denied a move to dismiss the summons on the grounds that the local law conflicts with Federal statutes. Case is being held for trial in Special Sessions Court.

SHORTLINES

► **British European Airways**—Has increased its London-Paris cut-rate excursion flights to four daily because of the operation's "unprecedented success." Started on July 29, the roundtrip excursions cost \$28 against the former rate of \$40.32.

► **Capital**—Flew a record 2,381,000 cargo ton miles in third quarter 1949—up 21 percent over the same period last year. September was the best cargo

month in the company's entire history.
 ► **Central**—Plans to start scheduled lightplane feeder service between Oklahoma City and Wichita, Kans., on Nov. 10 and between Amarillo, Tex., and Tulsa on Nov. 15.

► **Civil Aeronautics Board**—Is considering revisions of Parts 33, 34 and 35 of the Civil Air Regulations to clarify and amend requirements for flight radio operator, flight navigator and flight engineer certificates in the light of standards established by Annex 1 to the Convention on International Civil Aviation.

► **Golden North Airways**—The Fairbanks, Alaska, nonscheduled operator has been directed by CAB to show cause why its letter of registration should not be revoked for knowing and wilful violations of the Civil Aeronautics Act. CAB last April ordered the carrier to cease and desist from further illegal activity.

► **Pan American**—Plans to offer 20-trip commutation tickets for seats on regular first-class flights between the West Coast and Honolulu starting Dec. 3. Fare per flight, subject to CAB approval, would be \$30 below the normal one-way tariff. . . . PAA will inaugurate Stratocruiser service on its Pacific Northwest-Honolulu run Nov. 4. . . . Company is now using pilot-operated radio telephone to replace radio telegraph on its Shannon, Eire, to Basra, Iraq, link.

► **Pioneer**—Carried its 250,000th passenger last month.

► **Robinson**—Is modifying its DC-3s to include integral loading steps and an enlarged rear cargo compartment. Flight agents will replace stewardesses on the modified planes.

► **Southwest**—A CAB public counsel has recommended a five-year extension of the feeder's certificate. He said SWA should be given a new stop at Salinas, Calif., and urged that United Air Lines' authority to serve Red Bluff, Eureka, Monterey, Santa Barbara and Salinas in competition with Southwest be suspended for five years.

► **Trans-Canada**—Has applied to CAB for a foreign air carrier permit to operate between Canada, Tampa/St. Petersburg, Fla., the Bahamas and the Caribbean area. The controversial U.S.-Canada air transport agreement of last June provides that a Canadian carrier may operate this route.

► **Transocean**—Carrier's application for a 60-day exemption to carry persons from the Canton-Hong Kong area to San Francisco was denied by CAB.

► **Trans-Texas**—Has asked CAB for a five-year extension of its feeder certificate. Last spring CAB ordered the carrier to show cause why its franchise should not be permitted to expire May 13, 1950.

► **TWA**—Has signed a contract with

Kansas City assuring retention of the carrier's overhaul facilities at Fairfax Airport. The city, which has taken over operation of the airport from the Air Force, gave TWA a five-year lease and renewal option at an annual rental of \$56,260 for the base and \$250 a month for landing privileges at the field.

CAB SCHEDULE

Oct. 31—Oral argument on Board's investigation of directional commodity rates. (Docket 1705 et al)

Nov. 1—Prehearing conference on Nationwide Airlines' application for certificated routes in Michigan. (Docket 2832)

Nov. 7—Oral argument on CAB's enforcement action against American Air Transport and Flight School. (Docket 3405)

Nov. 7—Hearing in CAB's enforcement proceeding against Mt. McKinley Airways. (Docket 4035)

Nov. 10—Oral argument on CAA's complaint against Inter-American Airways. (Docket SR-2-269)

Nov. 16—Hearing on transcontinental coach type service. (Docket 3397 et al)

Dec. 5—Hearing in New York City area helicopter case. (Docket 946 et al)

Dec. 5—Hearing in Western-Inland mail rate case. (Docket 2870)

Dec. 6—Hearing on renewal of Trans-Texas Airways' feeder certificate. (Docket 3720)

Dec. 19—Hearing in Florida Airways mail rate case. (Docket 3695)

Jan. 9—Hearing on air freight accumulation, assembly and distribution tariffs. (Docket 1705 et al)

Feb. 6—Hearing in Colonial Airlines mail rate case. (Docket 2724)

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with the Type F-11 Isolation Amplifier CAATC No. 1R4-1



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Weight: 8 lbs. CAA Type-Certificated. Immediate delivery in 14 or 28 volt dc models. Complete technical details on request.

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WHAT'S NEW

New Books

"Airline Competition" is the 704-page Harvard Business School study of competition's effects on the quality and price of airline service and self-sufficiency of U. S. domestic trunk carriers.

The authors, Frederick W. Gill and Gilbert L. Bates, both men with airline industry background, make a thorough analysis of airline expansion from 1939-1948. They conclude that one of the most important reasons for the "profitless prosperity" of the domestic trunk operators in 1946-1948 is the multi-carrier competition authorized by the Civil Aeronautics Board during the postwar period.

Competition which is most consistently ineffective or adverse to the public interest is that where more than two carriers have been authorized to fly between major markets such as New York, Washington, Chicago, Boston, Detroit, Los Angeles and San Francisco, the study finds.

"There have definitely been diminishing returns in the improvement in quality of service rendered to the traveler in these markets with the addition of third and fourth carriers," the book states.

These major markets, the study asserts, could have been the source of substantial profit which would have allowed the carriers involved to achieve a greater measure of self-sufficiency and helped them offset the burden of serving other less profitable or unprofitable markets. Instead, the carriers have been fortunate to break even under the potentially ideal earnings conditions the markets represented.

Gill and Bates reject the "presumption doctrine" on competition which CAB applied in some route cases. This doctrine holds that since competition in itself presents an incentive to improved service and technological development, there is a strong but not conclusive presumption in favor of competition on any route which offered sufficient traffic to support competing services without unreasonable increases in total operating costs.

The authors emphasize that if air transportation is to attain a status of self-sufficiency and carry its fair share of the cost of airways and airports it must be allowed to earn a profit where that is possible unless it definitely is against the public interest.

"Airline Competition" is published by Harvard Business School's Division of Research, Soldiers Field, Boston 63, Mass., price \$5.75. —C.L.A.

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AVIATION WEEK

OCTOBER 31, 1949

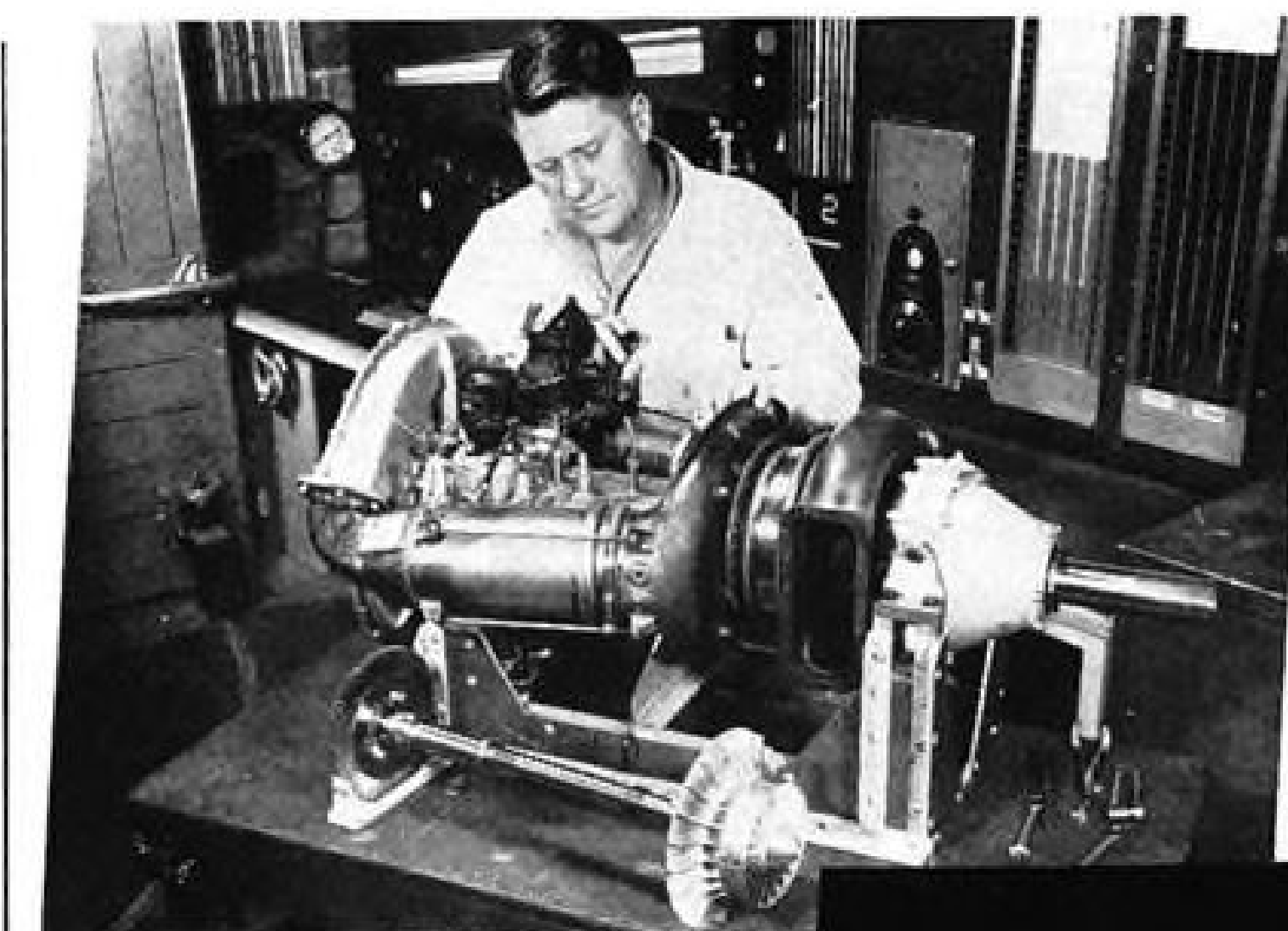
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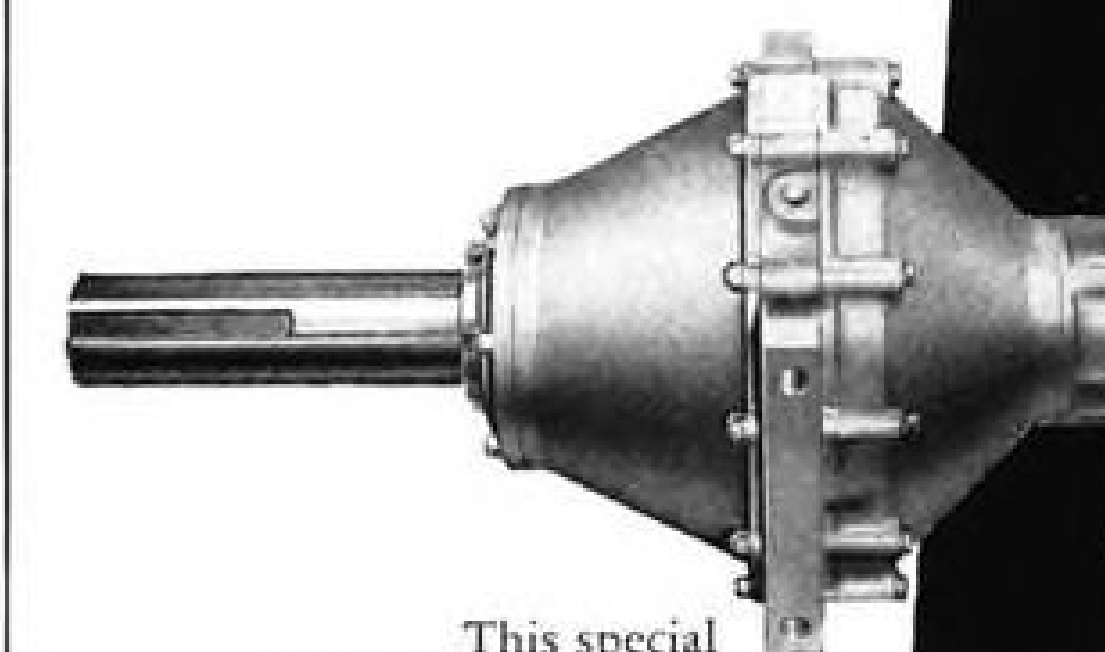
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AVIATION WEEK, October 31, 1949



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EDITORIAL

Awards for Air Safety

We congratulate the first four winners of the AVIATION WEEK safety awards, announced at a special testimonial dinner of the Flight Safety Foundation at LaGuardia Airport in New York. Selections were made by the Foundation, in consultation with the National Safety Council, the Aircraft Owners & Pilots Assn., and the director of the Institute of the Aeronautical Sciences.

Hugh De Haven, research associate in the Department of Physiology of Cornell Medical College received a plaque for his outstanding studies of aircraft accidents to determine the relationship of crash injuries to structural causes. Aircraft manufacturers are studying his conclusions and one or two aircraft, at least, are being designed to conform with some of his recommendations. He has been a member of the Cornell Committee for Air Safety Research since 1947. His work has been described frequently in this magazine.

Dr. Leonard Greene, president of Safe Flight Instrument Corp., received well-deserved recognition for his part in development of a successful stall warning indicator now widely recognized and adopted by the industry for both civil and military aircraft. Although AVIATION WEEK had nothing to do with selection of the winners, it is interesting to note that this magazine strongly championed the Greene device editorially as far back as 1947 when there was widespread criticism of the principle, mainly because of a lack of understanding of what the indicator was meant to do.

American Airlines System received a plaque for the preparation, production and utilization in crew training of the sound motion picture, "This Way Out," illustrating the most efficient procedures to be taken by crew members to assure safety of passengers in the rare instances of an emergency in flight. The movie also received a National Safety Council award.

United Air Lines was cited for preparation, production in cooperation with the Coast Guard, and utilization in crew training of sound movies on safety in over-water flying.

As Jerome Lederer, director of the Flight Safety Foundation told his audience at the presentation dinner, these awards sponsored by AVIATION WEEK are the only ones of their kind given in the United States. There are other worthy awards given for achievement other than safety, and at times the developments for which those awards are given will promote safety. Two safety awards are given in England.

It was fitting that these awards were bestowed during the three-day seminar on air transport safety which the Foundation was conducting. This seminar is one of several activi-

ties which the organization has undertaken to promote the exchange of information on safety concepts and developments. It is a very fruitful activity, because the tremendous amount of research and accomplishment by the industry and the governmental agencies in trying to achieve ever-greater safety is discussed informally, freely and provocatively.

"Those of us who are students of air safety know it to be a fascinating, ever-exciting subject requiring continuous pursuit," Mr. Lederer said in his opening address. "Marvelous air safety statistics must be ignored because the public is not impressed by them. It is now easy to prove by statistics that scheduled trans-Atlantic air travel, for example, has recently achieved a better fatality record than travel by ocean liner, or that a cross country journey on a scheduled airline is safer than travel by private automobile.

"But it is difficult to convince the public by statistics that flying on-scheduled airlines is safer than other things they do. The public is mentally conditioned to fear flying so when a rare accident occurs, the spectacular play it gets in the press by reason of the spectacular nature of aviation tends to confirm unfounded fears in the public mind.

"The public must learn that safety is the rule, accidents the exception. And this can mean only one objective: No fatal accidents; perfection must be our goal."

The Flight Safety Foundation is in a favorable position to help the industry accomplish this task. It is a non-profit organization. It has no axe to grind. It represents no vested interests. Because it is a non-official group, it enjoys freedom of expression and of action which is denied a governmental or trade organization.

We can only amplify the words of the "New York Times," which published an editorial on the AVIATION WEEK awards Oct. 25: "The Flight Safety Foundation, a non-profit cooperative organization, deserves much credit for its practice of making these awards, and still more for its day-by-day activities in the matter of improving still further the already commendable statistical record of safety in the air."

William A. M. Burden, former Assistant Secretary of Commerce, made the presentations. Harold Harris, vice president and general manager of American Overseas Airlines, delivered the main address, on British jet transports.

AVIATION WEEK is proud to initiate this unique annual award for the recognition of unusual effort in the cause of air safety.

—Robert H. Wood

AVIATION WEEK, October 31, 1949



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The Sperry ZERO READER* is a new type of gyroscopic flight instrument. It combines attitude, altitude, heading and radio path information on a simple two element indicator which tells the pilot exactly how to move the flight controls of his airplane.

• Developed by Sperry with the encouragement and cooperation

of All-Weather Flying Division, USAF and the Air Transport Association, the ZERO READER takes its place among other Sperry "firsts"—the Gyro-Horizon, Directional Gyro, Gyrosyn Compass and Gyropilot. Like these precision instruments it reflects in its performance the laboratory research and careful flight testing which have contributed to

marked advancements in instrument flying.

• The ZERO READER is another example of Sperry's pioneering in equipment to help make air travel increasingly independent of weather for it is the only manual system which approaches the performance of stabilized automatic flight control.

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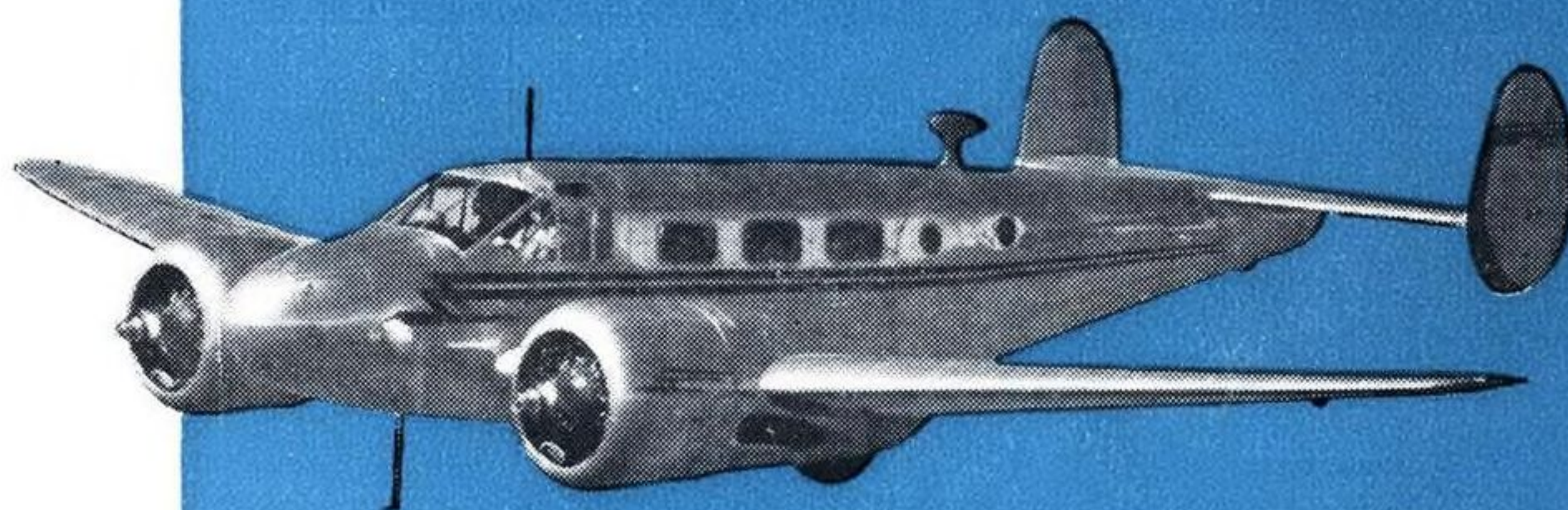
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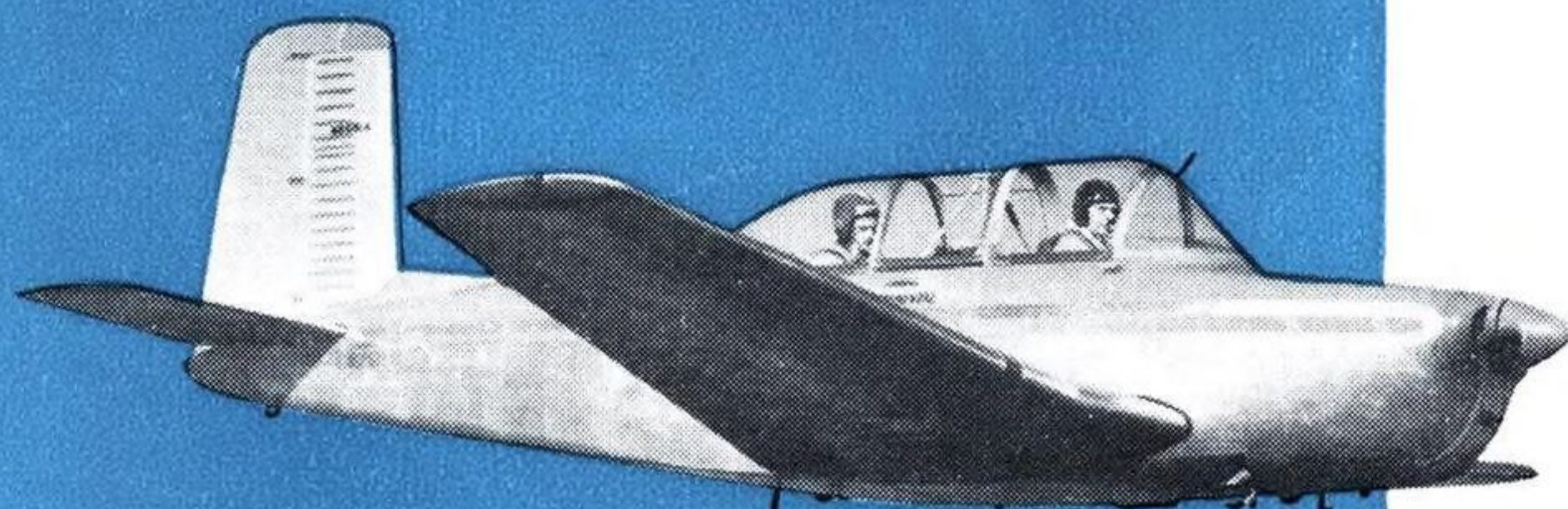
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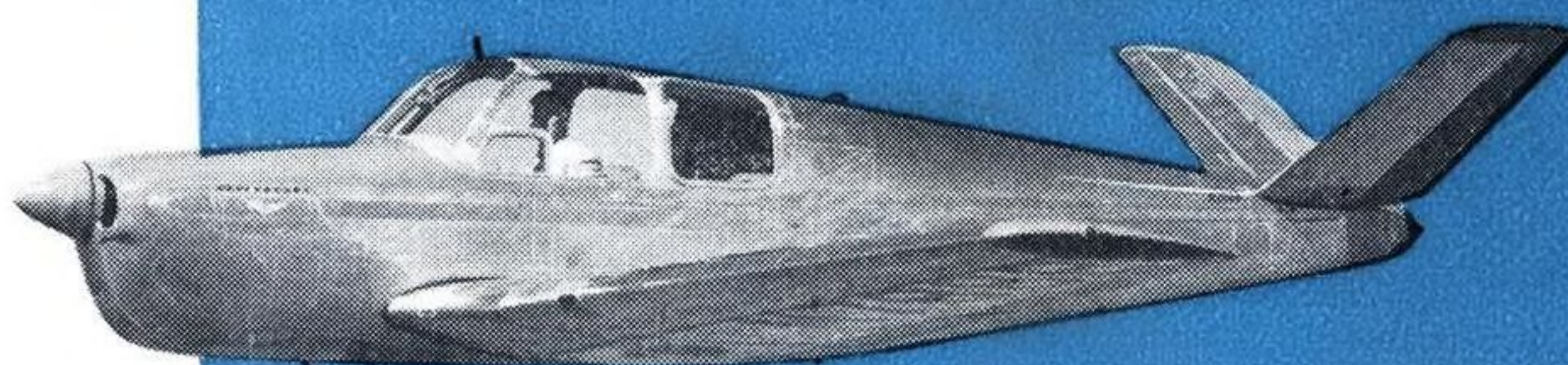
Beechcraft 45

The Beechcraft Model 45 Mentor is a two-place basic trainer to which the United States Air Force has just recently given the official number of "T-34."



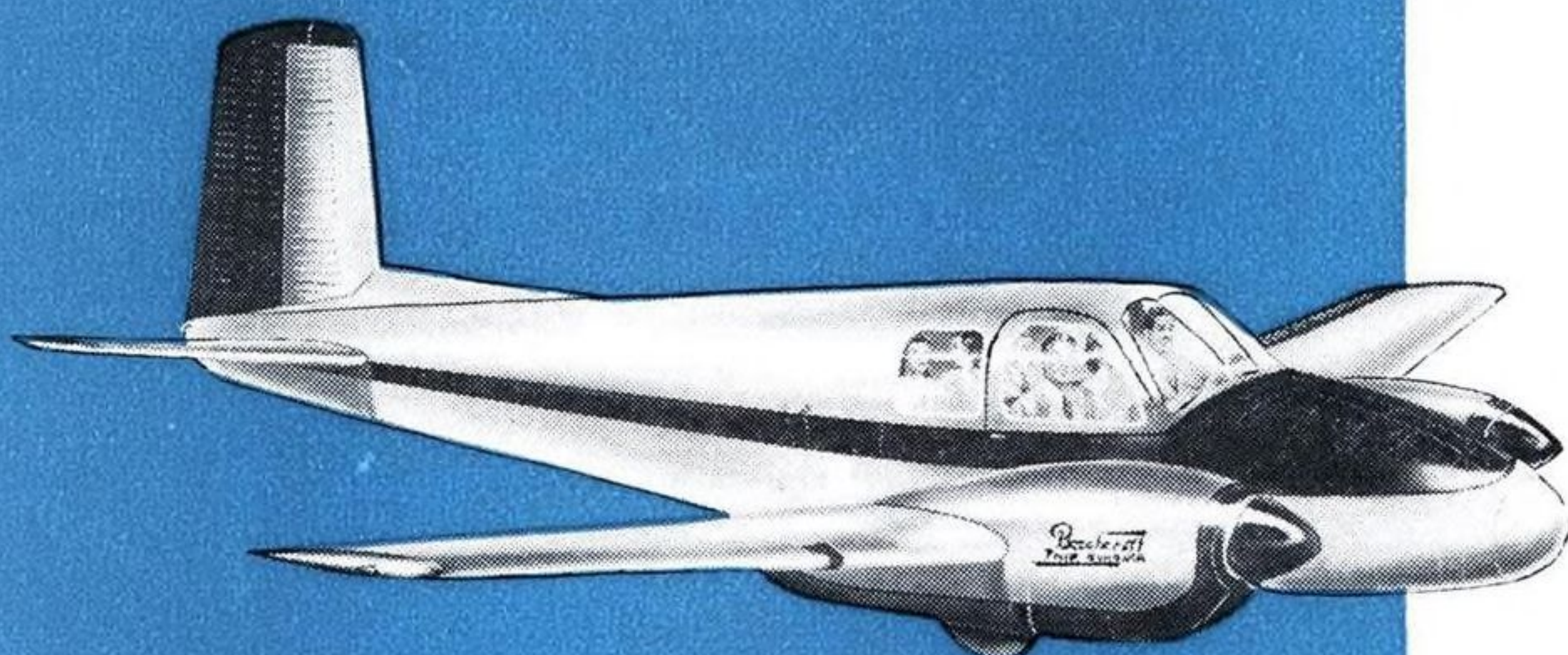
Beechcraft A35

The Beechcraft Bonanza cruises at 170 mph, carries four people in its comfortable cabin. Range is 750 miles; top speed, 184 mph. It combines safety, ruggedness, comfort, economy, speed and performance — is equipped for day, night, and instrument flight.



Beechcraft 50

The Beechcraft Twin Bonanza, shown here in an artist's sketch, is designed primarily as a 5-place airplane but will accommodate 6 people for short range flights. Preliminary estimates indicate a cruising speed of over 180 mph at a range of about 1000 miles. No deliveries expected prior to early 1950; approximately \$30,000 as delivered complete.



Beechcraft 34

The Beechcraft Twin-Quad Transport is a 20-passenger air carrier now undergoing further engineering. With four engines operating two propellers, the Twin-Quad represents a complete rationalization of aircraft design.



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