

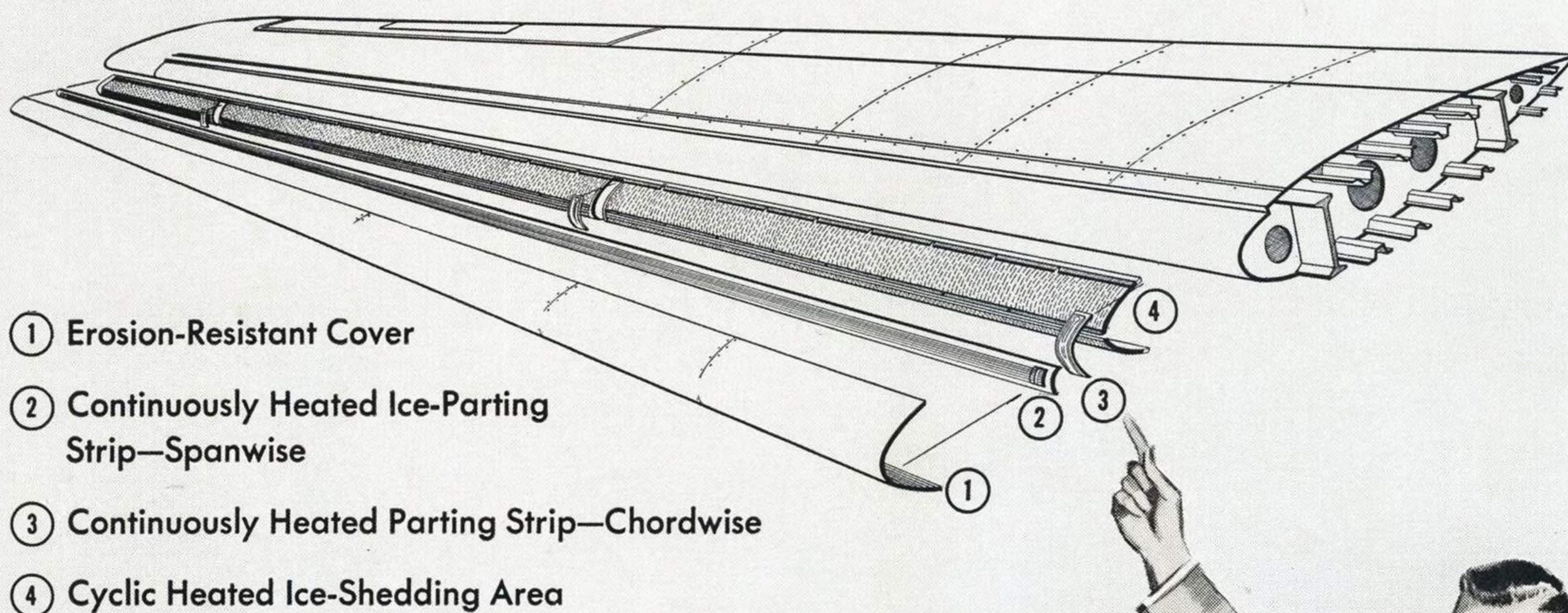
AVIATION WEEK

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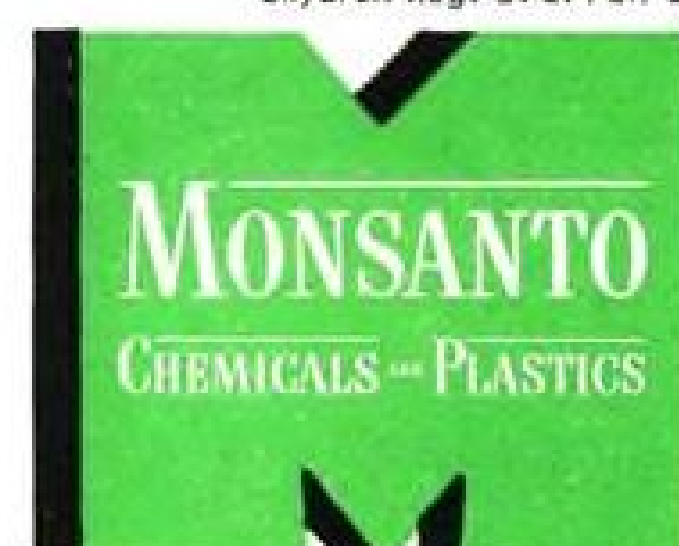
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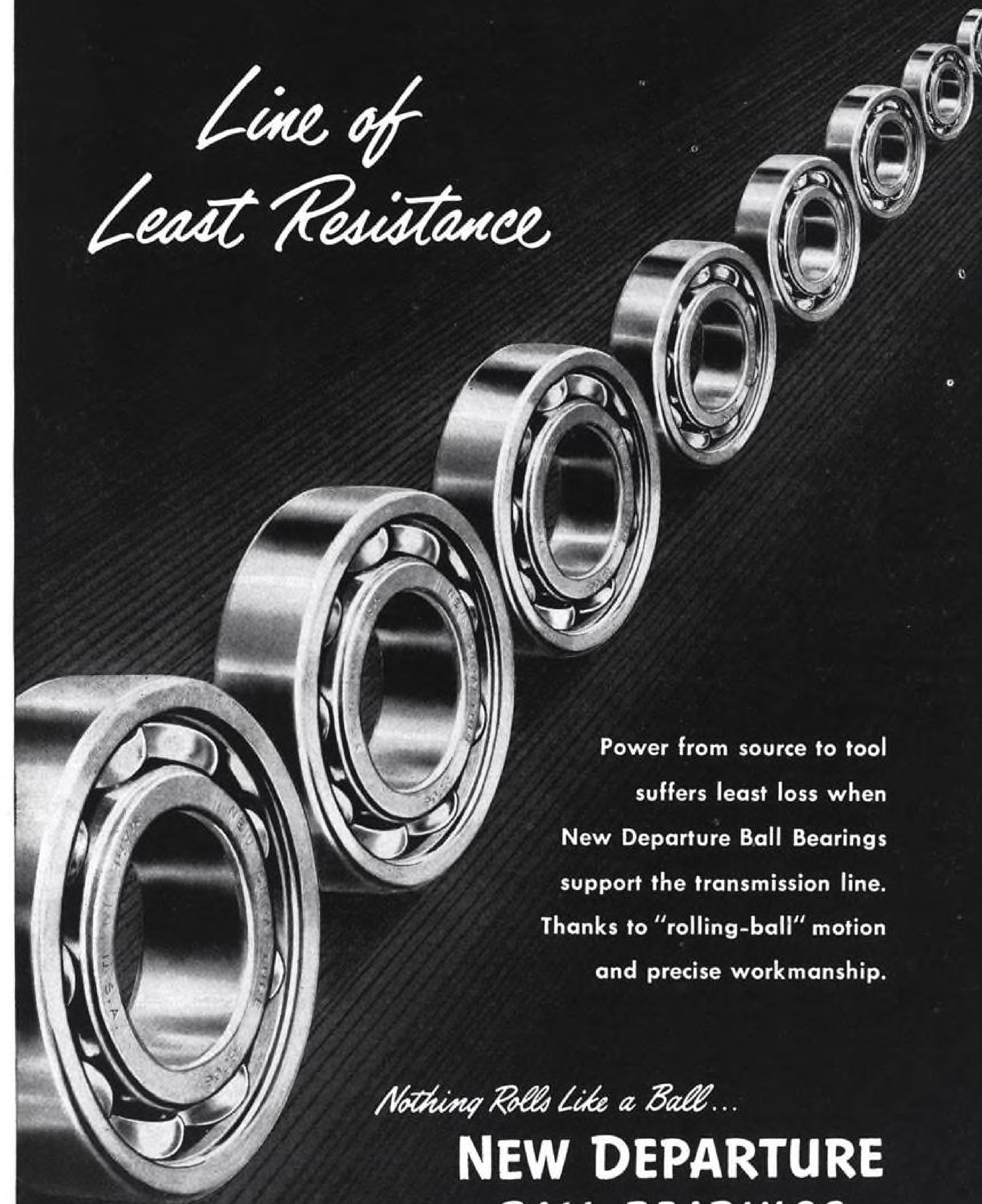
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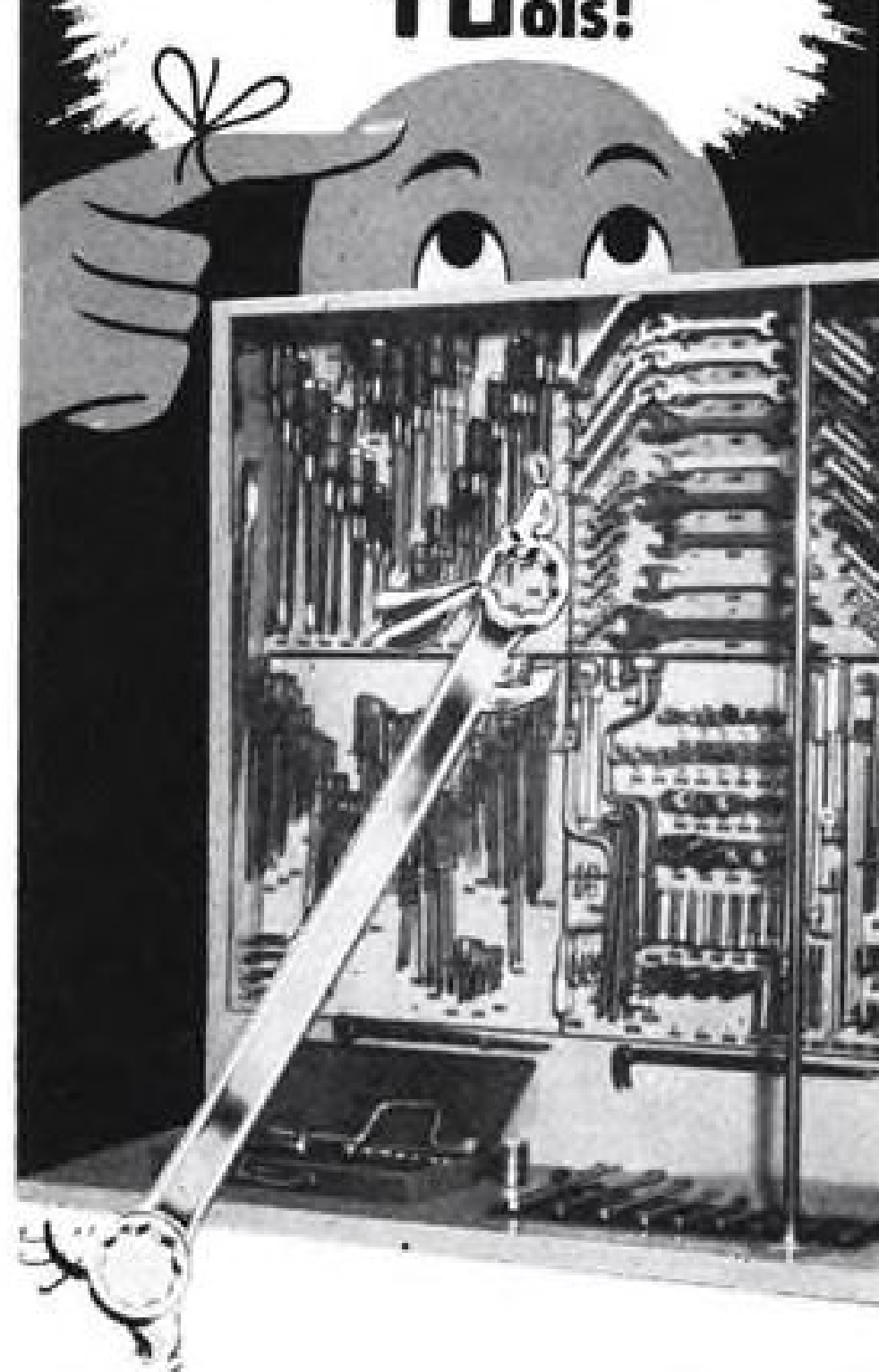
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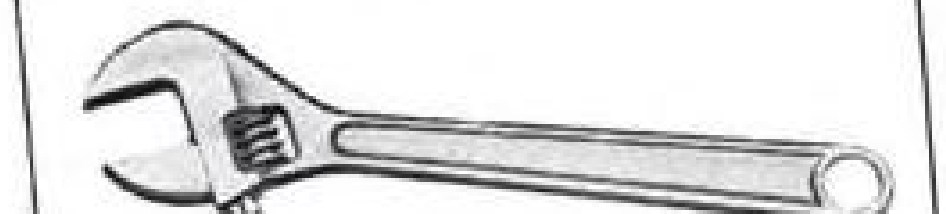
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Aviation Week



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Volume 54

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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 17, 1111 Wilshire Blvd.; San Francisco 4, 68 Post St.; Houston, 514 South St. Correspondents in more than 60 major cities.

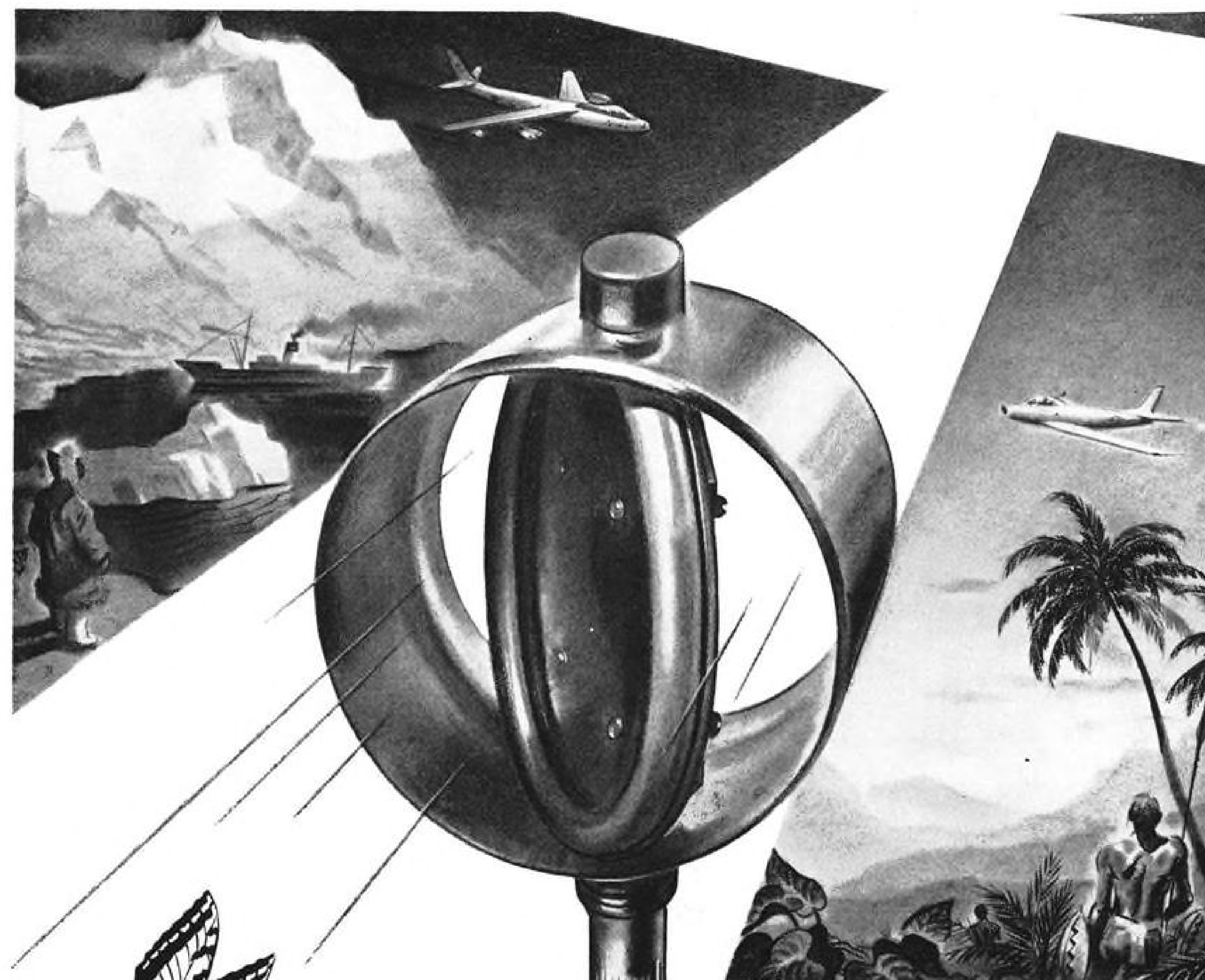
Foreign News Bureaus: London, Paris, Frankfurt, Tokyo, Bombay, Melbourne, Rio de Janeiro, Mexico City. Correspondents in more than 50 major cities.

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R. W. Martin, Jr., Sales Manager; J. G. Johnson, Business Manager; Anita Scaffo, Research and Marketing; Sales Representatives; J. C. Anthony, New York; M. J. Storz, Philadelphia; V. F. Disette, Cleveland; L. J. Biel, Chicago; W. E. Donnell, St. Louis; J. H. Allen, Dallas; R. C. Maulsby, Atlanta; J. W. Otterson, San Francisco; C. F. McReynolds, Los Angeles. Other sales offices in Pittsburgh, Detroit, Boston, London.

March 5, 1951 AVIATION WEEK Vol. 54—No. 10

Published weekly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder, Publication Office: 99-129 North Broadway, Albany 1, N. Y.
 Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 18, N. Y.
 Curtis W. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.
 Subscriptions: Address correspondence to AVIATION WEEK—Subscription Service, 99-129 N. Broadway, Albany 1, N. Y., or 330 W. 42nd St., New York 18, N. Y. Allow ten days for change of address.
 Please indicate position and company connection on all subscription orders.
 Single copies 50¢. Subscription rates—United States and possessions, \$6 a year; \$9 for two years; \$12 for three years. Canada, \$8 a year; \$12 for two years; \$16 for three years, payable in Canadian currency at par. Pan American countries, \$10 a year; \$16 for two years; \$20 for three years. All other countries, \$20 a year; \$30 for two years; \$40 for three years. Entered as second-class matter, July 16, 1947, at the Post Office at Albany, N. Y., under Act of Mar. 3, 1879. Printed in U. S. A. Copyright 1951 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Cable address "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.



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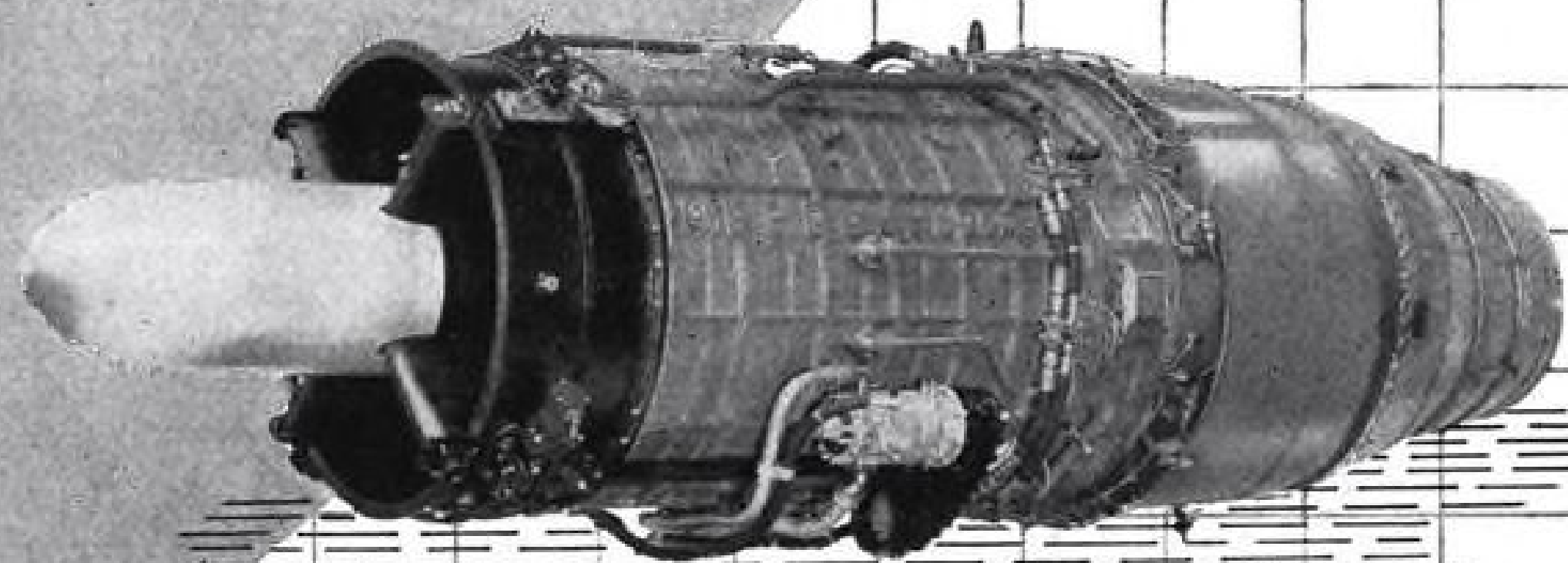
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NEWS DIGEST

DOMESTIC

Personal Aircraft Council announces shipment of 246 personal and executive aircraft in January. Shipments of the one- to 10-place planes by the 10 companies reporting had a total value of \$1,957,000, and included 153 of four or more places, 91 two-place and two single-place aircraft. December shipments by the same number of companies were 294 valued at \$2,130,000.

New Chief of the Navy BuAer after May 1 will be Rear Admiral Thomas S. Combs, 52, who has been ordered to Washington to succeed the present head of the Bureau, Rear Adm. Alfred M. Pride who is going on sea duty. Combs is chief of staff and aide to Adm. William M. Fechteler, commander in chief of the Atlantic Fleet. He was deputy and assistant chief in BuAer from 1946 to 1949.

Slick Airways has ordered three more DC-6As. This brings to six the total on order by the San Antonio cargo carrier. Another new Douglas order is for five DC-6Bs from Scandinavian airlines.

Mid-Continent Airlines' Convair-Liner crashed on takeoff from Tulsa Municipal Airport Feb. 27, but all aboard escaped serious injury despite the resulting fire that gutted the craft. Early reports indicated that the crackup was due to an engine failure.

Supersonic guided missiles production plant has been activated by Convair as a separate new division under contract to Navy's BuOrd. Initial output will be a highly classified anti-aircraft missile, possibly a shipboard-launched type. Plant occupies about 200,000 sq. ft. of floor space and will employ approximately 1500 in the next few months.

Pan American announced two agreements with other airlines. Under one, Eastern will operate New York-Miami PAA planes previously ferried empty between its bases at those two points. PAA crews will fly the planes under Eastern's name and control as extra EAL sections. Through the other, subject to CAB approval, Chicago & Southern and PAA will interchange equipment between Chicago, St. Louis, Houston and Mexico City, with PAA operating C&S Connies from Houston to Mexico City and PAA plans flying into Chicago with C&S crews.

Plans to resume the National Air Races elsewhere than Cleveland in 1951

will have a green light from Air Force and Naval Aviation for service participation unless war threat increases. Air Races general manager Ben Franklin has approached the Defense Department for revival of the event.

FINANCIAL

Douglas Aircraft Co. net sales for fiscal 1950 ending Nov. 30 were \$129,893,000, with net profit being \$7,124,000, equal to \$12.06 per share on the 600,000 shares outstanding. Dividends fiscal in 1950 amounted to \$6.25 per share, the thirteenth successive year in which the company has paid an average of \$5 or more per share. Backlog as of Nov. 30 rose to \$656,362,000 from \$275,499,000 the previous year. President Donald Douglas noted that the net worth of the firm climbed from \$73,230,000 to \$78,695,000 in the same period.

Continental Motors Corp. business improvement for the fiscal year ended last Oct. 31 showed consolidated net sales of \$96,404,468, a 31 percent increase over 1949. Net earnings were \$3,611,245, or \$1.09 per common share, the highest in five years. Fiscal 1949 total was \$1,801,205, or 55 cents per share.

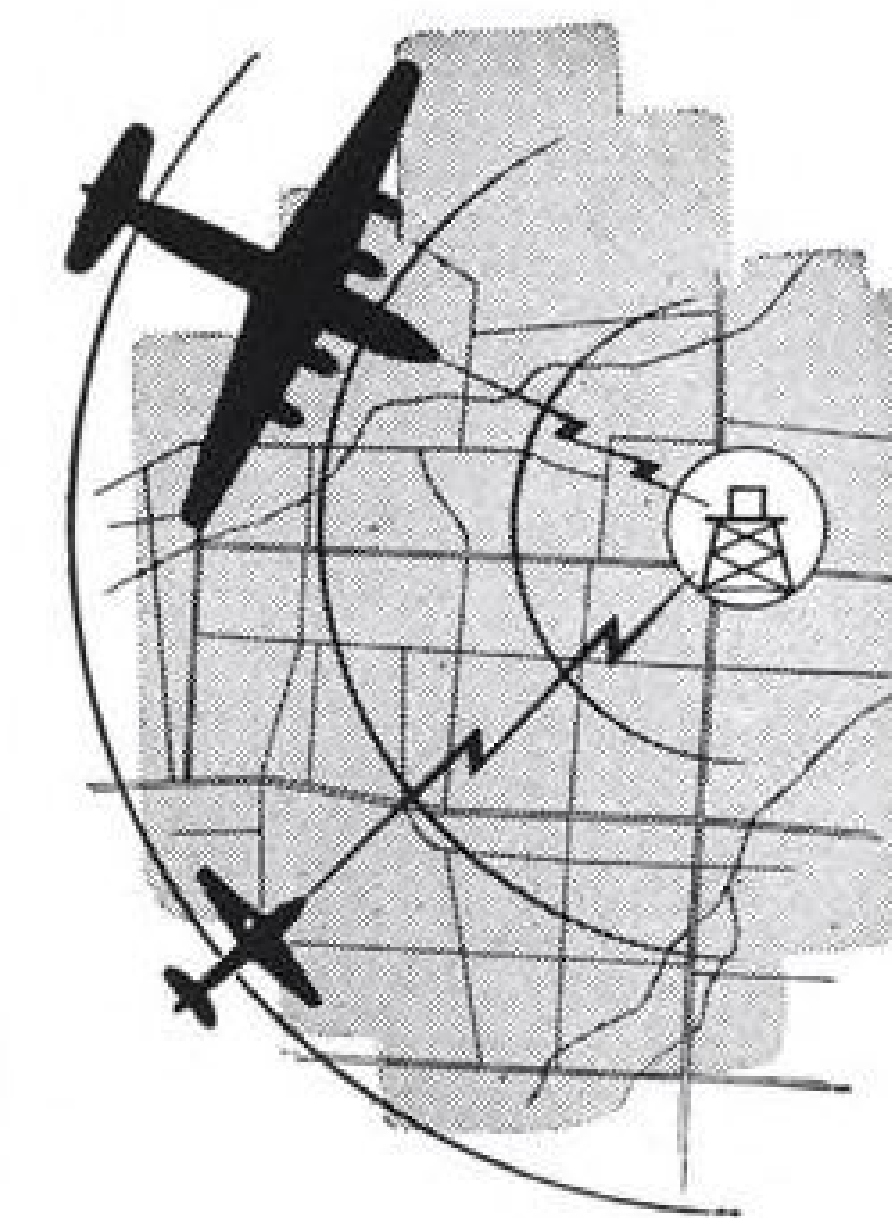
Pacific Airmotive Corp. net income was \$543,633, or 83 cents per share, for the year ended Nov. 30, 1950. The same period in 1949 showed a loss of \$24,962. Gross sales of \$13,702,547 were up 41 percent over 1949 and largest in company's 22 years.

INTERNATIONAL

In southwestern Sweden, completely underground operation of the Svenska Flygmotor Co., subsidiary of the SAAB Aircraft Co., is in prospect. Workmen are blasting an air pressure chamber out of rock 240 ft. below the surface and work has started on a subterranean workshop where Flygmotor will do the entire manufacture of jet engines designed in Sweden for the SAAB jet fighter, to replace the current J-29.

A jet aircraft factory for South Africa is the subject of preliminary negotiations reported by the Cape Town press. The "Star" said representatives of overseas manufacturers had approached the Defense Resources Board and that establishment of such a factory would be welcomed by the Government for defense and industrial reasons.

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SIDELIGHTS

Air Force

AMC Procurement field offices are now "procurement districts." Change has no effect on work the former PFO's do nor on contractors' relations with the offices, but is principally an internal housekeeping matter . . . Average Officer in the Air Force is 30.5 years old; average enlisted airman's age is 20.8; average officer in the Army is 36; average Army enlistee is 25, according to official figures . . . USAF has reactivated the wartime 12th Air Force with HQ at Wiesbaden, Germany. Commanded by Maj. Gen. Robert Douglass, Jr., all elements of USAF combat forces in Germany and Austria will come under control of the 12th.

People

Maj. Gen. W. H. Tunner is released from temporary command of Korean airlift to return to Washington. Brig. Gen. John Henebry replaces him . . . Brig. Gen. Jacob E. Smart becomes vice commander of Eastern Air Defense Force Mar. 1 . . . John O'Connell, ex-Curtiss-Wright public relations, joins Hill & Knowlton as an account executive . . . William A. Wheatley, 81, wins a Wings Club certificate of merit for his pioneer accomplishments in Aviation education; he developed and has supervised United Air Lines school and college service work.

Bog-Down at Columbus

Reconversion of the Lustron plant at Columbus to warplane production appears bogged down in the Senate investigation of RFC. There is also still substantial Congressional pressure to keep Lustron in housing, in view of the anticipated shortage of facilities for employes of new defense plants. If Navy gets it for planes, it's expected to be leased by North American Aviation, along with the adjoining former Curtiss-Wright plant which NAA already has occupied.

Industry

Representatives from seven manufacturers engaged in design and development of rocket power plants in aircraft have recommended establishing a rocket technical committee in AIA . . . Aviation Executives Club has been organized in Washington at the Dupont Plaza Hotel, where permanent facilities will open about Apr. 1. Ex-CAB Chairman Joseph J. O'Connell, Jr., is first president. Membership fees: industry resident members, \$48 a year; industry non-resident \$24; government aviation members \$12; bona fide aviation writers \$12.

Research

President Truman will soon ask for \$10 million to launch National Science Foundation program to promote basic research. Its 25-member policy board of top scientists and educators has been laying groundwork. But an administrative director hasn't been named although Congress voted \$225,000 in September to start the foundation moving.

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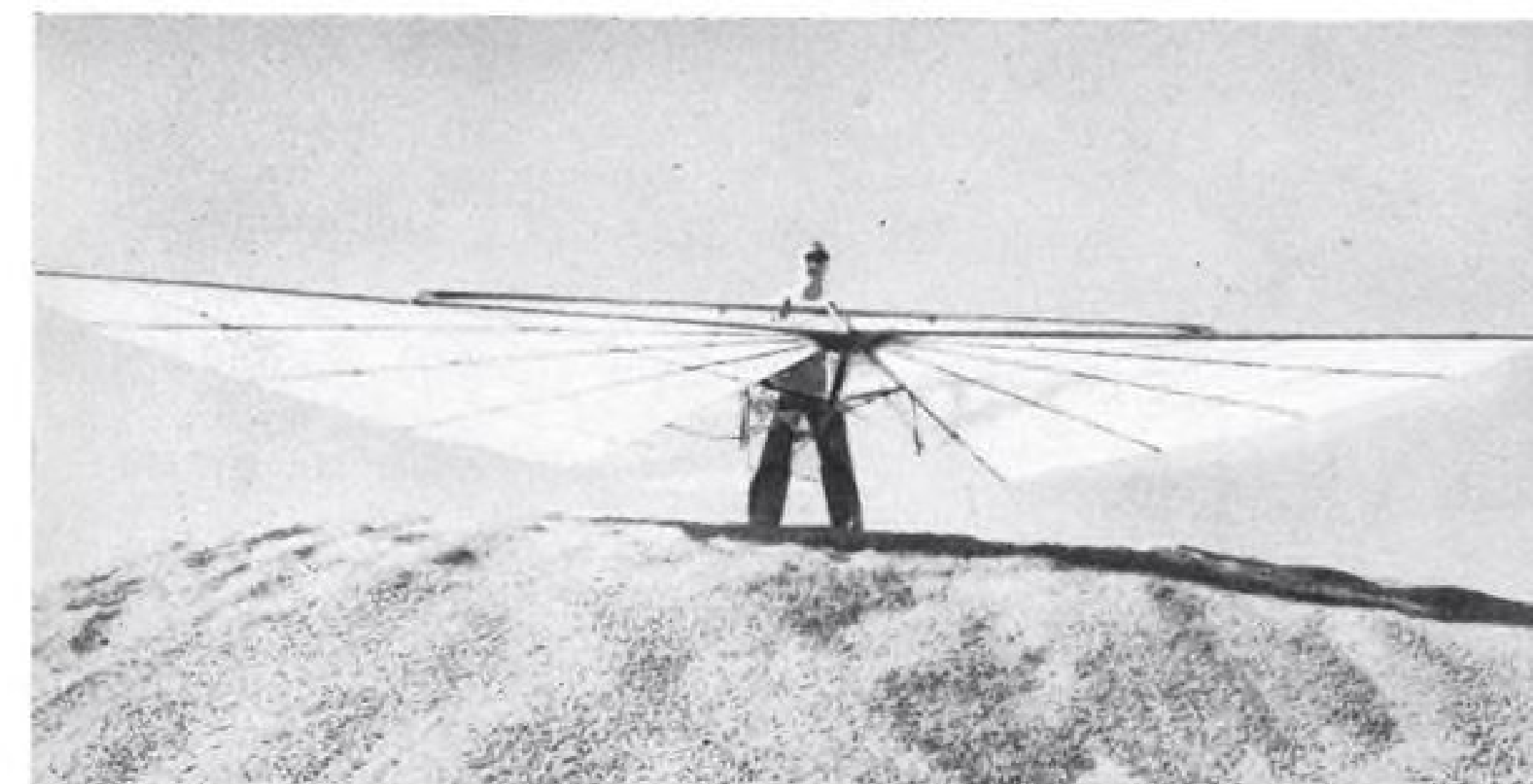
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ANOTHER SIKORSKY CERTIFIED—CAA has granted Sikorsky its third commercial helicopter type certificate, this one for the S-52-2, military version of which (YH-18) is shown in this flight view. The 3-4 placer has a 245-hp. Franklin. Note new tail fins, landing gear.



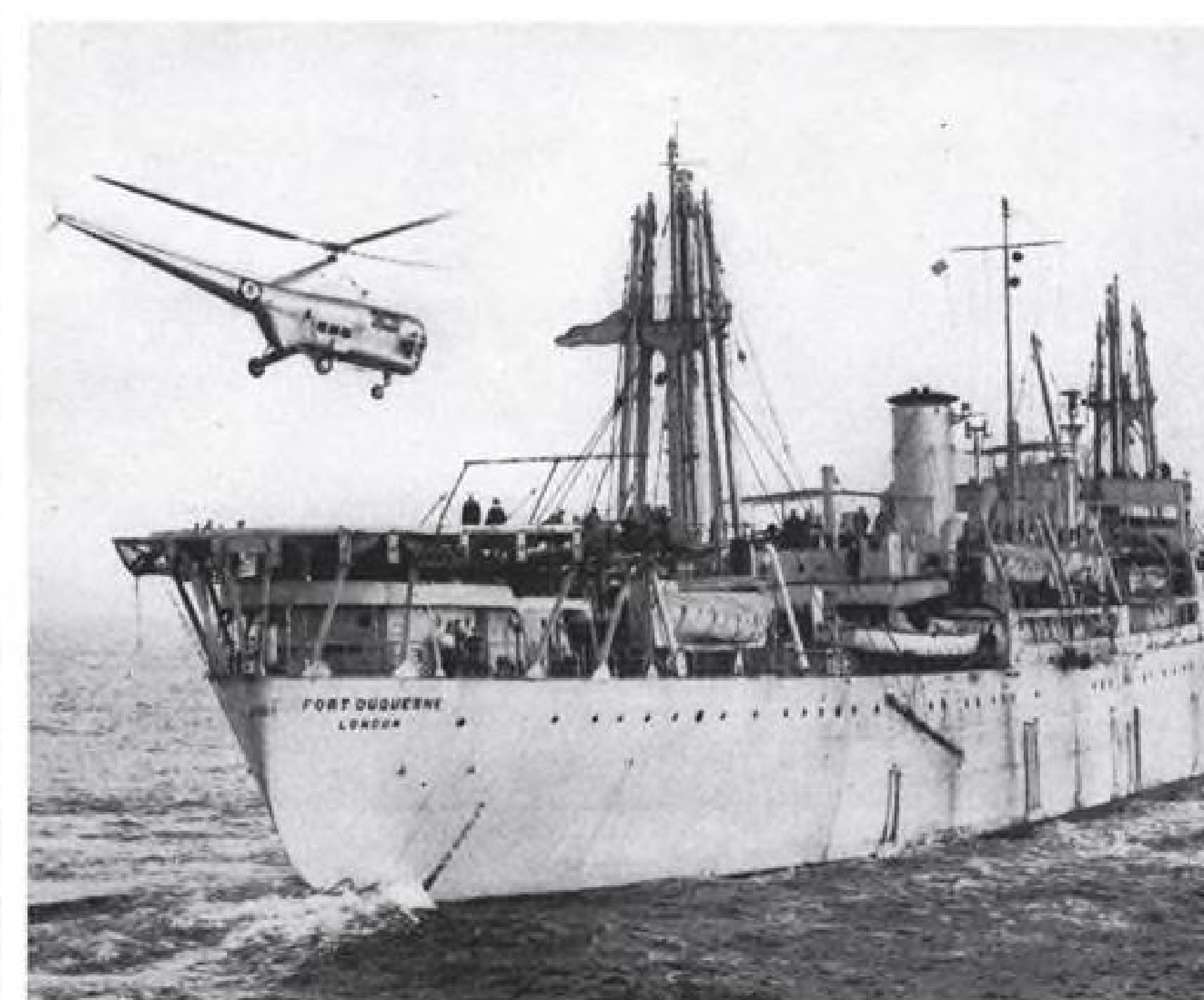
HOME-MADE FLYING WING—R. S. Ewers, Jr., La Junta, Colo., demonstrates a device built by his father, who is said to have flown 150 yd. using an automobile tow. He has reached altitudes up to three feet. Bars built into the wings enable them to be flapped.

Picture Highlights of the Week

SUPER TAKEOFF—Aided by the tremendous thrust of eight Rato bottles, Douglas YC-129 (USAF Super DC-3) makes a quick takeoff. Engines are two Wright R-1820-C9HEs.



CONVOY GUARDIAN—Royal Navy Sikorsky S-51 undergoes tests to prove the practicability of using copters to protect British merchant ships during hostilities.





On North American's New T-28 *Safety Glass* ... BY PITTSBURGH



Winner of an industry-wide design competition, North American's new T-28 advanced trainer embodies many safety features for the protection of beginner pilots. Important among them is better-than-standard visibility over the nose. This is accomplished by a flat windshield whose optical "perfection" is the result of close collaboration of Pittsburgh research, laboratory and production specialists with the design engineers who developed this aircraft.



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THE T-28, the newest, most modern and most popular trainer, is designed to help train Air Force pilots for ultra-high speed jet aircraft. On this plane—and in practically all of today's large commercial and military aircraft—pilots enjoy greater safety and comfort because of improved safety glasses and glazing techniques developed by Pittsburgh. They provide quicker, more accurate all-around vision for take-offs, maneuvers and landings, better protection from flight hazards.

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WHO'S WHERE

In the Front Office

H. V. Lindbergh has been appointed a vice-president of Kaiser-Frazer and will represent the firm at Fairchild E&A on the C-119 production program. Lindbergh joined K-F in 1933, coming from Heath Aircraft where he was in factory sales and engineering. He has served in design, sales and management capacities in the various Kaiser companies.

Charles S. Jackson has been named a vice-president of Boots Aircraft Nut Corp., Conn. He has been a director of the firm for the past five years.

Edwin C. Walton has been named vice president-general manager at Kaman Aircraft. He was previously acting general manager. Walton's connections in aviation go back to 1928 when he was with Curtiss-Wright and during World War II he served in the aircraft division of the War Production Board. Prior to joining Kaman he was again with C-W as European sales manager.

A. G. Postlethwait has been named vice president of Lord Mfg. Co., Pa., filling a vacancy open since 1946 when Thomas Lord was elected to the presidency. Postlethwait has been associated with the firm for 20 yr., is president of the Erie National Bank & Trust Co.

W. G. McDowell has been made president of Oakland Aircraft Engine Service and Thomas F. Lewis was named vice president. McDowell was chief aviation engineer for Union Oil Co. of California during World War II; Lewis began in aviation in 1930 with Western Air Lines. He was sales manager of Pacific Airmotive Corp.'s Burbank division prior to his present connection.

Changes

Herman Doege has been appointed director of the Republic Aviation-General Motors assistance program which will expedite F-84 production by both firms. Doege was formerly factory superintendent at Republic. Other changes made by the Long Island plane maker include: Richard Smith, coordinator of engineering; C. J. Kucyn, coordinator production control; Irving Lewis, coordinator of inspection; Phil Dorler, coordinator of tooling.

Carlyle H. Jones has been named manager of public information for Sperry Gyroscope . . . J. Copeland Gray has joined Bell Aircraft as special assistant in charge of manpower problems . . . Boyd Dahle has been made chief design engineer of Pacific Airmotive's Manufacturing division. R. M. Francis has been appointed chief project engineer, L. W. Reithmaier is now chief research engineer, and B. C. Gay has been made project engineer.

INDUSTRY OBSERVER

►Eglin AFB evaluation teams are testing Grumman SA-16, Fairchild C-119, Chase XC-123 and Douglas Super DC-3 aircraft to meet a Strategic Air Command requirement for long-range rescue missions. Requirement is for a plane with a 5000-mi. range, ability to get in over a 50-ft. obstacle, and land on a marginal strip, halting within 1000 ft. Plane, with a 20-passenger capacity, must be able to get off the strip, clearing a 50-ft. obstacle, using Rato, within 700 ft.

►First batch of Republic F-84E Thunderjets has been received by French Air Force under terms of Mutual Defense Assistance Program of the North Atlantic Treaty. French sources in Washington state that their country will have six squadrons of F-84 fighters in operation by the end of calendar year 1951.

►Premature publicity release of new Chance-Vought F7U-3 Cutlass contract by the company has caused some red faces at Navy Department. Funds for the plane are programmed out of the 3rd Supplemental budget yet to be presented to Congress.

►Industry circles are buzzing about the sudden way Air Force posted requirements for the 25,000-lb.-payload medium transport (see Transport Section). USAF, after chatting around aimlessly for more than a year, last month put out bids demanding that detailed engineering studies of the proposed plane be back in Air Force hands by Mar. 16, for evaluation. Some industry sources think Air Force has already made up its mind as to the "winner."

►Four of USAF's 86th Fighter Wing F-84 Thunderjets are being shown in a series of demonstrations to the Belgian air staff at Melsbroek Airport in Belgium. The country is scheduled to get a sizeable quantity of F-84 fighters under terms of MDAP. Meanwhile Belgian pilots are undergoing jet flight training at USAF bases in the United States.

►American Helicopter Co.'s lease of part of Falcon Field, near Mesa, Ariz., (AVIATION WEEK Feb. 26, p. 206), is for the purpose of continuing research and development work on the pulsejet X-45 which has been underway for the last three years. Company will base 100 workers at the field.

►Timing on first flights of the Boeing XB-52 eight-jet bomber, groomed as a successor to the B-36, depends largely on the speed at which development is pushed on the Pratt & Whitney J-57 axial-flow turbojet engine, which will power the XB-52. While the J-57 has already shown much promise in its test stand runs, the first one has yet to fly. It is due to get up soon suspended from the bomb bay of a B-50.

►Air Force has scheduled delivery of service test production quantity of Chase C-122C light transports now nearing completion at the company's Trenton, N. J., plant to Sewart AFB, Smyrna, Tenn. Planes will be used to equip the first assault troop carrier squadron at that base. Squadron is scheduled to study the aerial tactics for programmed assault plane troop carrier groups.

►Boeing B-47 and Martin XB-51 airplanes are now using anti-skid devices on their bicycle-type landing gears, and Wright-Patterson AFB officials say the devices will be used on tricycle-gear planes. One of the devices, the Decelostat manufactured by Westinghouse, is based on the relative speed of the wheel to an energy wheel. The other, the Hytrol developed by Boeing, uses a flywheel skid detector and a solenoid valve. But in both cases a valve is used to shut off pressure on the brake drum at the point where a skid begins, no matter how much pressure is applied on the brake pedal. The Boeing device is now being manufactured by Hydro-Aire, Inc., Los Angeles, under the name of Hydro-Aire. Reduced tire wear and reduced landing roll, regardless of pilot efficiency, are results of both systems.

Washington Roundup

"Emergency" Program: When?

Timetable for the "national emergency" build-up of defense has been slowed down—again. The plan now is that the budget request (a third supplemental of the rest of this year and 1952 fiscal year funds in "one package") to implement it will reach Congress "the beginning of April." That's the word the President has given to House Appropriations Committee Chairman Clarence Cannon. Original plan was to have the "package" arrive promptly after Congress convened.

Meanwhile, the country is still limping along on the modest defense build-up program, drawn up before the Russian-supported Chinese Communist onslaughts in Korea provoked the declaration on an emergency.

Cannon commented: "But the laboratory work is progressing—in Korea and here. The services are experimenting, studying, evaluating, to assure wise decisions when they move into mass procurement. They don't want to buy a lot of wrong equipment. Then, the industrial base is being expanded."

But generals and admirals below the top command are getting restless. They're responsible for fulfilling missions. They're not getting the wherewithal to do it. The funds they need for equipment and personnel are tied up in top policy-level talk.

Air Defense Command's Whitehead confided to senators: "Several months ago, I thought we were going to come along pretty fast. . . . But it seems to have slowed down. I certainly would like to have the means of carrying out my mission—with the least delay."

250-Group USAF?

What might have been the great debate over U. S. ground troops for Europe has fizzled for want of a real argument. USAF declined to supply it.

Two week's limelighted hearings before Senate Foreign Relations Committee developed that all the military services, really, were in basic agreement:

- **Holding action.** Build-up of a defensive land army in Europe strong enough for a holding action while strategic air blasts the industrial heart out of Russia is virtually a military "must." This would mean about 60 divisions and 60 supporting tactical air groups. There are now less than 20 divisions in Western Europe, including two U. S. divisions. If a U. S. contribution of four more divisions, plus tactical air support of probably four or five groups, spurs the European democracies to arm, the services consider it well worth while.

"It would be fatal to lose Western Europe," USAF's former Chief of Staff, Gen. Carl Spaatz, declared. Air Force generals who appeared, from Chief of Staff Gen. Hoyt Vandenberg down the line, agreed. Even Maj. Alexander de Seversky, strong advocate of intercontinental bombing, put the British Isles down as essential as a base for an air war against Russia.

- **But no land war.** There's no thought of an offensive land operation against Russia. That would take a minimum of 300 divisions supported by 300 tactical air groups, Secretary of Defense Gen. George Marshall estimated. There were only 91 divisions in Europe at the peak of World War II. The nearest military thinking comes to such strategy are the hints of Army's Chief of Staff Gen. Lawton Collins that atomic-headed guided

missiles and atomic artillery shells might make it feasible for a comparatively small Western ground force to win out over some 250 Russian divisions.

The debate will continue on the political level—is it the President's or Congress' prerogative to give the green light on the four divisions for Europe? But, factually, it's settled.

Net result is a key victory for USAF. The cautious testimony of USAF generals that the 95 groups, now planned by the end of 1952, isn't enough, mobilized congressional support for more airpower—and faster. USAF slid neatly into a position where it's going to be pushed by Congress into a bigger build-up.

"As a minimum, the Air Force should have as many groups as it had during World War II," retired Gen. Spaatz protested less cautiously. That would be 250. Congress probably won't push the goal that high. But senators are already demanding that Defense Department let the Air Force tell them what air power the U. S. "really" ought to have so they can fight for it. Gen. Vandenberg isn't telling the senators—yet. He won't—until and if Secretary Marshall succumbs to the demands and okays it.

USAF Generals Say

In testimony before the Senate Foreign Relations Committee, USAF leaders reported:

- **Gen. Hoyt Vandenberg.** On ex-President Hoover's proposal for an all-out build-up of Navy and Air Force: "I am very much in agreement with that portion regarding an increase in the Air Force."

- **Lt. Gen. Ennis Whitehead,** Air Defense commander. "Our air defense is not now adequate. . . . The airplanes are not coming as fast as I thought they would—and I can't go into their capabilities in public. . . . The programmed build-up will give a 'minimum' air defense. . . . First priority should go to a long-range striking force for a decisive offensive."

- **Lt. Gen. Harold L. George,** (now vice president of Hughes Aircraft Co.) protesting Whitehead's aim for only a "minimum" defense and Vandenberg's position that fool-proof defense is impossible, making offense the best defense: "The science and the capabilities of the American people can create an air defense that can punish the very devil out of Russia if she attempts to attack. We must have it—and be prepared to sustain it over a cold war of 20 or 30 years."

Navy, Army Say

- **Adm. Forrest Sherman.** "It's a fact of life that a war to prevent the over-running of Europe will have to be fought on the land. And we can't afford to have a hostile power move that much closer. It would give (Russia) outlets to the Atlantic for such attacks on naval sea and air power."

- **Gen. Lawton Collins,** on Sen. Kenneth Wherry's information "from a top military source" that studies show that at least 75 percent of the destruction on the enemy installations, tanks and other equipment in Korea was accomplished by USAF and Naval air: "Absolutely not. The best estimate is that 50 percent was by ground forces, 50 percent by air forces."

AVIATION WEEK

VOL. 54, NO. 10

MARCH 5, 1951



SUBCONTRACTORS tell what they can do; contractors show what they need.

New Way to Get Defense Orders

Prospective subcontractors get chance at area exhibits sponsored by AMC to inspect items they might make.

A new way of solving a production problem looming in the expanding aviation industry has been given a localized trial run in New York by the Air Materiel Command, with results indicating it may soon be standing practice elsewhere in the country.

The problem: lining up prospective subcontractors and suppliers quickly for prime manufacturers whose backlogs now have soared above \$4 billion.

The method: an exhibit by prime contractors of the things they want made elsewhere and open house for all manufacturers in the locality to come in and talk business.

► **Small Beginning**—The first show of this kind was winding up in New York last week at the offices of USAF's New York Field Procurement Office (now to become the AF Eastern Procurement District.) Originally, the show was scheduled for four days; it drew nearly 4000 firms seeking subcontracts, and was held over for another week as a result.

Representatives of AMC's districts in Boston, Chicago and Fort Worth studied the New York operation and it is expected those offices and the others at Detroit, Dayton and Los Angeles shortly will lay plans for their own shows.

► **Overall Benefits**—AMC's interest in an idea that started out as purely a localized affair underlines a problem that is

expected to become acute in the near future. In the last days of December and early in January, USAF obligated nearly all of the procurement funds so far made available.

This means that until a new appropriation is approved, AMC will have few contracts for the hordes of small businessmen that daily flock to Wright Field at Dayton. It also means that those same businessmen, squeezed by material and manpower shortages have a real survival problem without government orders. On the other hand, the prime contractors see no possibility of fulfilling their commitments without an army of subcontractors.

Both sides of that situation have spurred AMC to put greater drive behind a long-standing program of helping prime manufacturers find subcontractors.

► **Wright Idea**—Idea for the exhibit originated with Brig. Gen. Arthur Thomas, Chief of the New York procurement office, following a highly successful "private" deal put on with Air Force sponsorship by Wright Aeronautical about three weeks previously. Wright, which is getting set on a big Sapphire jet engine production program, was anxious to build up its subcontracting network. It arranged a display of sample parts in the New York office.

Possible subcontractors were invited by AF and Wright; local business pro-

motion organizations were contacted by both. In the first three days 1200 small business people came in to see what they could handle. So Gen. Thomas ordered that the Office get a reading on the other prime contractors in its jurisdiction.

AF personnel went to work alerting contractors, official state planning and development bodies, and chambers of commerce in eight Eastern states. The show, which began Feb. 19, was originally slated to exhibit the products of 27 big firms which had over 300 contracts totaling more than \$250 million.

The response proved overwhelming—800 small firms registered the first day, over 1000 during a day on which the weather was very bad, and at the week's end nearly 4000 small companies had sent representatives.

► **Everybody Happy**—The brief-cased, card-bearing businessmen poured onto the twelfth floor AMC offices at 67 Broad Street, and moved along the exhibit tables, fingering copier rotor gears, electronic bridges, big and small engine stampings; pouring over blueprints; throwing questions about tolerances and production runs at the astonished, hard-pressed, but happy representatives of the prime contractors ready with answers.

In turn, the contractors collected thick folios of questionnaires giving data on the production capabilities of the small firms, to be evaluated for letting of subcontracts.

Contractors' representatives were unanimous in their enthusiasm over the presentation. Bendix radio people told of the difficulty they had had previously in interesting firms in subcontracting a difficult radar part. In the first week of the show they had a list of 40 likely and eager prospects.

Philco had a harness operation involving delicate weaving of fine wire that it had been trying fruitlessly to farm out. Into the exhibit walked a representative of a fishing gear firm employing 200-300 women, well-versed and nimble-fingered through experience in weaving fine cord into fishline. The problem was discussed and Philco found a firm ready to tackle the job.

Stories like those were common all over the floor.

The system also operated well for would-be subcontractors who were able to make contact with larger firms interested in their special services.

As a result, Gen. Thomas ordered that the display run another week, and seven more prime contractors joined the original 27 exhibitors.



CANBERRA lands in U. S. at Andrews AFB, Md. after record trans-Atlantic flight and . . .



CREW left to right, Flt. Lt. A. J. R. Robson, Sq. Leader A. E. Callard, Flt. Lt. E. A. J. Haskett, is greeted by Air Commodore Ferdinand Swain, British Embassy RAF staff, and Maj. Gen. M. R. Nelson, USAF, requirements director.

night for engine inspection, the Canberra flew from Gander to Andrews AFB, a distance of 1155 mi., in 2 hr. 55 min.

►**Made Three Passes**—Although the Canberra is noted for its maneuverability and aerobatics, its arrival at Andrews was unspectacular. The ship made one pass high across the field to get its bearings; one low parallel with landing runway at approximately 450 knots; and a final low level pass over observers in demonstration of the Canberra's slow flying capabilities. Speed during the slow pass was reported later by Pilot Squadron Leader A. E. Callard, RAF, as 110 knots (126 mph).

USAF Secretary Finletter has already indicated (AVIATION WEEK Feb. 5) the plane is likely to be built in quantity in this country by Glenn L. Martin Co. for use as a night intruder on missions similar to those now being performed by the Douglas B-26 in Korea and by the earlier Douglas A-20 in World War II, in Europe. Plane's light wingloading, excellent maneuverability and high rate of climb make it especially adaptable for this work.

It is expected that the American-built Canberras will be powered with two Curtiss-Wright-built Sapphire turbojets rated at 7200-lb. thrust dry each, replacing the Rolls Royce Avon engines presently fitted in the British-produced models, rated at more than 6000-lb. thrust.

The Canberra wingspan 63 ft. 11 in. and length 65 ft. 6 in.—has a new modification, increasing its tail fin area, and a new fairing behind the cockpit.

►**Modifications Expected**—It is understood that if the plane is built in this country, the original Canberra design will be considerably modified for its new night intruder mission, to carry a heavy load of rockets, armament and radar, in place of the bomb load now provided for. Final decision to build the plane in this country has not yet been made. It probably depends on tests by USAF pilots undertaken in this country.

However, Air Force has evidenced considerable interest in the plane and Undersecretary John A. McCone stated that if the Canberra was produced in the United States, it would be manufactured by the Glenn L. Martin Co., Baltimore.

It is expected that twin production lines for the British-designed Canberra and Martin's own XB-51 will be undertaken by the Martin plant. The XB-51 is now completing final test flight before being delivered to USAF. Two have been built so far.

At the Canberra press demonstration at Andrews AFB, last week, the Martin XB-51, almost unnoticed by the crowd, circled above the field. It did not land.

English Electric's twin jet-engined Canberra bomber made its debut before the U. S. press and high ranking USAF brass at Andrews AFB, Md., last week, prior to completing the final leg of its journey for delivery to USAF's flight test section at Wright-Patterson

AFB, O. for evaluation test runs. The sleek all-weather fighter-bomber designed for tactical support operation flew from Aldergrove, Ireland, to Gander, Newfoundland, a distance of 2100 mi. in 4 hr. 40 min. setting a new unofficial record. After remaining over-

Who Will Build the Atom Plane?

Design race may already be under way among West Coast airframe makers as new work begins on atom engine.

It looks as if the builder of the first atom-powered airplane will be one of four West Coast manufacturers, with Consolidated Vultee likely to have the edge.

It is expected that the airplane will be the world's biggest aircraft when built, considerably larger than the experimental eight-engine Hughes Hercules flying boat.

The four most logical contenders to make the new atom-powered craft are:

- Consolidated Vultee, which has produced the B-36 bomber and the even larger XC-99 cargo plane;
- Douglas, whose big plane building experience goes back to the old XB-19 bomber, and the current C-124A cargo transport;
- Lockheed which has turned out the biggest passenger transport in this country, the Constitution; and
- Boeing, which has produced more big military airplanes than any other manufacturer, including the XB-15, B-17, B-29, B-50 and B-47, and has a new eight-jet giant bomber, the XB-52 now nearing completion.

There has been no hint yet as to when metal-cutting will start on an actual atom-powered aircraft, but it is logical to assume that several of these companies already have some designers at work on the project.

►**Designs Only Tentative**—Designs thus far, however, are only tentative until it is determined more definitely what form, size and weight the reactor powerplant and its shielding will take.

Recent announcement that General Electric Corp. is starting, probably within a couple of months, on what amounts to a Phase II contract for development of a powerplant that can be used with atomic fuel, was the first tipoff that atomic-powered airplanes are now considered definitely on the way to reality within the next few years.

GE issued the following statement: "Contractual negotiations are underway between the U.S. Air Force and the General Electric Co. for development of a nuclear power plant for aircraft. Subject to successful completion of negotiations it is expected that this activity will be carried on by the (GE) aircraft gas turbine division at Lockland, Ohio."

This followed announcement by the Air Force and the Atomic Energy Commission that after four years of research, the Phase I contract to Fairchild Engine and Airplane Co. to determine the feasibility of nuclear powered engines and aircraft had been completed.

►**GE Contract Indicative**—That GE received a contract for the second phase of the program can be taken as evidence that the practicality of the project has now been established.

Associated with Fairchild in its Phase I management contract at Oak Ridge, Tenn., as subcontractors were GE and eight other aircraft engine companies: Allison division, General Motors, Continental Motors, Lycoming Spencer division, Avco Corp; Pratt and Whitney division, United Aircraft; Westinghouse, Northrop Aircraft, Wright Aeronautical and Frederic Flader Inc. Several industrial laboratories and research consultants also have participated.

Main problem in constructing an airplane to be powered by atomic fuel, is how to carry the weight involved in the shielding needed to protect both personnel and instruments from the effects of radiation. It is estimated that a 100 hp. atomic powerplant would weigh about 50 tons with necessary shielding included in the total.

►**Attractive Advantages**—Advantages of almost limitless range plus virtually limitless power, to be achieved from the use of atomic fuel, however are so attractive as to overbalance the weight penalty of the shielding.

It is estimated that one pound of U-235, the fissionable material used in atom bombs, would supply enough power to do the work of 6 million gal. of aircraft gasoline.

Combined weight of the 10 engines and maximum fuel of a Convair B-36 has been calculated at 75 tons, which could be subject to replacement by an atomic engine.

Analysis of these estimates seems to indicate that an atomic powerplant which would supply sufficient power to equal the present B-36 powerplants' horsepower (41,800) would require such shielding weight as to be beyond the capacity of a plane the size of the B-36 to carry.

It follows that the first atom-powered plane will be presumably much bigger.

Besides the shielding problem, other problems which must be dealt with are: how to turn the atomic power on and off, and how to convert the heat into propulsive force.

One suggestion has been the use of a turbine, with a metal such as lead or mercury as the energy transmitting agent, rather than gas or steam. Such a turbine, geared to an aircraft propeller would provide a new ultra-powerful turboprop engine.

\$10.24 Million Profit Reported by Convair

Net profit of \$10.24 million is reported by Consolidated Vultee Aircraft Corp., for the fiscal year ending Nov. 30, 1950, as compared to a net profit of \$3.71 million for the preceding fiscal year, Floyd B. Odum, board chairman, announced last week.

Net sales amounted to \$256 million for the fiscal year, with a backlog of unfinished work as of Nov. 30 amounting to \$215 million. Since Nov. 30 substantial additional orders have been received further to augment the backlog.

Earnings for 1950 were \$4.36 per share compared to \$1.60 per share for fiscal year 1949. A dividend of 35 cents a share for the first quarter of 1951 fiscal year was declared payable to stockholders of record Feb. 16.

Principal orders are for additional quantities of the intercontinental B-36 bomber, and for the twin-engine T-29 trainer developed from the commercial Convair-Liner. Other orders are for Navy R3Y flying boats powered with turboprops. These are large cargo planes developed from the XP5Y-1 experimental patrol flying boat, also turboprop powered which has been flying in tests since Apr. 18, 1950. Convair also reports contracts for missiles and missile components.

►**New Production Order**—Sale of 15 Convair-Liners by Airfleets, Inc., Convair subsidiary, and a further demand for more Convair-Liners has led to the beginning of a new production order of 20 new and improved Convair-Liners, Odum said. (AVIATION WEEK reported Feb. 19 that Convair, since the first of 1951, has received orders for 61 Convair-Liner 340s, a larger 44-passenger version including 30 from United Airlines, 20 from Braniff Airways, eight from Continental Airlines, two from Arabian American Oil Co., and one from the Texas Co.)

First flight, Dec. 29 of the turboprop powered Convair Turboliner, purchased by General Motors Corp., was cited as another achievement in the commercial program.

►**B-36 Modernization**—A major conversion project underway at San Diego is the modernization of early B-36 bombers by addition of four jet engines in pods attached to the wings outboard of the six piston engines, and other modifications to up-date the older planes to status comparable with current production planes.

Odum reported that Convair had paid off in full loans which amounted to \$9 million as of Apr. 30, 1950, and is now operating on its own capital, with credit available up to \$20 million, if necessary.

Our Expanding Industry...

Allison division of General Motors received a large production contract for newly-developed J35-A23 turbojet engine which is rated in the 10,000-lb. thrust class. Both Allison and GM's Chevrolet division will work on the order, described as one of the largest single orders ever placed with GM...

Link Aviation Inc. has received a contract for F-89C flight simulators, boosting its backlog to approximately \$25 million. Link already has orders for simulators of the B-47B jet bomber and the F3D Navy jet fighter...

Whirlpool Corp., St. Joseph, Mich., home laundry equipment manufacturer, has received a sub-contract from Kaiser-Frazer Corp. for wing sections of the C-119C to be built by K-F at Willow Run...

Boeing Airplane Co. is planning construction of a \$5-million hangar across the street from its Seattle plant. Company has informally requested a 75-year lease on the site

from the county board of commissioners...

Bell Aircraft Corp. has taken possession of most of the former Globe Aircraft Corp. plant at Ft. Worth for assembly of jet engine nacelles of B-36 and B-47 bombers. This, plus 40,000 sq. ft. at another nearby site, will give Bell approximately 200,000 sq. ft. in the Ft. Worth area...

Seeger Refrigerator Co., St. Paul, Minn., has been awarded a \$4 million subcontract by North American Aviation for production of external fuel tanks designed by NAA. Seeger-built tanks will be used on the A, D and E models of the F-86 Sabre...

Luscombe Airplane Corp. has received new orders from Convair for "substantial quantities" of four major turret door assemblies for the B-36. Luscombe already is producing 26 types of B-36 door assemblies and is tooling to turn out B-36 elevators.

identity of the extruder, and the extruder's location. Thus the manufacturer will determine the extrusion producers who are tooled to produce his extrusion needs.

Previously there was no central source of such data. Each aircraft manufacturer was required to design his own dies for his particular needs, although duplicate dies, owned by other aircraft manufacturers, might have been already in existence.

►Where to Buy It—The catalog will be available for purchase by industry from the Superintendent of Documents, Washington, D. C.; from the Commanding General, Air Materiel Command, Wright-Patterson AFB, Dayton; or from the Commander, U. S. Naval Air Development Center, Johnsville, Pa. about Nov. 1, 1951.

Extruded Prop Blade In Production

Fabrication know-how has pushed the extruded steel propeller blade from a comparatively brief experimental period to a rapidly expanding pilot production status.

This blade extrusion process, first revealed by AVIATION WEEK, Nov. 13, 1950, evolved from a standing start about 15 months ago by the Propeller division of Curtiss-Wright Corp. at the Air Force Development Center, Adrian, Mich., under sponsorship of the Manufacturing Methods branch of the Industrial Planning division and the Propeller Laboratory of the Engineering division, Air Materiel Command. Aid of the metal working industry was also enlisted.

Starting with a 400-lb. steel billet, three simple extrusion steps give a rough blade in the form of a tapered wall, seamless, round tube with ears running from shank to tip which become solid leading and trailing edges of the hollow blade after the flattening process.

(Production details and advantages of the process will appear in a forthcoming issue of AVIATION WEEK.)

\$6-Million Projects For Hawaii, Johnston

The U. S. Corps of Engineers has announced it will spend more than \$6 million to improve air bases on Hawaii and on Johnston Island in the Pacific Ocean area.

At Hickam Air Base, outside Honolulu, a 13,100-ft. strip will be built, capable of handling the largest land-based planes the U. S. has, jet or otherwise. The 2½-mi., 100-ft.-wide strip will span both Hickam and adjoining Honolulu airport at a cost of \$1.5 million.

Army Buying

Funds set aside for purchasing four Chase C-122C transports.

First indication that Air Force and Army have agreed to ease present weight limitations now prohibiting Army from buying heavy aircraft is the new scheduling of Army funds to buy four Chase C-122C light transports.

Under terms of a procurement agreement at the close of World War II clinched by the Armed Force Unification Act of 1947 Army was stopped from direct buying of fixed-wing aircraft weighing more than 2500 lb. and rotary winged aircraft weighing in excess of 4000 lb.

Further confirmation of the easing of weight restrictions is seen in the report that Army has programmed "a large number of Beech model 50 (Twin Bonanza)" for purchase from Ordnance funds out of the 3rd Supplemental scheduled to be forwarded to Congress shortly.

Army in fiscal 1951 budgets to date has been authorized to spend approximately \$40 million for aircraft procurement. Estimates are that those funds will be upped by \$150 million more in the proposed 3rd Supplemental bill and basic 1952 budgets.

Pentagon sources say that if weight limitations are eased, Army funds for aircraft will probably be augmented still further. Army is particularly anxious to expand its helicopter development activities as well as its procurement of service helicopters.

Last year Army spent its plane procurement funds in a ratio of 4 to 1 for helicopters. Army pointed out that this was a dollar figure not a unit plane item. Out of every \$5, said Army, \$4 went for purchase of helicopters and only \$1 bought fixed-wing aircraft.

While Army will maintain its currently planned development and purchase of rotary winged aircraft—in fact increase it—the ratio will change somewhat in favor of fixed-wing equipment, at least for the time being.

Here are the principal data for the first two planes which Army will buy:

•Chase C-122C—powered by two 1425 hp. Wright 1820 engines, the C-122C has an empty wt. of 19,000 lb., and a max. wt. of 40,000 lb. range at maximum weight at optimum cruising speed, sea level is 1000 mi. max. speed is 240 mph.; cruising speed, 200 mph.

Flight compartment in nose seats two and cargo hold is 31 ft. 8 in.; 7 ft. 8 in. wide and 6 ft. 6 in. high. Usable floor area 240 sq. ft. and cubic capacity of 1560 cu. ft.

•Beech mod. 50—Known commercially

here as the Twin Bonanza, model 50 is powered by two Lycoming engines developing 240 hp. ea. With seating arrangements for six, the plane has an empty wt. of 3750 lb. and a max. wt. of 5500 lb. Wing span is 45 ft. 3½ in.; and length is 31 ft. 6½ in.; height is 11 ft. 4 in.

Range at 10,000 ft. and 60 percent power is 1005 mi.; service ceiling is 20,400 ft.; and cruising speed is 191 mph. at 10,000 ft. and 65 percent of power.

Army will use the plane as a multi-purpose transport for missions such as: air evacuation, liaison, cargo carrier, and executive transport. Designed to operate in all types of weather, the plane can land over a 50 ft. obstacle in 1137 ft. with full flaps and takeoff over a 50 ft. obstacle in 1050 ft.

Fairchild Builds New Guided Missile Plant

New indication of the general step-up in U. S. guided missile procurement is that new facilities for the Guided Missile div., Fairchild Engine and Airplane Corp. will be constructed on a 32 acre site at Wyondanch, L. I., N. Y.

Construction of the first unit, a 155,000 sq. ft., one-story plant, will begin this month, Fairchild has disclosed. It is scheduled to be in full operation by Sept. 1. Plant cost is estimated at \$1,750,000.

Planned to fit the special requirements of missiles and missile guidance

system development, the new Fairchild plant will include a shielded laboratory designed to be completely free of electronic interference. This and several other areas of the plant will be air conditioned. Equipment to stimulate temperatures 65° below zero and the pressure and humidity conditions encountered at very high altitudes, will also be incorporated.

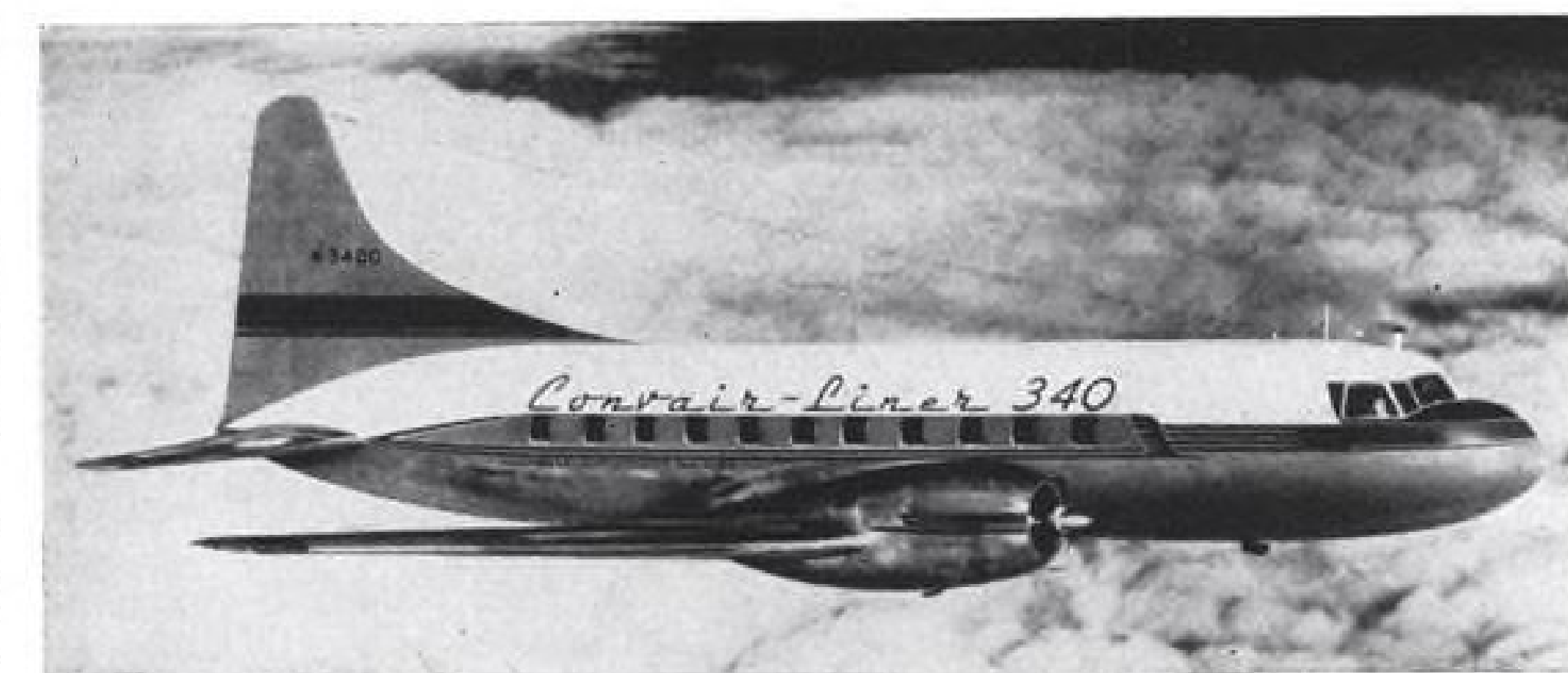
The building is designed for expansion and the site is suitable for construction of up to one million square feet of factory space. The plant, in addition to including extensive research and development equipment, will be tooled for initial production of the division's current missiles and a prototype quantity of new missiles.

Ramspeck Leaving ATA for Government

Air Transport Assn.'s executive vice president, Robert Ramspeck, plans to vacate that post to take over as chairman of the Civil Service Commission.

The President nominated him to the \$16,000-a-year government position last week. Quick Senate confirmation seemed assured for the new appointment of Ramspeck, who is a former Democratic representative from Georgia, who served as whip in the House.

Adm. Emory S. Land had already announced he planned to resign as ATA president at the end of 1951. Land said there were no immediate plans for choosing a successor to Ramspeck.



Orders Grow for Convair 340

Orders for four Convair-Liner 340 transports, plus option for two additional 340s were placed by Hawaiian Airlines last week, boosting Convair's 340 backlog to 65 orders since Jan. 1, plus the additional two on option.

The 44-passenger planes will be the first pressurized and airconditioned planes to provide local service through the Hawaiian Islands.

Deliveries are to start in 1952, Lamotte T. Cohu, Convair president and general manager said. Planes will have

1700 gal. fuel capacity making it unnecessary to install extra tanks for the long ferry flight to Honolulu.

The 45,000 lb. gross weight 340 now has a 105 ft. 8 in. wingspan and will take off at full gross load at sea level from 4020 ft. runway. It will land at its maximum landing weight of 44,500 lbs., on a 4250 ft. runway, at sea level. The improved landing and takeoff performances at higher gross weights make the plane especially suitable for the Hawaiian routes, Cohu said.

Dies Pooled

AMC project cataloging extrusion shapes will speed plane production.

A new standardization program for aircraft extrusion dies, announced by the Air Materiel Command's Supply Division will have an industry-wide effect, both on aircraft companies, and on aluminum and magnesium extrusion producers.

The program provides for all aircraft manufacturers who are Air Force contractors, to submit to the Supply Division at Wright-Patterson AFB, Dayton, complete lists of aircraft extrusion shapes which they consider active. The division will screen these lists to eliminate any dies for which it is decided that no foreseeable need exists.

►Dies in Pool—The participating aircraft manufacturers will relinquish all proprietary or exclusive rights to their extrusion dies and permit the dies to become available to all manufacturers taking part in the program and agencies requiring them. This will make it possible for any extrusion manufacturer in the pool to use any die in the pool for production of an extrusion to meet a military requirement of any aircraft company in the pool.

The extrusion producer will maintain and replace all dies broken or worn be-

yond repair as long as there is a foreseeable future requirement.

Upon completion of the screening process, the Supply Division will determine interchangeability and cross-reference of aircraft manufacturers' part numbers and extrusion die numbers, and complete data.

►Catalog Service—Then the Air Force Catalog and Coordination Section will publish a catalog for use by participants in the agreement, and by government agencies.

This catalog, "Aircraft Extruded Shapes—Aluminum and Magnesium Alloys," will be a revision of Air Force Technical Order No. 00-45S-2. The catalog will provide an engineering handbook for design and development work. It will give data relative to availability and interchangeability of die shapes required for maintenance and supply, and a consolidated cross-reference of sources for procurement or disposal of extruded shapes, to armed services personnel and the aircraft industry.

It also will include data regarding properties such as area list of dimensional factors, index of shapes, and various specification references.

For example, an aircraft manufacturer might need a two-inch standard angle-shape stock for use in an aircraft. He will consult the catalog, find an extrusion of the design he needs, its part number, its designer, the number of dies available, the die number, the

FINANCIAL

Capital Air Lines Cuts Its Debt

Carrier converting Series B debentures to common stock; possibility seen of dividends this year.

A major reduction in debt is being achieved by Capital Airlines in calling for redemption all of its 4 percent convertible debentures, series B, due Sept. 1, 1960.

In effect, the company is forcing conversion of the issue. Each debenture is convertible into common stock at the rate of 90 shares for each \$1000 debenture. At recent market prices for the common, this establishes a valuation of around \$1280 for each \$1000 principal amount of debentures.

Should holders choose to take the cash redemption payment, they will receive only \$1025 plus accrued interest. Unless conversions are effected before Mar. 12, 1951, the redemption date, a material market loss will be sustained by such holders.

► **Diluting the Common**—This conversion of the Series B debentures will considerably dilute the equity. At Dec. 31, 1950, Capital had a total of 527,855 shares of common stock outstanding. Assuming all of the Series B debentures are converted, an additional 248,355 shares of common stock will be created, thus increasing this equity by more than 46 percent to a total of 776,210 shares. A total of 20,468 additional shares will be created when the remaining options, issued to key employees and officers in December 1948, are exercised at \$5.50 per share. This will bring the total issued common outstanding to 796,678 shares.

Of greater significance is the substantial improvement in the Capital financial position achieved by this recent move. At the completion of the conversion of its Series B debentures, the company will have reduced its funded debt to \$3,455,500. The measure of this reduction can be appreciated when contrasted with the debt existing at Dec. 31, 1946. At that point, outstanding debentures amounted to \$9,850,000 plus \$4 million in extended notes payable due the banks. Moreover, on Dec. 31, 1946, current liabilities exceeded current assets by about \$360,000. As of Dec. 31, 1950, net working capital approximated \$838,000.

► **New Obligations**—While previous obligations are being liquidated, new ones are being created to a lesser degree. These are in the form of notes payable issued to finance the acquisition of five Constellations and related parts. It is

significant that these notes are non-interest bearing and are payable to Lockheed Aircraft Corp. in monthly installments over a period of from 31 to 35 months from the first day of the second month following dates of delivery. Originally, these notes aggregated \$3,332,506. As of Dec. 31, 1950, payments of \$387,275 had been made, leaving a total of \$2,945,231 of these notes outstanding at that point.

The company recently ordered two additional Constellations for delivery in January, 1952 to be paid in the same manner. In effect, this type of financing is on a pay-as-you-go basis and can be construed as self-liquidating. Current depreciation charges are more than 1.5 times the required monthly payments on the five Constellations.

Continued debt reductions should be effected during 1951 through sinking fund operations. Each May 1, the company is required to pay \$500,000 into the sinking funds for the retirement of debentures, if available net income permits. This condition prevailed on the basis of 1950 results. With earnings on the upgrade, available net income for 1951 can easily facilitate the sinking fund payments due May 1, 1952, thus anticipating further debt purchases this year.

During 1950, Capital, through its sinking fund operation, acquired \$259,000 principal amount of its 3½ percent debentures and \$343,500 of its Series A issue. Both of these issues were purchased at a discount from par, resulting in a gain of \$120,409 to the company over the year.

► **Reorganization Helped**—There is no doubt that the company's financial reorganization, achieved late in 1948, facilitated the rapid debt retirement program since effected. Prior to that time, the indenture provisions surrounding the 3½ percent debentures, then outstanding in the amount of \$9,850,000, proved to be a millstone around the management's operations. The company was precluded from raising any additional funds to finance badly needed equipment.

The recapitalization plan called for the relaxation of the old indenture provisions and, as an inducement, the debenture holders were offered an exchange of the new Series A and B debentures in equal amounts. The Series

A carries a fixed 4 percent interest return but is non-convertible. The Series B also carried a 4 percent interest return but was subject to available earnings, the same as the old 3½s. But the B series are convertible and attracted many investors.

It is significant that while the majority of debenture holders accepted the exchange offer, a substantial number did not. In retrospect, this is one time where the "hold-outs" did not do as well as those who went along with the plan. For example, the "hold-outs" have a market value of around \$850 per debenture compared to an aggregate average of \$1120 for those who made the exchange.

► **Mail Award Helped, Too**—There is no question that Capital was also helped considerably in 1948 by a retroactive mail pay award of around \$4 million. This went a long way in relieving the financial strain at that time. The company's permanent mail rate is on a sliding scale basis and as its passenger volume increases, its mail rate declines in proportion.

This is plainly evident in the 1950 showing of passenger revenues of \$22,179,403 against mail revenues of \$3,816,875. During 1949, revenues were \$19,237,207 and \$4,567,313, respectively.

If figured in a ton mile rate, Capital was paid an average of \$1.02 per ton mile in 1949 and only \$0.71 in 1950 for carrying the mail. On this basis, the company is moving very rapidly from a "need" mail carrier to the group considered in the compensatory service class.

During 1950, Capital succeeded in disposing of the 136 surplus engines it purchased after the war for use on aircraft then on order, for which orders were subsequently canceled. It realized about \$1 million in this sale, taking a loss of approximately \$237,000 in the process. But this loss served to reduce the company's tax liability for the year just finished.

Net earnings for Capital in 1950 were the best in its history. The net income from operations, after taxes, came to \$1,066,841, and compared with \$834,178 for 1949. In keeping with industry trends, Capital's earnings for 1951 are currently running substantially ahead of 1950.

No dividends can be paid on the common stock until the deficit in the earned surplus account is cured. This deficit was reduced to \$415,393 at the 1950 year-end, representing a substantial improvement over past periods. If earnings continue at their present rate, Capital may no longer have a technical bar to dividend payments on its common stock by the time 1951 will have come to a close.

—Selig Altschul

PRODUCTION

AMC Expediter

New Industrial Planning Division will help solve manufacturer problems.

Second phase of the overall Air Force industrial mobilization program went into action recently when Air Materiel Command's Industrial Planning Division at Wright Field assumed a new name and role as the Production Resources Division, under the same chief, Brig. Gen. Alfred H. Johnson.

Gen. Johnson said the new division's assignment would be to help manufacturers in the Air Force program fill their manpower requirements, locate scarce metals and materials, and act as a general trouble-shooter and bottleneck-breaker for any contractor who needs assistance.

Further industrial planning will be continued by a separate section within the new division. But the broad outlines of the industrial plans for the present emergency are now defined, and the industrial mobilization is already proceeding along these lines. So now Air Force planners see as their principal work the job of sparkplugging the national aircraft production program.

While some difficulties resulting from shortages of manpower, materials production equipment and facilities are inevitable, Gen. Johnson's new division is working to hold this to a minimum, well below the high confusion levels of early World War II days.

► **Veteran Nucleus**—He is building his new division on a nucleus of veteran industrial planning analysts and specialists from the old division, and upon AMC studies of production procedures in many industries and nations. The Production Resources Division has been part of an overall plan for the last five years. U.S. trade groups, such as the National Tool Builders Assn., Aircraft Industries Assn. and Society of Automotive Engineers, have worked with the Air Force in setting up plans for the new division, and have offered to assist in its activities, now that it is established.

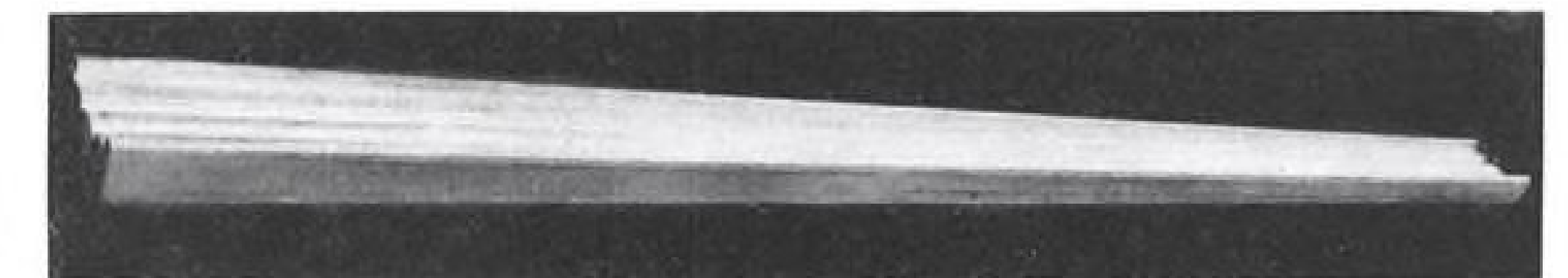
Gen. Johnson said: "Because of the extensive and realistic planning by all concerned, the Air Force has a good start at licking production problems. For example, we already have a panel of manpower specialists to help industry locate skilled labor of every type. Also, we have a group of materials expeditors to assist our contractors in locating sources of scarce metals and materials.

"One accomplishment already paying off handsomely is the stockpile of spare machine tools put in storage by the industrial planning division at the close of World War II. These tools are now invaluable. They are being apportioned to Air Force contractors as their needs warrant."

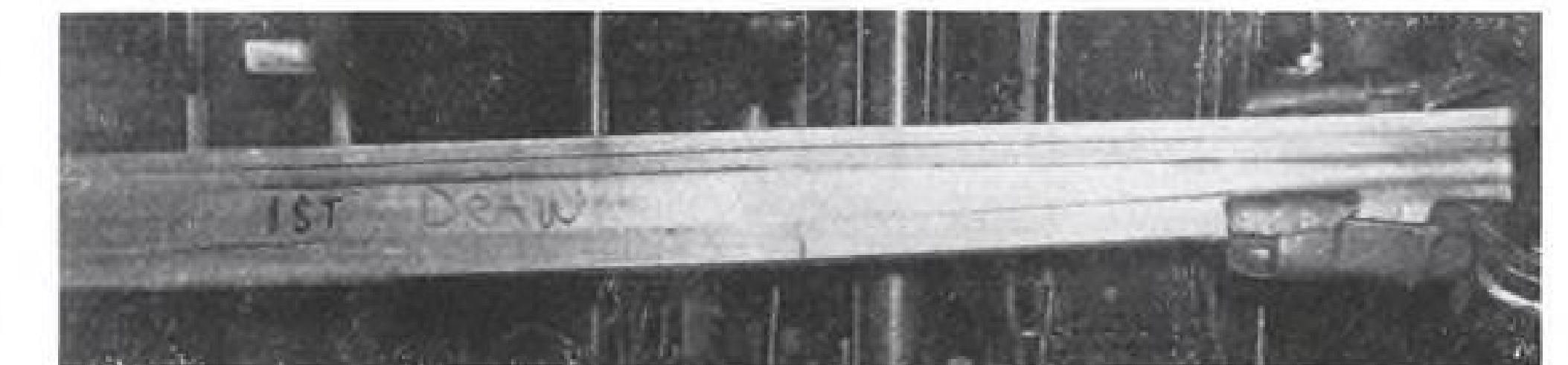
Another major activity of the new PRD will be to help manufacturers find suitable production facilities. If a contractor needs additional plant capacity, the division will assist him to locate suitable facilities engaged in non-military production, and to convert them

to fit the needs of the Air Force. PRD aid is available to all prime contractors and subcontractors engaged in Air Force work. Headquarters will be at Wright-Patterson AFB.

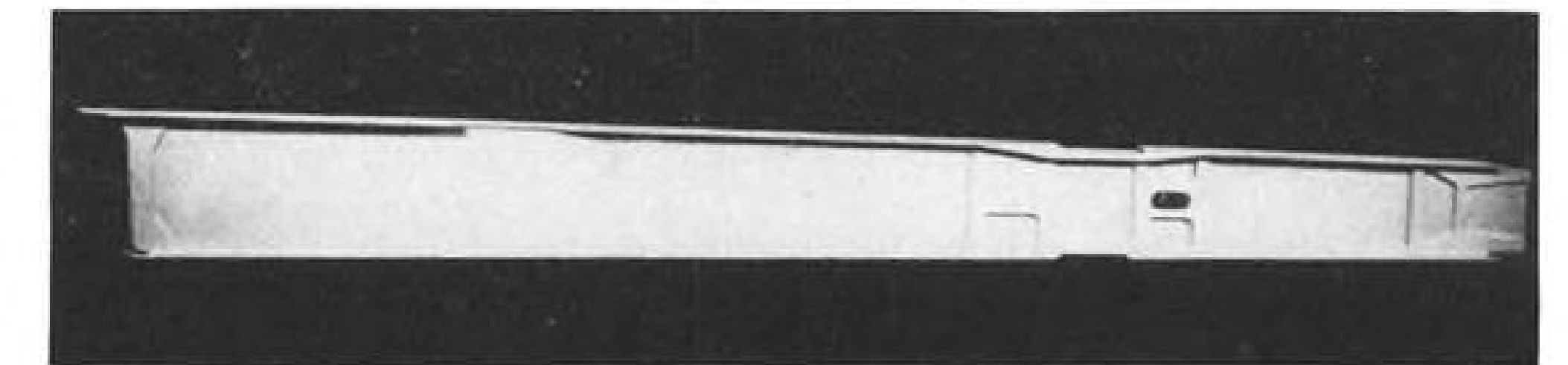
The new division is seen as a parallel organization to the old Production Division operated by AAF's Materiel Command in World War II. It was as the head of this organization that Lt. Gen. K. B. Wolfe, now Deputy USAF Chief of Staff for Materiel, first demonstrated his ability to short-cut administrative red tape in expediting war production. His work there led to a similar assignment to head the successful "Crash" program to expedite production of the Boeing B-29 Superfortress, which is credited with materially shortening the war with Japan.



BULB SECTION in web of 75S-T6 extrusion is key for putting . . .



TAPER in wing spar. Bulb is shown flattened after first forging run and . . .



FINISHED SPAR with 5½-in. taper results from further forging and machining.

Forge-Taper Forms Wing Spar

An aluminum alloy wing spar has been experimentally fabricated for a McDonnell Aircraft Corp. fighter plane by a new forge-taper process.

Taper in the spar's 13-ft. length is from approximately 15½ in. down to 10 in. Spar weight is 117 lb.

Idea for the fabrication scheme came from McDonnell's production manager, Walter F. Burke. Collaboration between McDonnell and Aluminum Co. of America gave the finished unit.

► **Benefits**—Aim of this new approach is to eliminate the comparative complexity required in the usual method of using two T-sections and successively smaller web members to achieve spar taper.

The forge-tapered unit is reported to

eliminate about 50 parts and to cut riveting extensively. And because of the unified structure of the 75S-T6 spar, the fatigue factor is reduced. An additional dividend is a saving of about 50 lb.

► **Process Details**—Feature of the method is a bulb section in the web of what would otherwise be an I-beam type extrusion. The extrusion is then forged so that the bulb is flattened progressively to give the 5½-in. web taper in the 13 ft. of spar length.

The bulbed section is extruded at Alcoa's Lafayette works and the forging is done at its Cleveland plant. McDonnell rough-machines the forge-tapered extrusion and returns it to Alcoa for heat-treat and stretching. Final machining is done at McDonnell.

Negotiated Contracts

The Air Force contracts logjam continues to break up at a rapid rate. Negotiated contracts totaling nearly \$70 million were announced by USAF for the week ended February 9.

Several of the contracts were multi-million dollar affairs. Radioplane Co., Van Nuys, Calif., got over \$16 million in contracts for target aircraft and accessories. Douglas Aircraft, Santa Monica, got \$12 million for prototype aircraft. North American Aviation, Los Angeles, was awarded over \$6.8 million for miscellaneous spare parts and assemblies for aircraft. Beech, Wichita, got over \$5 million for jettisonable fuel tanks.

A partial list follows:

Aeroquip Corp., Jackson, Mich., aircraft hose, Cl. 04B, \$397,245.

Aero Supply Mfg. Co., Inc., Corry, Pa., aircraft bolts, Cl. 04A, \$89,427.

Air Associates, Inc., Teterboro, N. J., commercial hardware, Cl. 27, \$33,176; aircraft hardware, Cl. 04A, \$39,500.

Aircraft Hardware Mfg. Co., Inc., Bronx, N. Y., aircraft close tolerance steel bolts, Cl. 04A, \$142,545; aircraft bolts, Cl. 04A, \$78,691.

Airquipment Co., Lockheed Aircraft, Burbank, Calif., carrier-banner target, Cl. 28B, \$87,844.

Air Reduction Magnolia Co., div. of Air Reduction Corp., Houston, breathing oxygen for flying, Cl. 06B, \$63,735.

Aluminum Co. of America, Washington, D. C., aluminum alloy extrusions, Cl. 23A, \$37,785; aluminum sheet, Cl. 23A, \$102,138.

American Airmotive Corp., Miami Springs, dome, navigator's observing, Cl. 03F, \$32,712.

American Cord & Webbing Co., New York, webbing, Cl. 21, \$122,850.

American Locomotive Co., Dunkirk, N. Y., metal shipping containers, Cl. 02A, \$3,070,624.

American Machine & Foundry, Brooklyn, N. Y., drive, antenna, Cl. 16E, \$25,185.

Anti-Corrosive Metals Products Co., Inc., Castleton-on-the-Hudson, N. Y., aircraft hardware, Cl. 04A, \$34,990.

Armco Steel Corp., Middletown, O., galvanized steel, Cl. 23A, \$35,059; steel sheet, Cl. 23A, \$30,687.

Beech Aircraft Corp., Wichita, jettisonable fuel tanks, Cl. 03L, \$390,078; fuel tanks, Cl. 03L, \$408,657; jettisonable fuel tanks, Cl. 03L, \$4,974,000.

Bendix Products div., South Bend, Ind., miscellaneous struts, Cl. 03C, \$50,000.

Biederman Motors Corp., Cincinnati, spare parts for oil clarifiers, Cl. 19C, \$50,952.

Boeing Airplane, Seattle, emergency kits, Cl. 01F, \$100,000; modification of power racks, Cl. 01F, \$218,797.

Burdett Oxygen Co., Cleveland, breathing oxygen, Cl. 06B, \$59,113.

Cannon Electric Development Co., div. Cannon Mfg. Corp., Los Angeles, connector, receptacles, Cl. 08E, \$59,142.

Chandler-Evans div., Niles-Bement Pond, West Hartford, Conn., carburetor parts, Cl. 03D, \$52,045.

Clayton Mfg. Co., Rosemead, Calif.,

cleaner, vapor pressure type, Cl. 17A, \$400,000.

Cochran Foil Co., Louisville, Ky., reflectors, Cl. 16A, \$39,807.

Curtiss-Wright Propeller div., Caldwell, N. J., whirl test stand assemblies, Cl. 17C, \$29,113.

Deutsch Co., Los Angeles, Freon valves for Freon cylinders, Cl. 06B, \$45,360.

Douglas Aircraft Co., Inc., Santa Monica, Calif., model airplanes, Cl. 01D, \$12,000,000.

Duracote Corp., Ravenna, O., waterproof fabric, Cl. 21, \$35,446.

Eclipse-Pioneer div., Bendix Aviation Corp., Teterboro, N. J., transmitters, fuel flow type, Cl. 05D, \$172,923; tester assemblies, Cl. 17C, \$115,900.

Eicor, Inc., Chicago, alternators, Cl. 03C, \$438,076, alternators and regulators, Cl. 03C, \$225,000.

Elastic Stop Nut Corp. of America, Union, N. J., aircraft hardware, Cl. 04A, \$141,433; aircraft hardware, Cl. 04A, \$184,192.

Federal Leather Co., Belleville, N. J., artificial upholstering leather, Cl. 21, \$69,920.

Federal Motor Truck Co., Detroit, spare parts for oil clarifiers, Cl. 19C, \$38,889.

Fire div., Cardox Corp., Monee, Ill., container, ferrying, Cl. 19A, \$193,139.

Gates-Mills, Inc., Johnstown, N. Y., glove set, Cl. 13A, \$89,800.

Gates Rubber Co., Denver, aircraft hose, Cl. 04B, \$385,172.

General Electric Co., Dayton, device checking central station fire control system, Cl. 17C, \$30,272.

General Electric Co., Schenectady, N. Y., generators, Cl. 03C, \$249,147; position indicators, Cl. 05C, \$25,656; aircraft generators, Cl. 03C, \$85,480.

General Electric Co., Syracuse, N. Y., major components for radio set, Cl. 16C, \$365,750.

General Metals Corp., Adel div., Huntington, W. Va., aircraft clips, Cl. 04A, \$35,135.

B. F. Goodrich Co., Akron, wheel assembly, Cl. 03B, \$61,573; de-icer shoes, Cl. 01F, \$168,050.

Goodyear Tire & Rubber Co., Akron, wheel and brake assemblies, Cl. 03B, \$158,173; wheel and brake assemblies, Cl. 03B, \$245,197.

Guardite Corp., Chicago, work on low pressure chambers, \$41,000.

Hackensack Cable Corp., Hackensack, N. J., aircraft hardware, Cl. 04A, \$108,275.

Hammond Mfg. Corp., Pasadena, Calif., metal shipping containers, Cl. 02A, \$347,400.

Harris Products Co., Cleveland, aircraft hardware, Cl. 04A, \$98,402.

Hughes Aircraft Corp., div. Hughes Tool Co., Culver City, Calif., adapter assemblies, Cl. 11B, \$35,619.

Industrial Air Products Co., Portland, Ore., breathing oxygen, Cl. 06B, \$58,076.

Jack & Heintz Precision Industries, Cleveland, starters, Cl. 03C, \$635,905; ball bearing races, Cl. 04D, \$52,500; voltage regulators, Cl. 03C, \$40,925.

Keco Industries, Inc., Cincinnati, portable aircraft coolers, Cl. 19A, \$759,924.

Kollsman Instrument div., Square D Co., Elmhurst, N. Y., indicator, tachometer, Cl. 05D, \$40,898.

Lewis Engineering Co., Naugatuck, Conn., temperature indicator, Cl. 05D, \$60,119.

Linde Air Products div., Union Carbide & Carbon, New York, N. Y., breathing oxygen for flying, Cl. 06B, \$334,951.

Liquidometer Co., Long Island City, N. Y., indicator, position flaps, Cl. 05C, \$98,725.

L. W. Foster Sportswear Co., Inc., Philadelphia, flying jackets, suits, coveralls, Cl. 13, \$897,039.

Magnavox Co., Ft. Wayne, Ind., control assembly, bomb arming, Cl. 11A, \$123,014.

Marlin-Rockwell Corp., Jamestown, N. Y., ball bearings, Cl. 04D, \$27,656.

Metal Hose & Tubing Co., Dover, N. J., non-metallic gasoline hose, Cl. 12, \$218,585.

Micro Balancing, Inc., Oceanside, L. I., N. Y., balancer, dynamic gyro, Cl. 17C, \$75,116.

Miller Steel Co., Inc., Kokomo, Ind., low carbon hot rolled sheet, Cl. 23A, \$171,516.

Minneapolis-Honeywell Regulator Co., Minneapolis, vertical gyro indicators, Cl. 05C, \$1,250,000.

Mirax Chemical Products Corp., St. Louis, metal shipping containers, Cl. 43, \$216,534.

Moran Paint Co., Dayton, paint remover, Cl. 07, \$252,341.

Motorola, Inc., Chicago, electronics spare parts, Cl. 16, \$38,312.

National Products Co., Grand Haven, Mich., work benches, Cl. 17A, \$40,800.

New Departure, General Motors Corp., Bristol, Conn., ball bearings, Cl. 04D, \$39,429.

North American Aviation Inc., Los Angeles, Calif., miscellaneous assemblies, sub-assemblies, kits and spare parts for aircraft, Cl. 01M, \$2,000,000; spare parts for airplanes, Cl. 01M, \$4,813,083.

Pennsylvania Transformer Co., Canonsburg, Pa., transformers, \$34,650.

Peters Dalton, Inc., Detroit, metal shipping containers, Cl. 02A, \$971,495.

Phaestron Co., South Pasadena, Calif., generator field control relays, Cl. 03C, \$142,728.

Protective Treatments, Inc., Dayton, fluid, de-icing, Cl. 24, \$117,742.

Radioplane Co., Van Nuys, Calif., target aircraft, spares for aerial targets, autopilots, Cl. 28B, \$15,280,000; target aircraft, Cl. 28B, \$916,429.

R. E. Dye Machine & Supply, Breckenridge, Tex., release, bomb rack, Cl. 11A, \$181,556.

Revere Copper & Brass Co., Detroit, copper sheet, Cl. 23A, \$60,920.

Reynolds Metals Co., Louisville, Ky., aluminum alloy extrusions, Cl. 23A, \$25,517; aluminum sheet, Cl. 23A, \$115,526.

J. M. Rubin & Sons, Gloversville, N. Y., flying gloves, Cl. 13A, \$44,008.

Schwien Engineering Co., Los Angeles, modification and repair gyro assemblies, Cl. 11F, \$1,448,195.

Sikorsky div., United Aircraft Corp., Bridgeport, Conn., fatigue test machine, Cl. 18, \$25,000.

Simmons Brothers, Inc., Long Island, N. Y., printers, Cl. 10B, \$203,233.

SKF Industries, Inc., Philadelphia, anti-friction bearings, Cl. 04D, \$57,000.

Sorenson & Co., Inc., Stamford, Conn., power unit, gun bomb rocket sight, Cl. 03C, \$1,000,000.

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These two wear-resistant TIMKEN® steels will do 90% of your hollow parts jobs

WHEN you've a rush job on your hands, these two general purpose Timken® steels can be shipped to you in warehouse quantities within 24 hours after your order is received! With these two steels—52100 and "Nickel-Moly"—you can do 9 out of 10 of your hollow parts jobs. Both offer good hardenability and wear resistance.

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ina and shock-absorbing qualities.

52100 tubing is available from the Timken Company in 101 sizes, from 1" to 10½" O.D. And "Nickel-Moly" comes in 52 sizes, from 1½" to 10¼" O.D.

No matter which of these two Timken steels you order, you can be sure of uniform, high quality in every tube—and in every shipment. That's because every step of manufacture is rigidly and carefully controlled—from melting to final testing. Write for stock lists with the latest information on available sizes, grades and finishes. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

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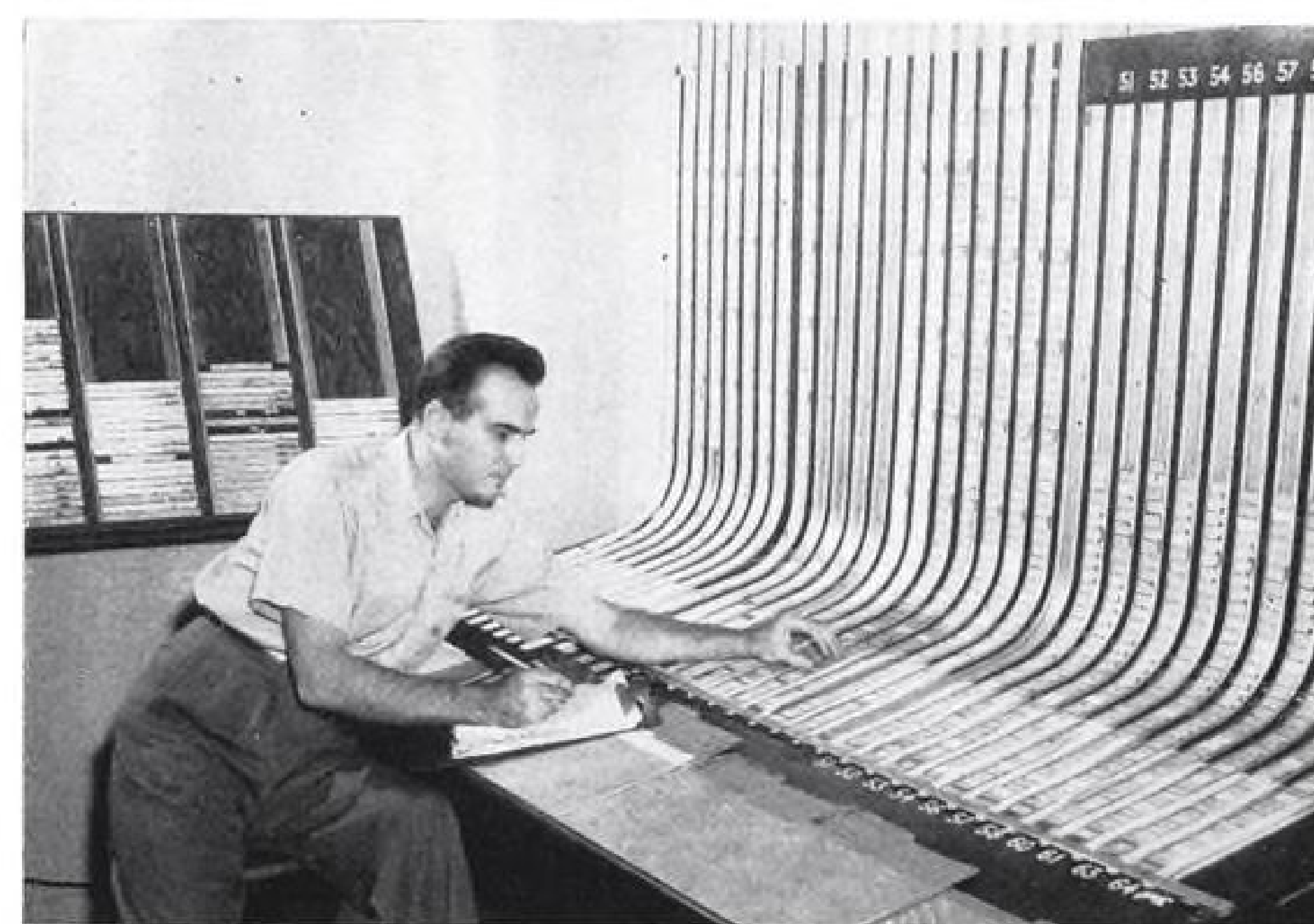
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EQUIPMENT



MAINTENANCE TIME control board used at NAL's Miami overhaul base to keep overhaul records.

Spark Advance Saves At National

Carrier says DC-4 fuel consumption and costs drop; reports passengers are pleased with cabin music.

By George L. Christian

Miami—National Airlines, only DC-4 operator to use automatic spark advance on the R-2000 engine, reports that the system saves fuel, is easy on exhaust valves and functions very satisfactorily. Richard Sawyer, NAL operations engineer, told *AVIATION WEEK* that his company was realizing these benefits from the automatic device:

- **Reduced fuel consumption.** In 1949 average fuel consumption for DC-4s was 237 gal. per hour. Average consumption in 1950 was 220 gal. And installation of the system, started in January of that year, was not completed on all aircraft until April, therefore the savings for 1951 should be even greater.

- **Lower fuel cost.** Fuel cost in dollars per airplane hour dropped from \$39.60 in 1949 to \$36.88 in 1950. Sawyer said he felt this was primarily due to activation of the automatic spark advance. He added that, in his opinion, the savings would stabilize at these levels.
- **Better exhaust valves.** Sawyer pointed out that exhaust valves were found in better condition with more time on them. Also, not a single engine failure could be attributed to the system.

A former Pratt & Whitney engineer,

Sawyer was familiar with inherent advantages obtainable with the system. On joining NAL, he convinced its management that tests would be worthwhile.

Service tests begun on the engine in 1947 were concluded in March of 1949. Results were so gratifying that it was decided to make a fleet-wide installation on all seven DC-4s.

NAL engineers said that the spark advance, used on R-2000-D3 engines, occurs between 400–750 hp. Spark advances to fire spark plug at 37 deg. before top dead center instead of 25 deg. and fuel/air ratio is reduced from .063 to .057.

P&W believes it desirable to use spark advance on the R-2800 and R4360 engines. The engines are equipped for its use.

Some interesting innovations noted at NAL's Miami headquarters:

- **Maintenance time control board.** Nicknamed the "Parimutuel Board," this NAL invention (see photo) consists of a series of chutes, one for each plane in the company's fleet. Sliding down in each chute are a number of small blocks, one to each operation to be performed on the craft.

The bottom block in any chute indicates the next operation due on

that particular airplane. The total plane time when the work is due is also indicated. When plane time equals time indicated on the block, the operation is performed. Time for next performance of that job written in on the block which is then removed from the bottom of the chute and inserted higher up in the line according to the new time entered on its face.

A roll of teletype tape beside each chute keeps tabs of total aircraft time and lists time remaining on all items having 150 hr. or less before requiring overhaul.

NAL says the parimutuel board has definite advantages over previously tried systems. It enables personnel to keep tight control of continued time parts. Example: a propeller governor is removed at 75 hr. but when checked in the shop is found to be in perfect condition. Instead of undergoing an unnecessary overhaul, it is returned to stock with a record that it has operated 75 hr.

When issued from stock for installation on a particular plane, a block showing the used time is inserted in that ship's chute and when the governor reaches full overhaul time the block will automatically appear at the bottom telling the supervisor that its removal is due. NAL indicated that other airlines had inspected the board with a view to adapting its principle to their use.

The board handles with equal ease items which must be removed or overhauled at specific dates, instead of times, such as life vests.

- **Cabin music.** National is one of the first airlines successfully to provide its passengers with music.

When you board an NAL DC-6, soft music emanates from four ceiling loud speakers. Source is a tape recorder located in the vestibule by the main cabin door. Muzak provides the tapes.

Passenger reception has been so enthusiastic that NAL is proceeding with a more elaborate installation which will include the addition of 28 extra speakers, one for each pair of seats. These will be equipped with individual volume controls.

- **Omni sets.** NAL is half way through installing the Collins Model 51R-2 omni-directional radio receiver in its DC-6s. Program calls for complete installation in 8 DC-6s and 7 DC-4s by next winter at a total cost of approximately \$2400 per plane.

Other activities at National include:

- Installation of shut-off valve on propeller alcohol anti-icing line on DC-4s. One alcohol pump supplies fluid to

inboard engines and a second to the outboards. With such a system, alcohol would have to be supplied to a burning engine if its partner required de-icing, or raw alcohol would be sprayed on a feathered prop in the event of engine failure under icing conditions. NAL thinks the solenoid-operated valve is a lightweight, simple method of avoiding such contingencies.

- To prevent pilots from inadvertently pulling DC-6 throttles back into the reverse position while the ship is still airborne, NAL has engineered a simple, hinged plate mounted on the pedestal behind the throttles.

When swung into the forward position, the plate effectively blocks the throttles in the idle position. It is placed in the rearward position by the flight engineer at take-off and touch-down at the captain's command and is a check list item.

- The company has converted half of its DC-6 fleet to Skydrol (in the cabin supercharger drive) and as a result anticipates stretching the blower drive's overhaul period and increasing its dependability.

- Civil Aeronautics Administration has just approved a 1000-lb. increase in maximum takeoff and landing weights for the carrier's Lockheed Lodestars. New weights are 19,500 and 17,500 respectively.

- J. D. Crane, vice-president-engineering, inspection and planning pointed proudly to a recent record rung up by an NAL DC-6: out of 24 consecutive hours the airplane flew 19:58 hr. A DC-4 was not far behind with a total of 18:00 airborne hr. out of 24.

As indications of his company's expansion and success, he cited these figures: in 1942, National operated three Lodestars—in 1951 its fleet had grown to include eight DC-6s, 7 DC-4s and 11 Lodestars.

Earnings for the first ten months of 1950 increased to \$1,700,000 from \$177,000 for the equivalent period in 1949.

- D. A. Shorpsire, NAL's superintendent of overhaul at Jacksonville, Fla., said that he is beginning to use Elastic Stop Nut Rollpin fasteners (AVIATION WEEK, Sept. 11, 1950) on DC-6 cowl flap jack shafts, where considerable vibration is experienced.

National is saving \$10.50 per ball socket joint in the exhaust system of its DC-4s. Carrier now presses out its own units on a hydraulic press for \$1.50, Shorpsire said, instead of paying \$12.00 per assembly. Unscheduled removals have been reduced virtually to zero by changing the entire set at engine change when the engine is torn down anyhow.

Two NAL-developed fixtures in the engine overhaul shop are saving time and money.

One, for the R-2800, holds the accessory drive shaft adapter in its correct mating position with the rear of the crank shaft enabling overhaul personnel accurately to measure backlash between the two splines. Keeping the wear within tolerance has greatly reduced replacement of these parts.

A similar R-2800 fixture to check backlash between the low ratio supercharger clutch cone and impeller intermediate drive shaft assembly has also resulted in considerable economy to the airline.

Hydrant Fueling Installed at Bangkok

One of the newest converts to hydrant fueling (AVIATION WEEK, Aug. 21, 1950) is Don Muang Airport, Bangkok, Thailand.

The hydrant system, recently opened by Standard-Vacuum Oil Co., is capable of refueling all types of aircraft at a rate of 150 gal./min.

Pumps at the 75,000-gal.-capacity bulk storage plant push fuel through 6-in. underground lines to 13 apron outlets where the gas is metered to planes through two hose-carts. All bulk plant tanks are connected to a vapor-breather balloon to increase safety and reduce

evaporation losses, which are high in tropical temperatures.

The system reduces moving about of fuel trucks which might damage aircraft, and cuts the danger of stationing large quantities of gas near planes.

Bowing to local Thai custom, Stanvac officials consulted an astrologer for an opening date and arranged for Buddhist priests to be on hand.

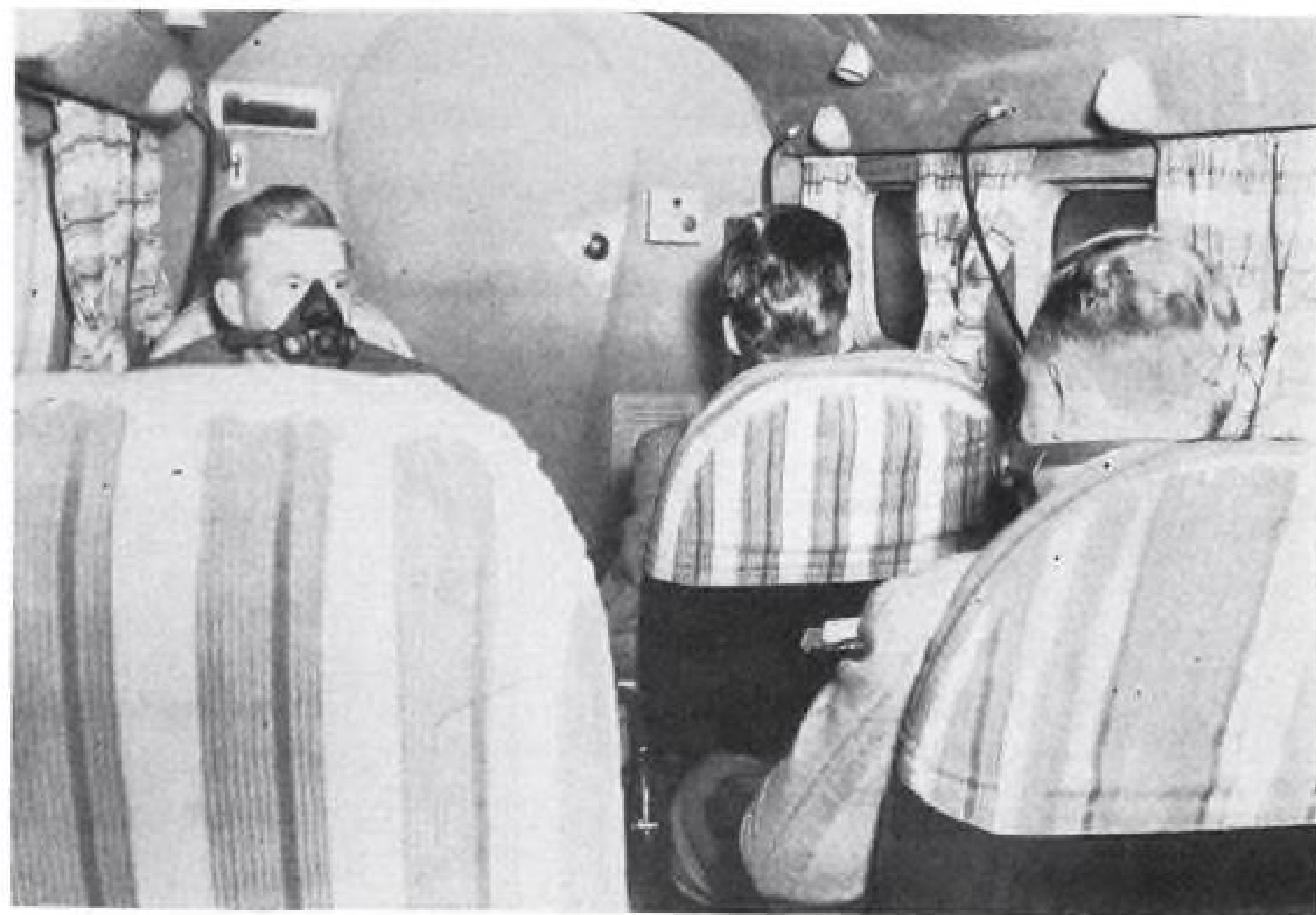
Among the airlines to be served by the new system are Pan American World Airways, Air France, Siamese Airways Co., Pacific Overseas Airways (Siam) Ltd., Bharat Airways and Philippine Airlines.

New Type Cylinders Absorb Test Sounds

The deafening blast in engine test cells can be deadened effectively by banks of acoustical tubes, according to the manufacturer, Janke & Co., Hackensack, N. J.

The sound absorbing units, called PY-DEE, are made by wrapping Fiberglas TWF insulating wool around a center cylinder of hardware cloth, then enclosing that in a Fiberglas mat and outer case of corrosion-resistant, perforated aluminum (see cut next page).

The units are 7½ ft. long, 9 in. in



FIXED OXYGEN BREATHING EQUIPMENT

Fixed-type oxygen breathing equipment especially for the Beech 18 has been developed by Scott Aviation Corp., 207 Erie St., Lancaster, N. Y. The manufacturer says the "8500" was designed to meet the need for supplementary oxygen during high-altitude flights. Produced as a complete system, it can be supplied for a variety of aircraft, such as the DC-3, larger passenger and freight planes. Scott describes the equipment as the lightest available per hour

of oxygen carried. Its small, simple regulator, manually adjustable to altitude, consumes oxygen. It services up to 50 outlets. Components are available to convert existing low pressure systems to the lighter and more economical high pressure system, using most of the present piping and outlets. Typical complete cost for the illustrated 7-place Twin-Beech system is approximately \$350 in addition to some 15 man/hours for installation.

At Newark Airport the Celanese DC-3 heads for the Esso Sign...



When the Celanese Corporation of America's DC-3 comes in to the Newark, N. J., Airport, the ship generally points in the direction of the winged Esso Oval at Newark Air Service, Inc. Chief Pilot Howard Zbornik and Pilot Clint Housel are accustomed to the expert service and high-quality Esso Aviation Products which have distinguished Newark Air Service for more than 20 years.

Long a familiar landmark at one of the nation's busiest airports, Newark Air Service is an approved CAA repair station, and a regular stop for hundreds of private flyers and executives who want to keep their planes ship-shape. Newark Air Service is open 24 hours a day and provides storage and outside parking facilities.

It is a tribute to Esso Aviation Products that Chief Pilot Zbornik keeps an eye out for the Esso Sign whenever he flies. With 17 years of extensive flying experience behind him, he is a good judge of the quality of aviation fuels and lubricants. And Mr. Zbornik's judgment is shared by many leading airlines, aircraft and engine builders, who make Esso Aviation Products their first choice.



Taking time out for a relaxing chat while the DC-3 is being refueled with Esso Aviation Gasoline are (l. to r.) Howard Zbornik, Celanese Corporation of America's Chief Pilot; Clint Housel, Pilot; and Chuck Nelson, Hangar Manager of Newark Air Service, Inc.

C. J. Strickland, President of Newark Air Service, Inc.



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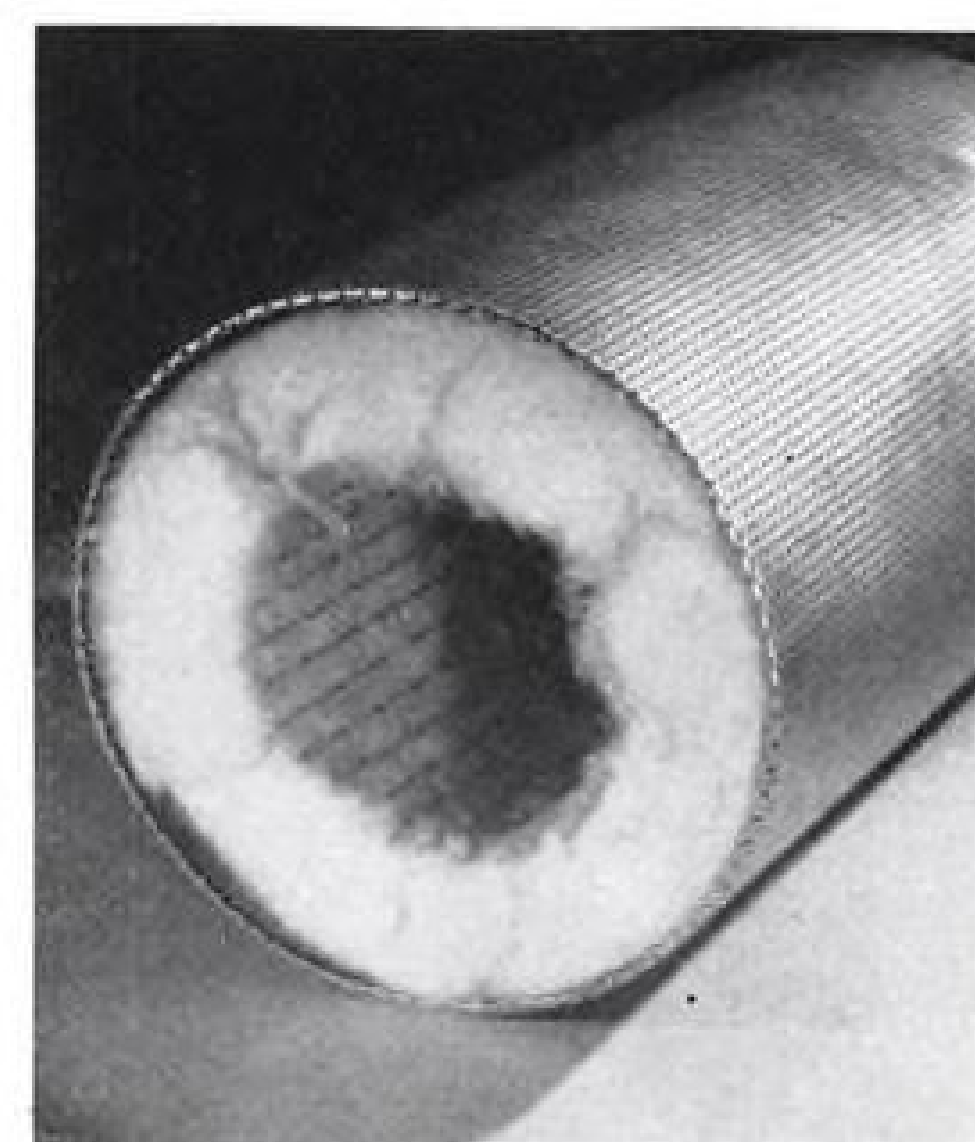
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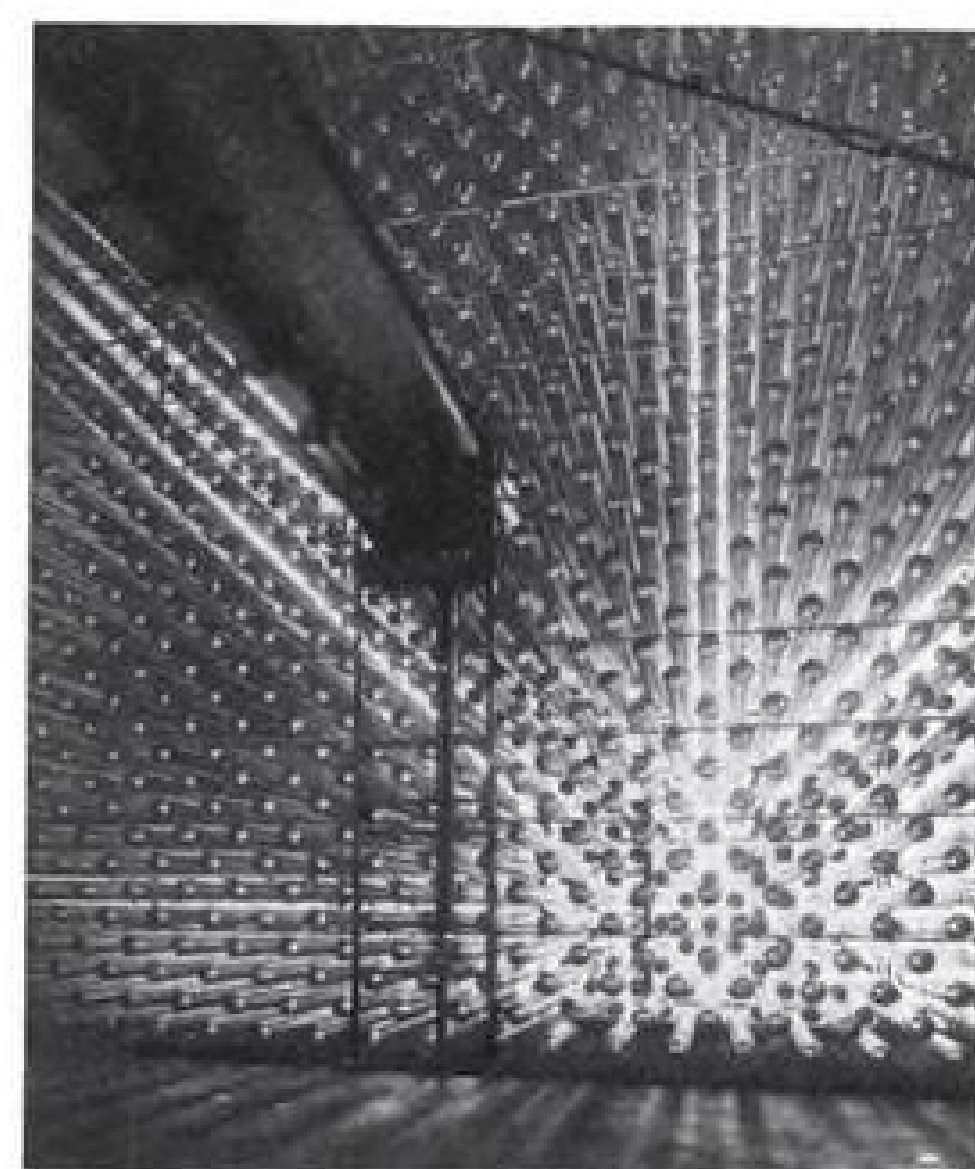
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CONSTRUCTION detail of PY-DEE sound absorber with Fiberglas insulation.



STRIKING picture of acoustical cylinders installed in Curtiss Propeller's test cell.

diameter. Each provides 17 sq. ft. of perforated acoustical area and weighs 20 lb. Aluminum caps seal the ends and are provided with studs for suspension. The PY-DEE units should be hung independently with no contact between them.

Janke says that in addition to their sound absorbing efficiency, the cylinders are undamaged by the high wind velocities to which they are subjected and are highly corrosion resistant.

Some 20,000 PY-DEE units have been delivered to such users as Curtiss Propeller Division, Curtiss-Wright Corp.; USAF, Wright-Patterson AFB; U. S. Naval Air Station, Banana River, Fla.; British Aero Engines, Ltd., Vancouver, and Argentina Air Force bases at Cordoba and El Quatro.

The 3600 units installed in the intake end of Curtiss Propeller's test cell in Caldwell, N. J. (see cut), provide 61,200 sq. ft. of accoustical area.

Janke & Co. produces a variety of equipment for testing reciprocating and jet engines.

NEW AVIATION PRODUCTS



Dimple Tread

Goodrich Co. has developed a new long-life "dimple tread" airplane tire.

The tire is designed, among other things, to make it harder for stones and other objects to lodge in the tread. In sizes presently available it will fit on the DC-3, DC-4, DC-6, Constellation and Convair 240.

Goodrich officials report 16 airlines tested the tire during its development period. A Goodrich engineer told AVIATION WEEK that tests by one airline indicated the tire wore 50 percent longer than other types the carrier was using. Address: Akron, Ohio.



Changes Big Tires

A tire changer for removing heavy aircraft tires, for use both in the shop and in the field, has been developed by Dixie Tallyho, Inc., Fairburn, Ga.

Designed for use with large forward drop center aircraft wheels, the hand-operated "Tirematic" will exert up to 18 tons of pressure by means of the movement of a manually controlled hydraulic pump, the company says. It explains the device is adjustable to accommodate various tire sizes and "will remove the toughest tire from rusty rims."

Included in the equipment is a spe-

cial dolly designed to permit one operator to change the tire or remove the wheel for brake service. The Tirematic also can be used with trucks and other equipment. It is similar in appearance to a tire changer developed by Eastern Air Lines for its own use.

Small Aero Cable

General Electric Co. has developed what it terms "a greatly improved low-tension cable for lighting and power in aircraft."

Called Flamenol aircraft wire SI-57360, the cable has a vinyl compound insulation covered with a protective nylon sheath. It is designed for operation at 90C. and conforms to specification AN-J-C-48a.

The wire is smooth, flexible and abrasion-resistant. It also is exceptionally resistant to fungi, moisture, gasoline, oil and grease, according to the firm. Address: Construction Materials dept., General Electric Co., Bridgeport 2, Conn.

Tableway Lube

A high performing tableway lubricant for machine tools, "Febis K-53," for use with lathes, planers, grinders and similar equipment has been developed by Esso Standard Oil Co., New York.

The lubricant meets the requirements of the Cincinnati Milling Machine Co. (specification CMM Co. P-47) for a lubricant of this type and passes CMM's "slip-stick" test. To pass this test, a tableway lubricant must have a coefficient of static friction lower than its coefficient of kinetic (or sliding) friction. In effect, less force is required to start one surface moving in relation to the other than is necessary to maintain movement between the two surfaces. As Esso engineers explain, "this is a unique quality, since most lubricants are most effective under the opposite, or dynamic conditions."

In many operations the tool head or table must travel at speeds so slow as to be almost imperceptible. It's impossible with ordinary lubricants for a full fluid film to build up between the two working surfaces under these conditions, says Esso. The table chatters and hesitates, making it difficult to work to desired tolerances.

Febis K-53 is designed to prevent this, maintaining a full fluid film at all times. It also is superior to straight mineral oils in resisting wear on sliding surfaces, says Esso. The product is a slightly tacky, non-corrosive lubricant. It has high resistance to washing from

metal surfaces and mild rust preventative characteristics. Address: 15 W. 51 St., New York 19.

LIGHT GUN SIGNALS		
	On the Ground	In Flight
STEADY GREEN	Clear for take-off	Cleared to land
FLASHING GREEN	Cleared to taxi	Return for landing (to be followed by steady green at proper time)
STEADY RED	Stop	Give way to other aircraft and continue circling
FLASHING RED	Taxi clear of landing area (runway) in use	Airport unsafe—Do not land
FLASHING WHITE	Return to starting point on airport	
ALTERNATING RED & GREEN	General Warning Signal—Exercise Extreme Caution	

Safe Flight Decals

Information on cruising altitudes, VFR minimums and light gun signals is arranged for quick reference on new flight decals developed by W. S. Thomas, Fort Scott Airways, Fort Scott, Kan.

These small decals easily can be applied to windshields or instrument panels after wetting. They pack in a neatly arranged manner much information essential to the safe operation of aircraft, and serve as helpful reminders to pilots, particularly on cross country flights. Decals sell in sets of three.

ALSO ON THE MARKET

Efficient pump for drawing light liquids from 15- to 55-gal. drums has pull-type suction tube that fits snugly into 1½- and 2-in. openings. Made by General Scientific Equipment Co., 1015 Packard Bldg., Philadelphia.

Fuel flowmeters for reciprocating and jet engine aircraft have been adapted for use in U.S. planes and are offered in complete range by George Kent, Ltd., Luton, England.

Portable light, designed for defense plant use in emergencies has two filaments, one providing 80 hr. continuous service at normal power, the other permitting unit to be used as high-power floodlight for 20 hr. without battery charge. Made by Carpenter Mfg. Co., Somerville, Mass.

Improved Lan-O-Kleen hand-cleaner for use in factories incorporates soap-intensifying emollient and lecithin to enhance detergency and stabilize new foaming or "sudsing" effect. Made by West Disinfecting Co., Long Island City, N. Y.

Lube service cart, for dispensing lubricants to bearings in industrial machinery, is self-contained, two-wheel grease rig that can be moved rapidly along plant aisles and between closely spaced production machines. Made by Gray Co., Inc., Graco Sq., Minneapolis 13.

AERONAUTICAL ENGINEERING



Royal Navy Drafts the Fairey 17

Quantity production of new turbopropelled subhunter is ordered after extensive competitive trials.

(McGraw-Hill World News)

London—The Fairey 17, Britain's turboprop subhunter has been ordered in quantity from Fairey Aviation Co. Ltd., Hayes, Middlesex.

The British Admiralty, after sponsoring extensive competitive trials of three similar types (Fairey 17, Blackburn Y.B.1 and Y.A.5), settled on the Fairey design as their choice. Shortly after the end of the competition, the Ministry of Supply placed the production order.

Outstanding feature of the subhunter (aside from its functional ugliness) is its powerplant, a Double Mamba turboprop engine.

Production of the plane should be greatly speeded by Fairey's envelope jiggling system (AVIATION WEEK, Jan. 30, 1950, p. 27) in which the outside skin of an airframe component is located in the jig, and ribs and other internal members are then built into this skin. The prototype 17 was built this way.

► **Cut to Fit**—A study of the external and visible characteristics of the 17 show that it has been tailored for sub-hunting.

The three-man crew (two are provided for in the prototype) sits above the Double Mamba. The pilot has excellent downward and forward visibility.

Main radar devices are housed in a retractable "dustbin" radome located astern on the belly. Attack weapons—including a new short torpedo developed since the war—are stowed in the

large bomb bay. Sonobuoys and other equipment will be carried on the underside of the wing.

The plane has been designed to keep within a height limit that will permit it to be stored on the hangar decks of some of the smaller carriers. Height with wings folded is 13 ft. 9 in.

Wings are double-folded, which requires the flaps to be built in two sections, spanwise, and are folded and spread hydraulically in 22 sec.

Fairey officials claim there is no difficulty in loading the bomb bay, although the ground clearance there is very small.

In common with other Fleet types, the 17 is fully-equipped for deck operations; it has a tail-stinger arresting hook and catapult fittings.

► **Engine Choice**—Fairey designers saw

two major reasons for selecting the Double Mamba turboprop engine.

- The Admiralty wants to switch all its carrier aircraft to gas turbine engines to avoid carrying gasoline on its carriers.
- Overall fuel consumption characteristics of the twin turboprop could be better than those of the single engine.

Power of each unit of the Double Mamba is enough to cruise the 17; for combat, both engines are teamed. Further, if either half of the engine should fail, or be knocked out in combat, the other half would have enough power reserve to get the plane back home.

In fact, the 17 has actually taken off on one engine and flown that way from Boscombe Down to Fairey's works at White Waltham.

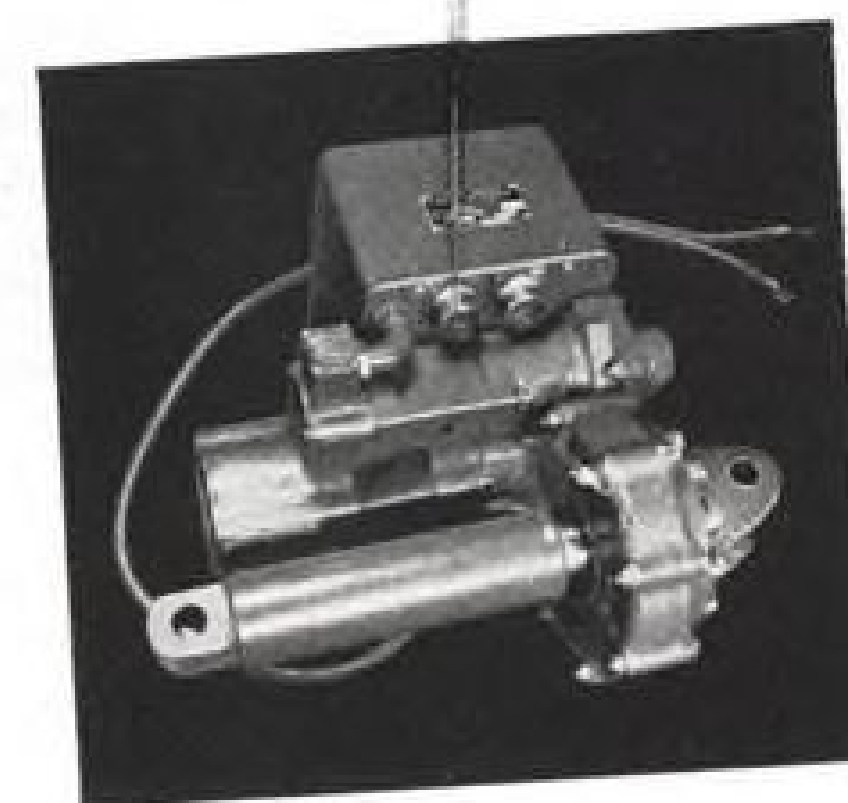
► **Lighting and Relighting**—In normal operations, one-half of the engine is started with external power supply or the aircraft batteries. When its prop is up to speed, the other prop is wind-milling because of the slipstream of the



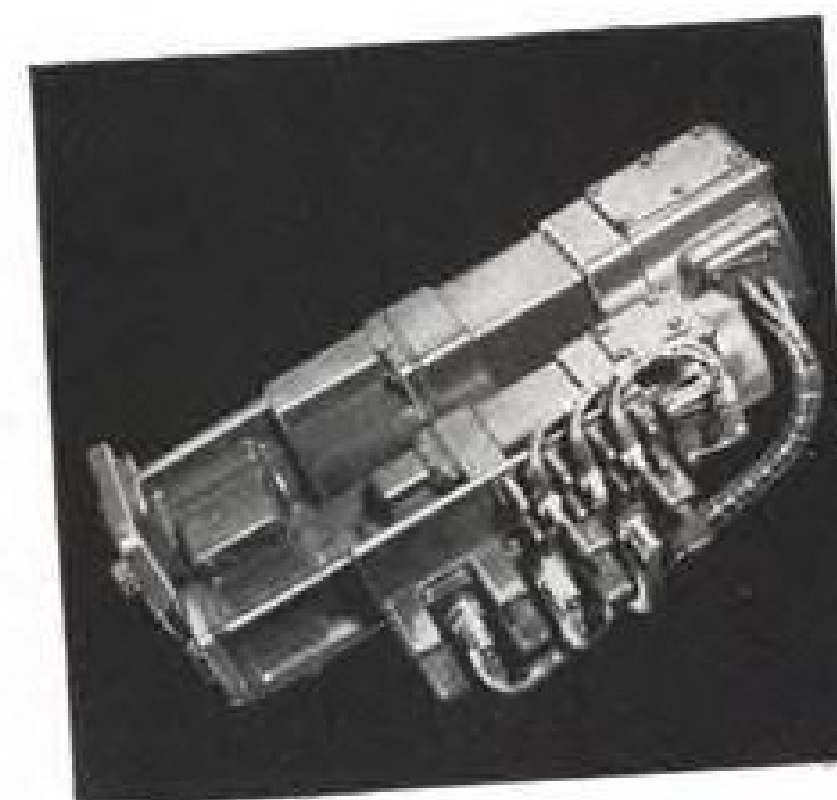
DOUBLE-FOLDED wings make Fairey 17 a small package for easy carrier handling.

EEMCO technical bulletin

New Electric Power Units Foretell Era of Pushbutton Flight... Faster aircraft and busier pilots are pushing automatic flight devices into the forefront. The development of versatile fool-proof power units to actuate control surfaces in conjunction with automatic pilots is a primary factor in achieving pushbutton flight. Such units are being produced by EEMCO in close cooperation with the designers and builders of tomorrow's aircraft.



Stabilizer Actuator for Large Jet Fighters... One such "radical" advance is the motor actuator used on a new jet fighter. This unit incorporates two motors of different size, driving into individual gear reductions to operate the screw jack. Each fulfills a particular need and is not to be considered a standby. The small motor of 1/10 h.p. output operates practically continuously under control of the automatic pilot and provides a rate of travel to jack of 6/100" per sec. The large intermittent duty 3.3 h.p. motor provides manual operation of screw jack by pilot for maneuvering and extreme situations with a rate of travel of 7/10" per sec. Normal operating load of unit 11,000 lbs....28 volt operation. Equipment includes overload and travel limit switches, radio noise filters, position indicator and non-jamming stops.



Double Motor Power Unit for Horizontal Stabilizer... A similarly unconventional motor arrangement operates the horizontal stabilizer actuator on a turbo-prop aircraft of recent design. A small continuous duty motor of 1/15th h.p. operating through a gear reduction is used for automatic flight and a large intermittent duty 3-1/2 h.p. with direct drive of 12,000 rpm is used for manual operation. The unique feature again is that it provides a large power source for maneuvering and a smaller unit for trimming in flight in small increments through the automatic pilot.

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first. Windmilling speeds are sufficient to light the engine.

In the air, restarting the dead half of the engine is done by unfeathering that prop; after top windmilling rpm. have been reached, the engine is lit.

The production Double Mamba for the Fairey 17 will have a constant-speed arrangement to control prop pitch in accordance with fuel input automatically, with no need for pilot action. A propeller brake will also be built on the production engines to prevent windmilling while on the deck or on elevators.

One other point about production engines: the Double Mamba is only at the beginning of its developmental life. It can certainly be assumed that improvements in both power output and fuel consumption will be achieved.

► **Dimensional Data**—The Fairey 17 wingspan is 54 ft. 4 in. spread and only 19 ft. 6 in. folded. Overall length is 43 ft. Normal height to tip of fin is 13 ft. 8½ in.; with folded wings, this increases only ½ in. to 13 ft. 9 in.

Basic design responsibility for the aircraft belongs to D. Hollis Williams, Fairey's chief engineer.

New Way to Figure Lift Distribution

Spanwise lift distribution can be calculated approximately by an improved method described in National Advisory Committee for Aeronautics Tech. Note 2282.

Basic improvement in this method is that lift distribution can be calculated more closely than by the Schrenk empirical method (NACA TM 948) using about same amount of computing time.

► **Four Twists**—Distribution due to any one of four types of wing twist—symmetrical, antisymmetrical, continuous or discontinuous—is calculated making use of the lifting-line theory. Method makes use of the lift distribution due to angle of attack and takes into account the effects of wing aspect ratio.

Twist of the studied wing may be from washout in the design, from aeroelastic deformation, from deflected flaps or ailerons, or from downwash induced by another lifting surface or the jet boundary of a wind tunnel.

► **By Reasoning**—The report shows that the lift distribution on a twisted wing can be closely approximated by a simple expression. Then it is reasoned that, if both load and moment thus approximated agree with lift and moment obtained from more exact calculation, then load distributions for approximate and theoretical cases must agree.

TN 2282, An Improved Approximate Method for Calculating Lift Distribution due to Twist, is by J. C. Sivells of Langley Aeronautical Lab.

British Metals Adhesive Uses

Redux bonding yields improved strength-weight ratios in primary and secondary structural components.

By C. J. Moss*

(McGraw-Hill World News)

London—The applications for metals adhesives in the British aircraft industry have steadily increased since the "Redux" process was used in the latter years of the recent war for bonding wood to metal for the wing spars of the de Havilland Hornet fighter. Early experience with the process was successful enough to encourage its use gluing wood to metal for components of a number of other aircraft (the most recent example being the tail fin of the Canberra jet-propelled bomber) and also in a more ambitious way for bonding parts of all-metal aircraft.

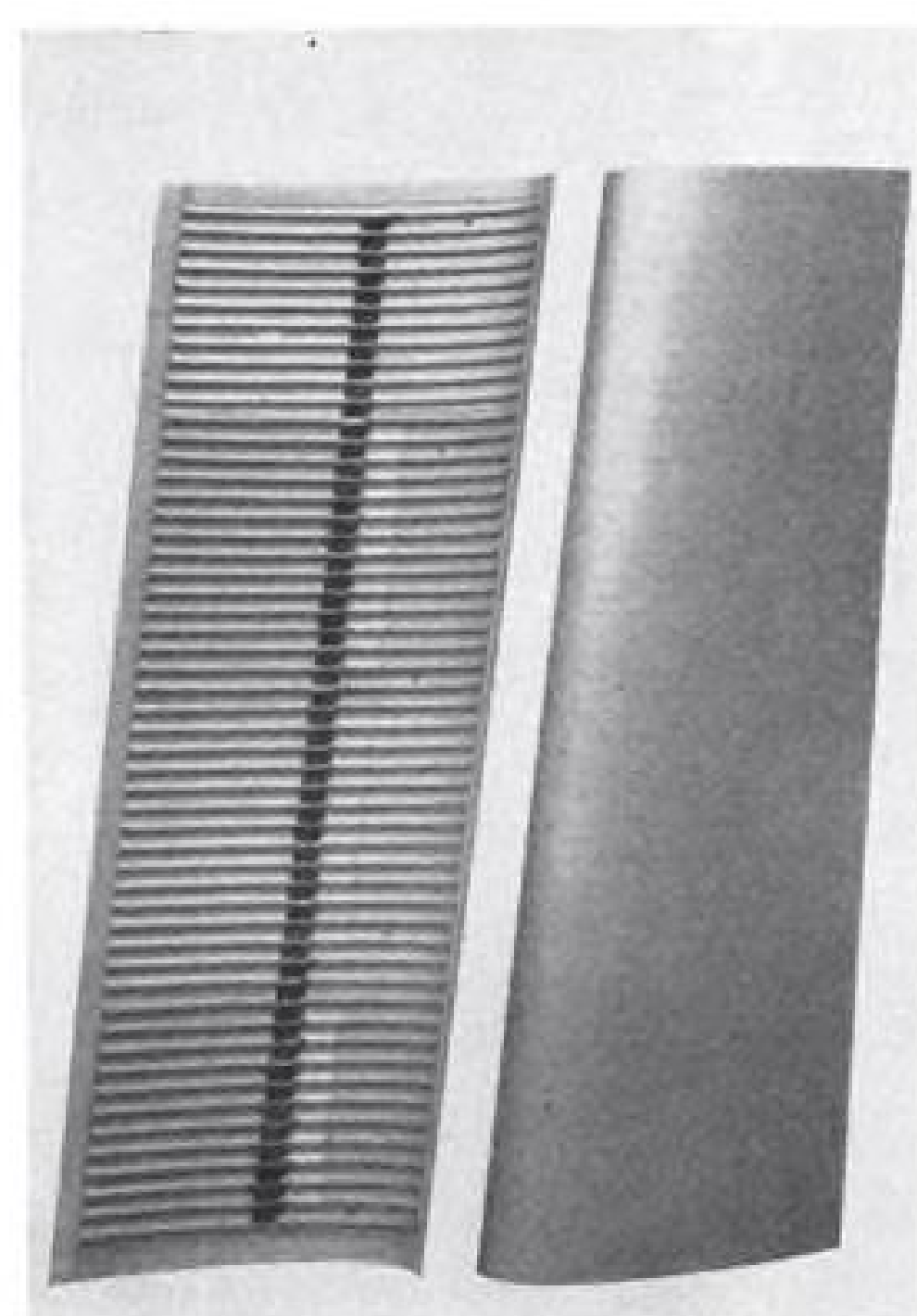
Redux bonding has now been applied to the building of wings and fuselages of the de Havilland Dove, Heron, and Comet airliners, and will be used quite extensively in the manufacture of the Bristol Type 175 and Brabazon Mark II civil airliners, as well as for the Bristol Type 173 ten-seater helicopter. The process has been used for fixing stringers to fuselage and wing skins; for making doubly-curved leading edge panels from plain outer and corrugated inner skins; for local reinforcements of a wide variety of components; for floors; and even for bonding rubber-to-metal to seal strips on engine bay doors.

► **Advantages**—Apart from the bonding of local reinforcements to ribs, edges of wingskins, ends of stringers, etc. (where metal bonding obviously offers advantages over any method which weakens the original member by the drilling of holes for mechanical attachments), the process has been extensively used for making wing and fuselage skin panels.

The gluing of stiffeners to skins may eliminate large numbers of rivets whose heads add to the drag of the aircraft. Gluing avoids a large number of small leaks which would occur in riveting pressurized fuselages and facilitates the construction of integral fuel tanks. Finally, bonded structures are often stronger than similar riveted ones and appreciable savings in weight are made possible.

► **Savings in Pounds**—Some indication of this weight saving may be obtained from the results of tests carried out by Gloster Aircraft Co. Ltd., Bristol Aeroplane Co. Ltd. and the College of Aeronautics. They showed that Redux bonded panels will usually carry ap-

*Project Engineer, Aero Research Ltd., Duxford, Cambridge, England



CURVED panel typical of those produced in autoclave. Corrugated inner skin is Redux bonded to a plane outer skin.

preciably higher compressive loads than similar riveted ones, the increase varying with the design of panel but seldom being less than 5 percent and sometimes reaching 40 percent.

It is probable, however, that these static tests do not give a true measure of the superiority of metal adhesives because only under fatigue loading will a continuous glued joint, relatively free from stress concentrations, show its full advantages over riveting.

Work carried out by de Havilland Aircraft Co. Ltd., Hatfield, on repeated loading tests on the wing of a Dove aircraft gave excellent results. When the wing was finally broken after a prolonged series of loadings there was only a slight failure of the Redux bond on either side of a fractured metal stringer. No less promising results have been obtained by Bristol from a varied program of fatigue tests ranging from "panting" tests to compression tests on stiffened panels. It is hoped that later it will be possible to give the results of comparative fatigue tests on both Redux bonded and riveted panels; results to date have suggested the glued specimens have striking advantages.

► **New Glue**—Strong glues for metals are a quite recent development. The bonding of metals to give joints of high mechanical efficiency is a difficult problem to solve for the following reasons: • Metals are not porous. Therefore glues containing solvents are unlikely

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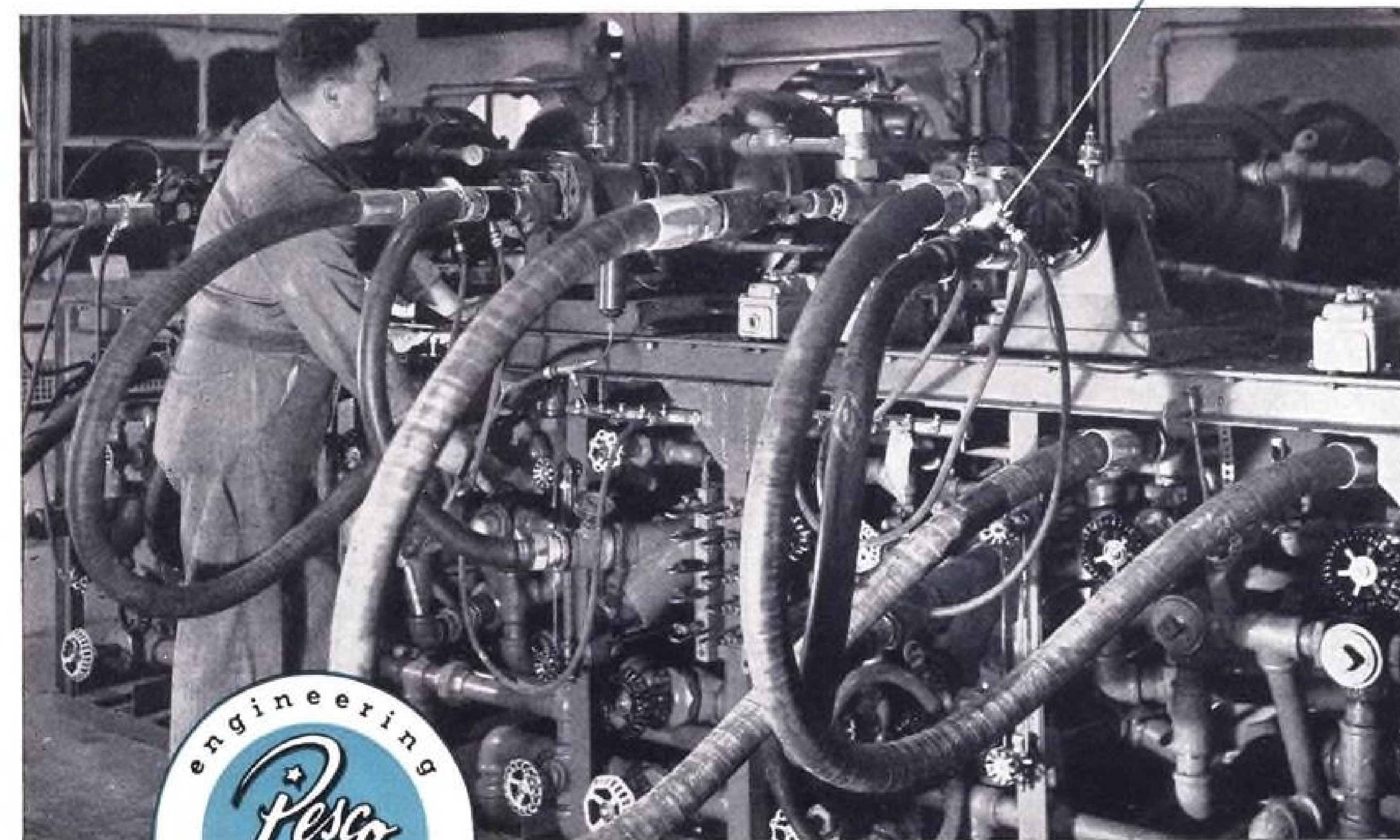
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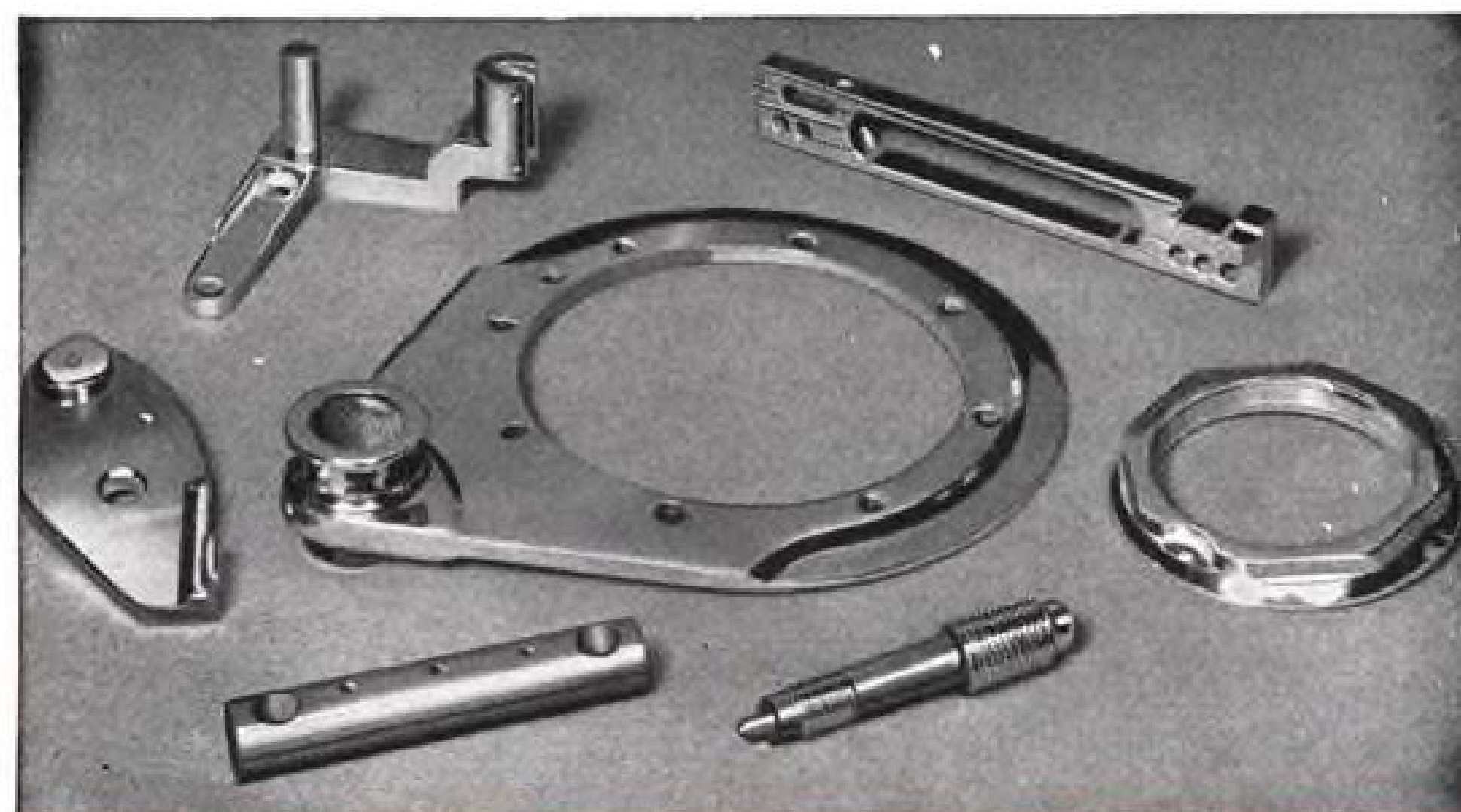
This kind of constant research and testing has enabled Pesco engineers to develop aircraft equipment and accessories so good that they have long been accepted as standard for both military and commercial planes.

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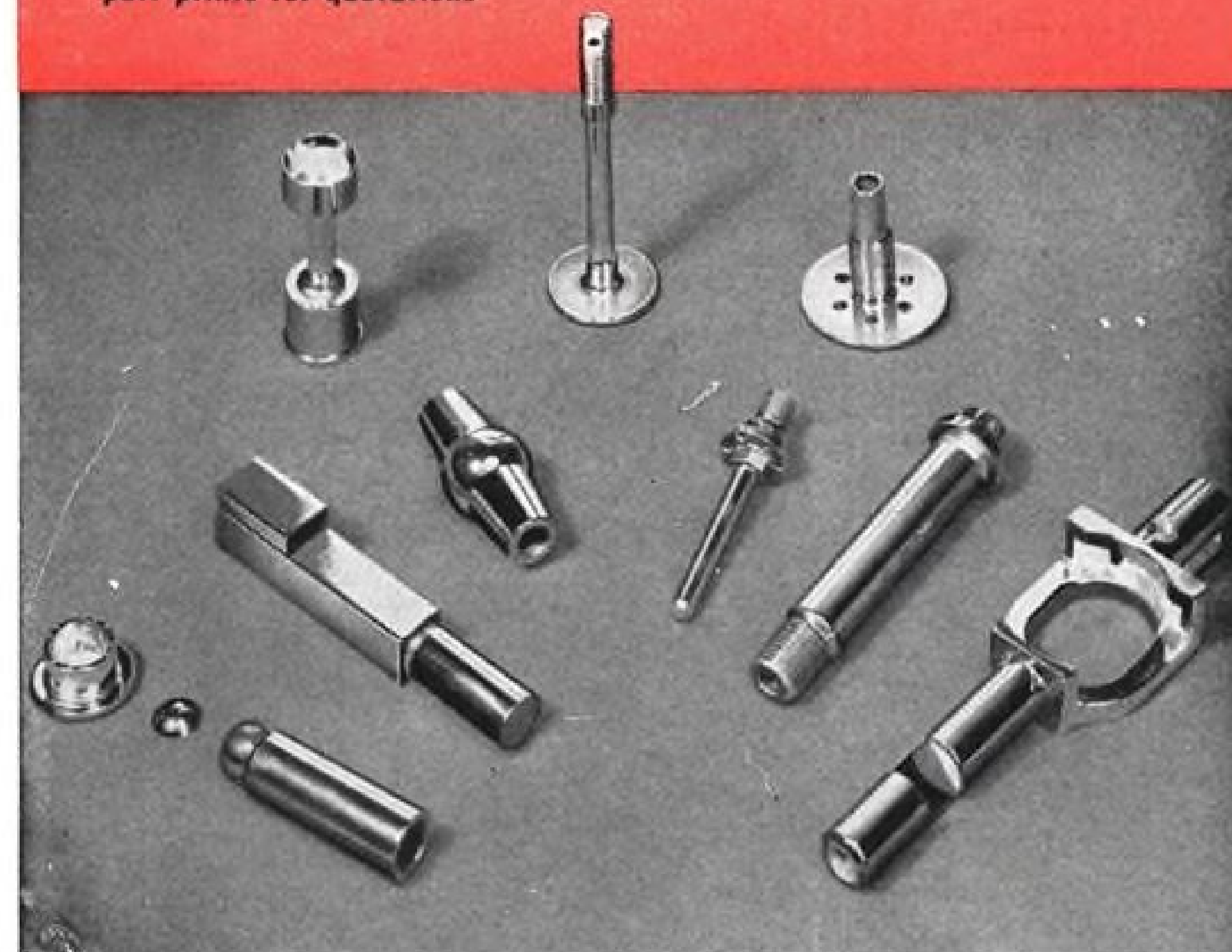
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to be satisfactory except for very small joints. If solvent is trapped in a joint, it will be unable to escape through the metal and will cause poor adhesion.

- Any glue used must neither give off volatile by-products in hardening nor must it require any products from outside the joint.

- It is difficult to apply the adhesive to the metal in such a way that the metal is "wetted." If the adhesive does not wet the metal, there is no possibility of obtaining adhesion.

- It must be possible to make it change into a strong material which is resistant to solvents and weathering.

- Adhesives should have good cohesive and adhesive properties. They must be much stronger than those commonly used for wood gluing.

- When metals are loaded beyond their yield point they stretch very rapidly. Elongations of the order of 25 percent are not in the least uncommon and many metals stretch far more before breaking. Therefore if joints are to be made which approach the strength of the metals themselves, the jointing material used must be capable of withstanding very severe strains before break-down occurs.

- Adhesives must not corrode metals. It is difficult to give any explanation of the nature of adhesion. In gluing porous materials, the glue penetrates into the surface of the material and the joint made by hardening of the glue depends for a part of its strength upon the resulting interlocking of adhesive and adherend.

With metals, such a penetration by the glue cannot occur to any appreciable extent and the resulting interlocking accounts for only a small proportion of the strength of the joint produced. Perhaps this will be more readily appreciated if it is understood that bonds may be made quite readily between polished metals and that their strength is in no way inferior to those made between metals whose surfaces have been deliberately roughened by shot blasting or wire brushing.

It is reasonable to conclude that in bonding metals, forces of a different nature from those arising from mechanical interlocking must also operate. Such forces are probably the result of inter-molecular attractions between the metal surface and hardened glue, and the effect produced by them is usually referred to as "specific adhesion" to distinguish it from the "mechanical adhesion" resulting from interlocking.

Mention must also be made of the "pressure welding" of some of the softer metals. The surfaces of the metals are thoroughly cleaned and then pressed together very strongly, sometimes at an elevated temperature. Under these conditions the metals are welded together without any adhesive,

presumably by the inter-molecular attractions across the surfaces of the metals when brought into contact.

► **Metal Pre-Treatment**—Before discussing glues which have been developed recently for the bonding of metal, it may be well to mention what pre-treatment of the metal itself is desirable. Traces of grease result in inferior or unsatisfactory wetting of the metal and consequently a thoroughly reliable method of degreasing is essential. Trichlorethylene vapor baths have been used for this purpose for many years and have given satisfactory results.

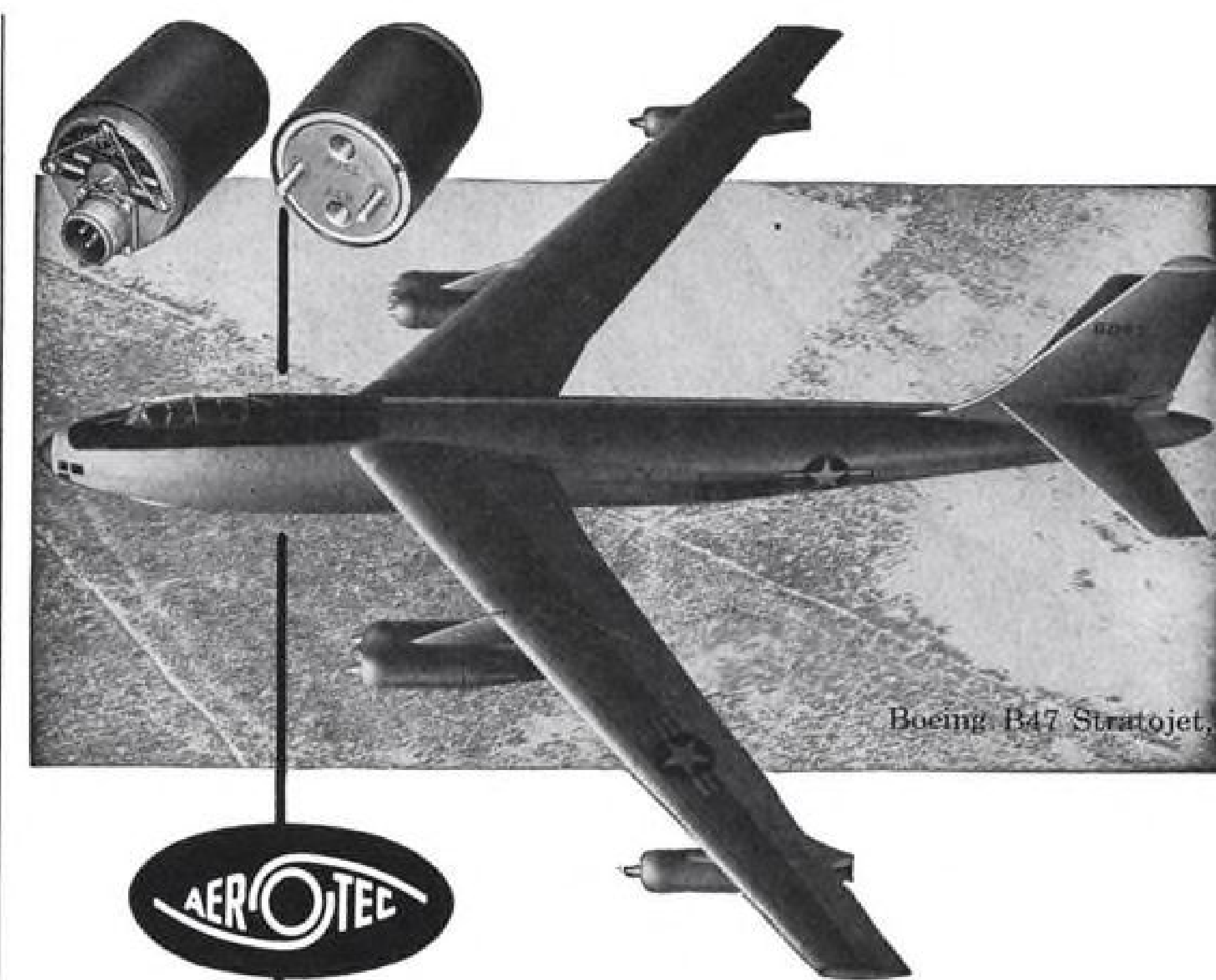
It is also important to remove any corrosion from the metal surfaces. For example, steel which is rusty or covered with scale or light alloys which are corroded may be sand-blasted, wire-brushed or rubbed vigorously with emery. Chemical cleaning agents may also be used, and a mixture of chromic and sulphuric acids is known to provide a suitable method for pickling aluminum alloys.

One of the most successful glues for metals was developed in 1941 by Aero Research Limited, Duxford, Cambridge. This glue, Redux, consists of a phenolic resin which wets the metal surfaces, together with a polyvinyl formal powder which gives the joint considerable toughness and ductility.

The two constituents taken together satisfy all the conditions which we have proposed for metal glues. The polyvinyl formal has good mechanical properties, a high softening temperature and is resistant to most solvents. But even under the influence of heat and pressure, it does not wet metal surfaces satisfactorily. If the phenol formaldehyde resin is first brushed on the metal and then the powder sprinkled onto it, the metals may be strongly bonded by clamping them together and curing the resin at a suitable temperature, e.g. at 140-150 deg C. for 15-20 minutes. The liquid resin makes possible the wetting which is essential for good adhesion and then it polymerizes into a hard solid material resistant both to solvents and to weathering.

► **Rubber to Metal**—A recent development of the Redux process has been for the bonding of rubber to metal. Hitherto this has been carried out by brass-plating the metal, followed by vulcanizing the rubber. Since it is difficult to brass-plate many metals, the process has in practice been restricted mainly to bonding rubber to mild steel. By means of Redux, vulcanized natural or synthetic rubbers may be bonded to light alloys, stainless steel, etc. The rubber is first treated by immersing it for a few minutes in concentrated sulphuric acid, followed by washing, drying, and application of the Redux adhesive.

The effect of the concentrated acid



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is to make the rubber surface a little harder and to cover it with fine cracks, usually called "crazing," which are only noticeable when the rubber is distorted. Chemically the change appears to be the conversion of the rubber to various isomers with superior adhesive properties. If the immersion in acid is unnecessarily prolonged, the surface hardening will be very marked and the rubber may be made unsuitable for use. It is often desirable to spread the acid by felt only on those surfaces of the rubber which are to be bonded.

The glue is normally cured in about 15 minutes at 140-150 deg. C., but rather lower pressures than the 100-200 psi. used in metal bonding have been found satisfactory. For rubbers which will not withstand the bonding temperature required for curing Redux, a neutral accelerator may be added to the resin which reduces the curing cycle to about 20 minutes at 110-120 deg. C. or to about 5 minutes at 140-150 deg. C.

► **Equipment Needs**—To carry out production bonding, it is essential to degrease and chemically clean the metal surfaces and immediately to apply the Redux liquid and powder. After a period to allow evaporation of the small amount of solvent in the Redux liquid, the parts must be clamped together with a pressure of approximately 100 psi. and subjected to a temperature of 140-150 deg. C. for 20 minutes. This temperature cycle is not sufficient to have any appreciable effect on the heat treatment and strength of aluminum alloys, nor is it sufficient to make them susceptible to intercrystalline corrosion. Experience to date has shown that it is almost essential for good production work to have all the stages of bonding in one workshop. Whenever efforts have been made to degrease and clean

the metal in one part of a factory and complete the bonding in another, there have been occasions when panels have been contaminated in transit and expensive components have had to be scrapped.

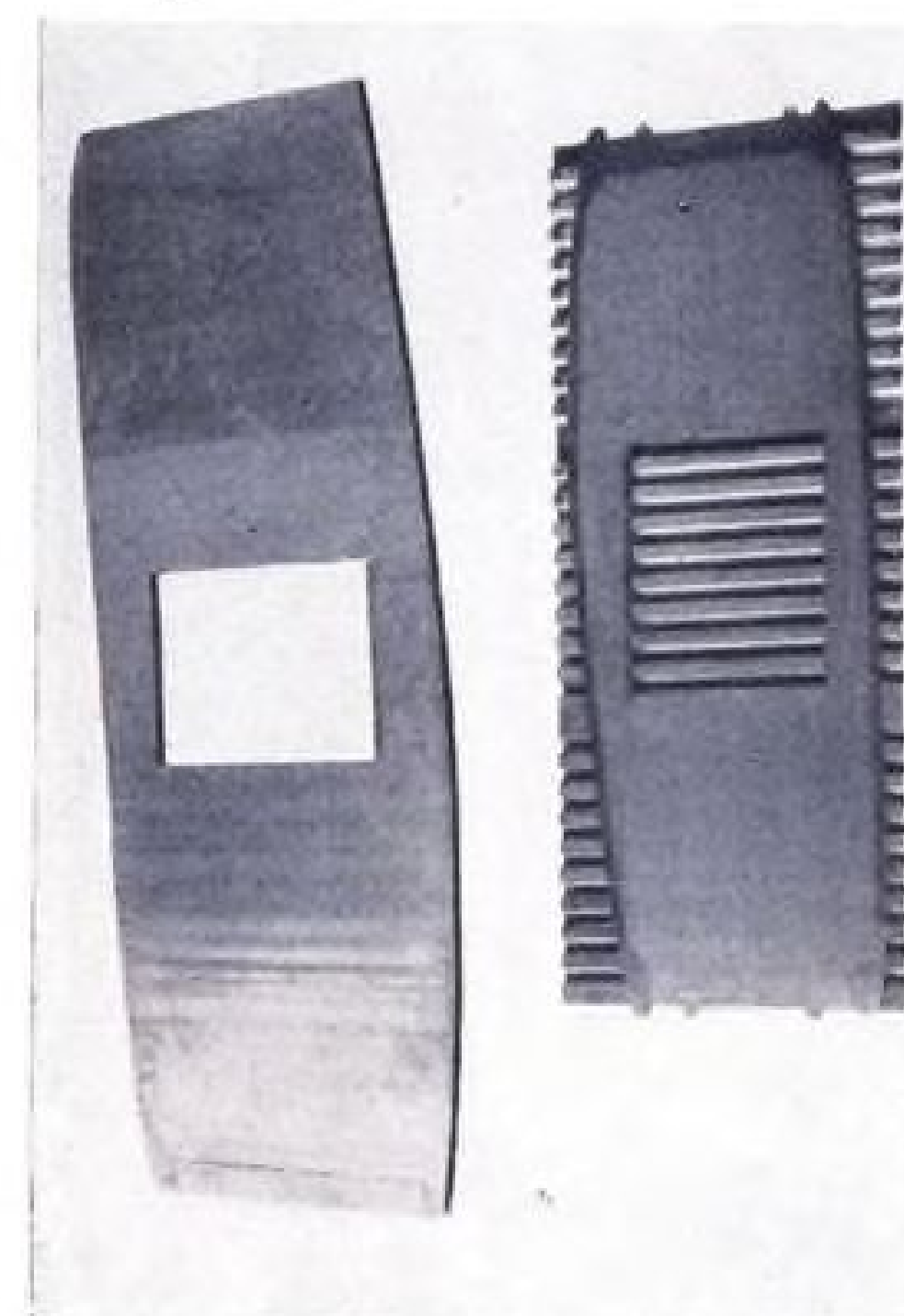
Flat panels are most economically handled in steam-heated hydraulic presses and a large number of single-curvature panels can also be dealt with similarly. For example, de Havilland, Hatfield, bonded some wing and fuselage panels for the Dove in a flat press, and then wrapped them round the fuselage frames or wing ribs. This was not difficult because the skins were very thin, but a rather different technique can sometimes be applied to thicker skins. Short Bros. & Harland Ltd., Belfast, pre-formed some skins for float struts, bonded stiffening members to them in the flat press and then allowed them to spring back to the correct curvature after removing the pressure. Needless to say, some experience is necessary to judge how far such methods are practicable.

For dealing with doubly-curved panels two methods have been devised so far. Bristol favored the use of an autoclave and has developed the necessary plant so that reliable and economical production is now carried out on a very large scale. De Havilland adopted quite a different technique. They have bonded stringers to double-curved skins up to 30 ft. in length in a long, narrow steam-heated press, with tools machined to the correct contours to apply the pressure necessary for bonding. In this equipment, they glue one stringer at a time to the wing or fuselage skin.

► **Savings in Cost, Weight**—The contribution which metal bonding can make to savings in cost is twofold. Because of the savings in structure weight, the aircraft can carry more payload and

earn more revenue. And Redux has already led to savings in the cost of producing aircraft.

This can be seen most clearly from a comparison with the work involved in riveting 4 ft. by 12 ft. panels for the Dove. On such panels there are about eight "top-hat" stringers, running parallel to the longer sides. Each would have two rows of riveting, for which it would be necessary to jig-drill the holes in skins and stringers, to counter-sink the holes in the skins, and then to put in each rivet individually. Bonding, on the other hand, may be carried out in a total time of about ½ hour after degreasing and chemical cleaning, and has the additional advantage that all the attachments are made in the one operation.

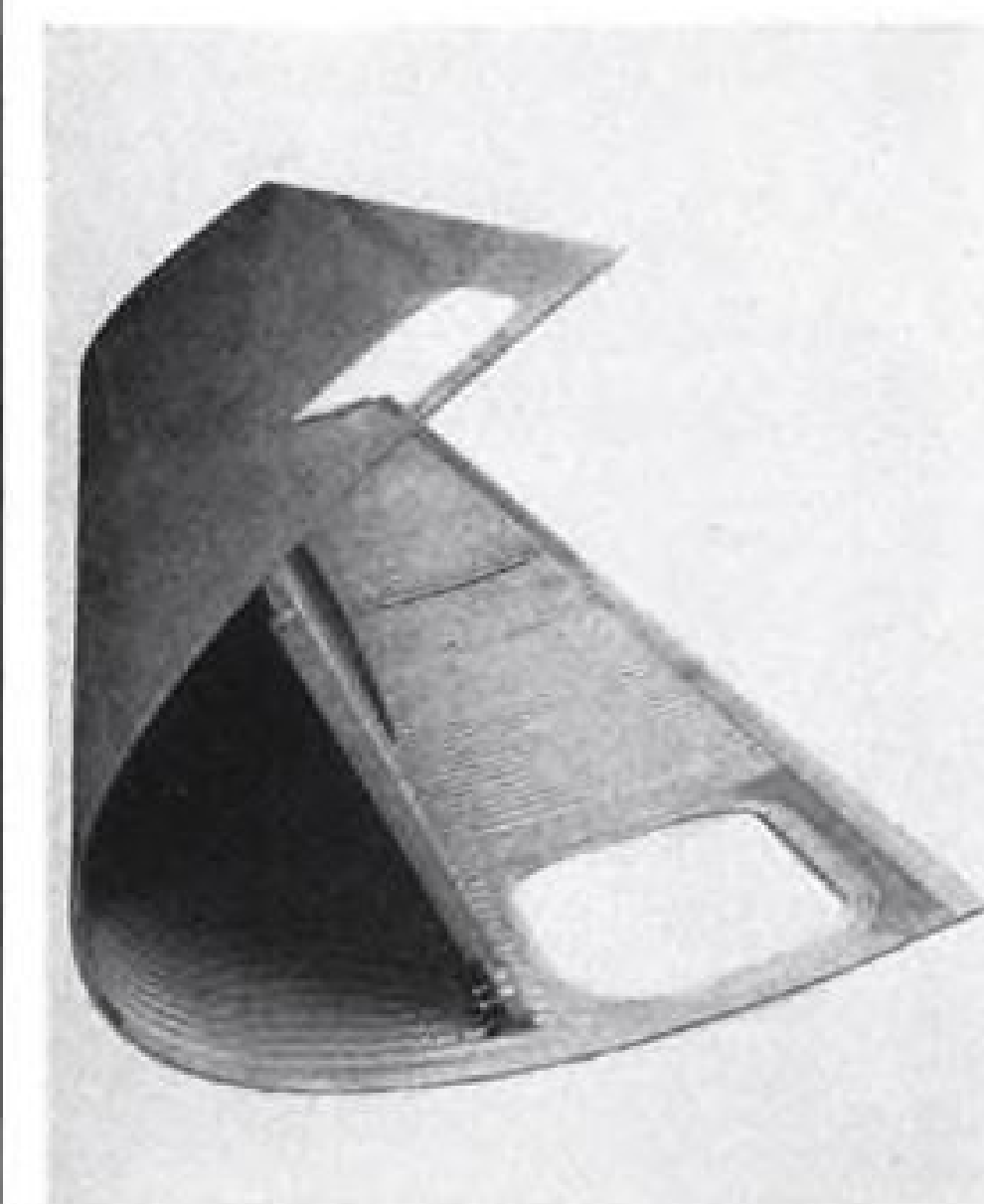


BRISTOL uses Redux bonding for fabrication of simple sandwich structure ribs. Surplus core on right-hand unit is band-sawed off.

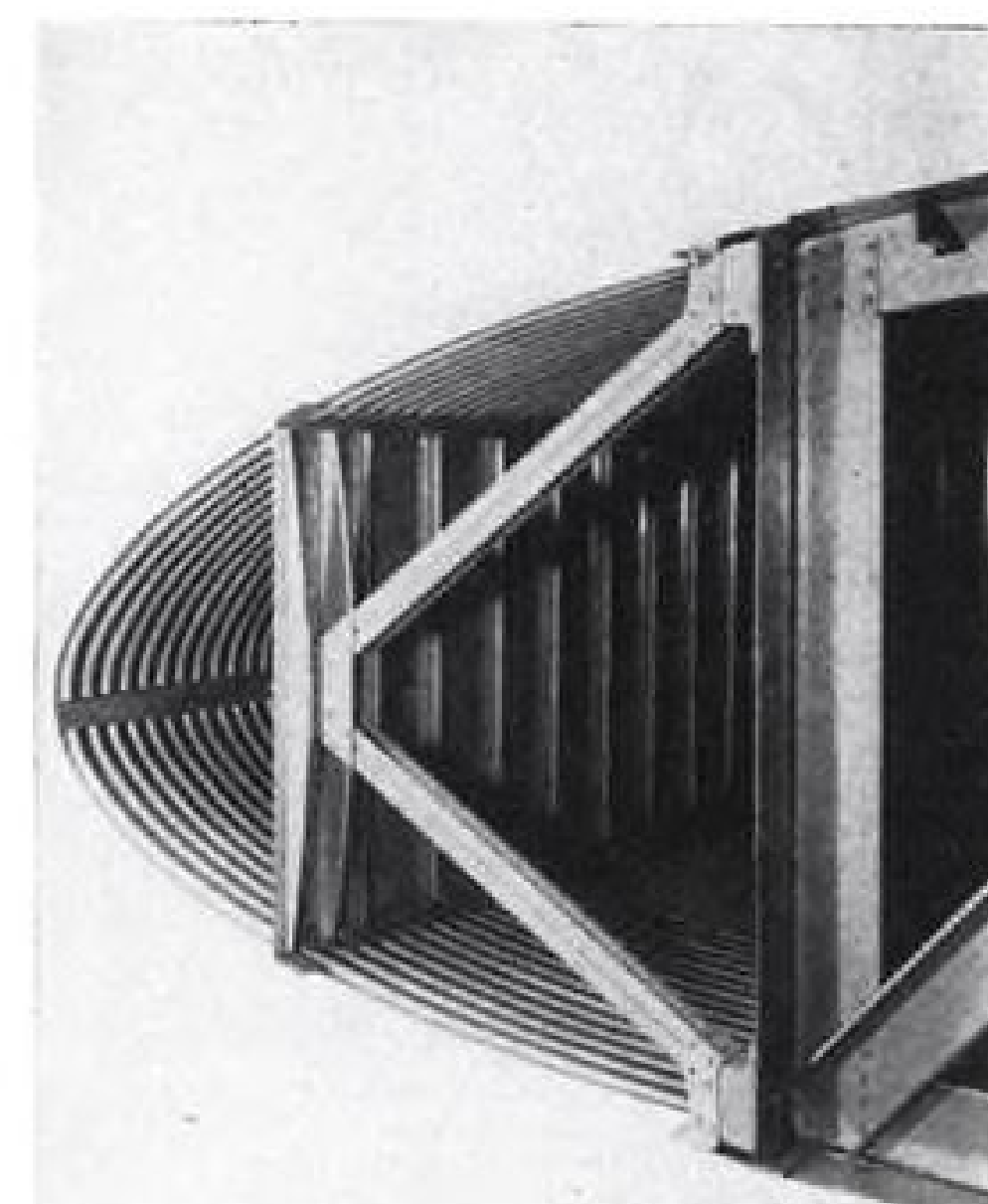
► **Methods Compared**—Having given this description of metal adhesives at present available in Great Britain, let us compare them briefly with others.

For many years engineers have used rivets to join sheet metals, but this method suffers from a number of disadvantages. Sometimes it is unsuitable because of the unsightly appearance of the rivet heads; in aircraft construction, their aerodynamic drag causes a loss in speed and range of the aircraft. In addition, it is now widely recognized in the British aircraft industry that Redux bonded structures are often stronger than similar riveted ones.

The brazing and soldering of light alloys, although sometimes practised, are hardly the simple and reliable processes which they are for joining steels; moreover, soldered joints have a poor resistance to corrosion. Spot welding



LEADING EDGE of Bristol 175 wing built up from curved panels with corrugated inner skin Redux-bonded to outer skin.



SPAR-NOSE assembly of Bristol 175 wing consisting of leading edge section shown at left attached to main spar structure.

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of light metals is a more difficult process than for steels because of the good electrical and thermal conductivity of aluminum and its alloys. Heavy currents and an accurate control of current, pressure and time of welding are necessary, and even then, spot welding can usually be applied only to sheets of approximately the same thickness. No such limitation occurs in gluing, which can be used effectively for joining extrusions, forgings, sheet or castings of widely varying thicknesses.

► **Inert Arc Welding**—A method for making joints between light alloys which has advanced rapidly in recent years has been electric arc welding in an atmosphere of argon gas. The inert argon gas effectively prevents oxidation of the aluminum and thereby eliminates the need to use fluxes to dissolve the oxide. There are still disadvantages in its use, however, not the least being the relatively high cost of argon and of skilled welders. And, of course, any process dependent upon heating the metal to its melting point destroys the properties produced by careful heat treatment. It also introduces the risk of distortion of the components.

It is reasonable to conclude that for many applications, metal gluing processes possess advantages which are sufficiently striking to encourage engineers to make the quite drastic change in production methods which their adoption requires. If, however, the maximum advantage is to be obtained from this innovation, it requires an even bigger change in the outlook of the designer than it does in that of the production engineer.

Motion Sickness Program Pushed

The Air Force School of Aviation Medicine has announced a joint project with the Army and Navy to study the effects of certain drugs and drug combinations as preventive in motion sickness.

Major purpose of the project is to find a medicine which gives the best motion-sickness prevention with the least side effects. The series of experiments is an extension of those conducted a year ago in which soldiers aboard an Atlantic transport were given drugs, under controlled conditions.

Benadryl, which was found last year to be one of the better preventives, will be used as the control drug this time.

For the three-service project, Army provides the men as subjects, Navy the ships and a medical officer for each and the Air Force conducts the study.

Ships are being used instead of aircraft to save time through the increase in the number of man-tests which can be performed in a given time.



Visor Adds Safety In High-Speed Bailout

New protection for jet pilots is this full-face visor that anchors the helmet during a high-altitude, high-speed bailout. Developed by Bausch & Lomb Optical Co. for the Air Materiel Command, the clear plastic shield is mounted on the helmet by a metal yoke and holding plates.

Pulled down over the pilot's face, it locks in place, safeguarding against uprush of air blasts which normally might tear the helmet off the head. Teamed with the helmet, it keeps the oxygen equipment with the pilot and affords protection against facial injury. When not in use it can be pushed up out of the way.

Helmet-visor combination recently was successfully tested at Holloman AFB, New Mexico. Visor is now in production.

New Autopilot Allows Unlimited Maneuvers

Three non-tumbling rate gyros are the heart of a new electrical autopilot, featuring unlimited maneuverability, just announced by Westinghouse Electric Corp.

Described as the speediest and most sensitive automatic pilot ever built, the device is slated for installation in the F-94C all-weather fighters being built by Lockheed Aircraft Corp. for the U. S. Air Force.

► **Joint Venture**—Several years of basic research and flight testing by Westinghouse scientists plus more than a year of development work at Wright-Patterson AFB, Dayton, O., led to the final instrument.

A test model was flown for over 60,000 air miles in an F-82 Twin Mustang during the program's research phases.

Westinghouse says that the auto-

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pilot is the first with unlimited maneuverability, and credits that quality to the use of three non-tumbling rate gyros. These gyros respond to rate of change of position rather than to position itself, and are therefore productive of faster responses.

Another claim for the autopilot is extreme lightness; its weight is stated as being less than one-third that of conventional autopilots.

► **Finger-Tip Control**—Flight controller for the autopilot is a single control knob. For normal flying, the controller is arranged for coordinated flight. To climb, the pilot pulls back on the knob; to turn, he rotates it to right

or the left. The rate of turn depends on the amount the knob is turned, and control coordination is automatic.

For combat, the pilot switches the autopilot to a stage of complete maneuverability, in which coordination of the plane depends largely on the pilot.

Dr. Clinton R. Hanna, associate director of Westinghouse Research Labs who made the official announcement of the autopilot, said that it is suitable for military and commercial aircraft. And, with an eye to the future, he added that with radio control of the autopilot, the flight of guided missiles could be directed.

Flying Test Beds Amplify Jet Data

The flying test bed is playing a major role in Pratt & Whitney Aircraft's development program for its turbojets and turboprop.

Already in service for carrying these powerplants aloft for extensive runs are these vehicles:

• **P&WA-owned Boeing B-17 Flying Fortress** mounting the new T-34 turboprop in its elongated nose.

• **Boeing B-29 Superfortress** loaned by the Navy and toting in its bomb bay the J-48 Turbo-Wasp fitted with an afterburner.

And a Boeing B-50 Superfortress on loan from the Air Force is being groomed to carry the new J-57 in a pod that is to be suspended from the plane's belly.

This flying test bed technique supplements the facilities of P&WA's huge Andrew Willgoos Turbine Lab. In addition to performing jobs that cannot be done in the lab, the aerial testing procedure gets the engine aloft at an early stage of development and reveals any operational weaknesses well in advance of production, so that remedial measures may be taken in ample time to meet schedules.

► **Wider Study**—Relying on the safety afforded by the four basic piston engines powering the flying test beds, test crews enjoy a wider latitude of experimental study, and it is possible to maintain specific test conditions more precisely than could be done if a jet fighter were carrying the experimental engine.

And the large bombers provide an opportunity to gather substantial quantities of data per test hour because of load-carrying capacity. Special fuel supplies and tons of test and recording equipment can be hauled. A test engineer can be accommodated at a specially rigged station to operate the experimental engine and a data observer taken along to check the instruments and automatic recorders.

Also, since the experimental engines need be cut in only when desired test conditions of airspeed and altitude are reached, jet fuel can be conserved solely for test runs, thus allowing long trial periods and making possible more varied operation.

An indication of the dividends stemming from the flying test bed technique is shown in the early aerial tests of the J-42 in a B-29. Data on the cause and cure of engine blowout in quick accelerations at high altitude was provided by 157 hours of runs. In addition, the tests afforded data that led to boosting the altitude at which the engine could be relighted from 10,000 to over 30,000 ft.



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Heli-Coil screw thread Inserts of stainless steel or phosphor bronze wire are widely used on airframes, engines and accessories . . . wherever cap screws, bolts, or studs are used. These precision-formed inserts outlast the product, and permanently protect the threads against stripping, galling, corrosion, seizure, electrolysis, vibration or other causes of thread failure. In one famous jet engine alone, 588 Heli-Coil Inserts are used.

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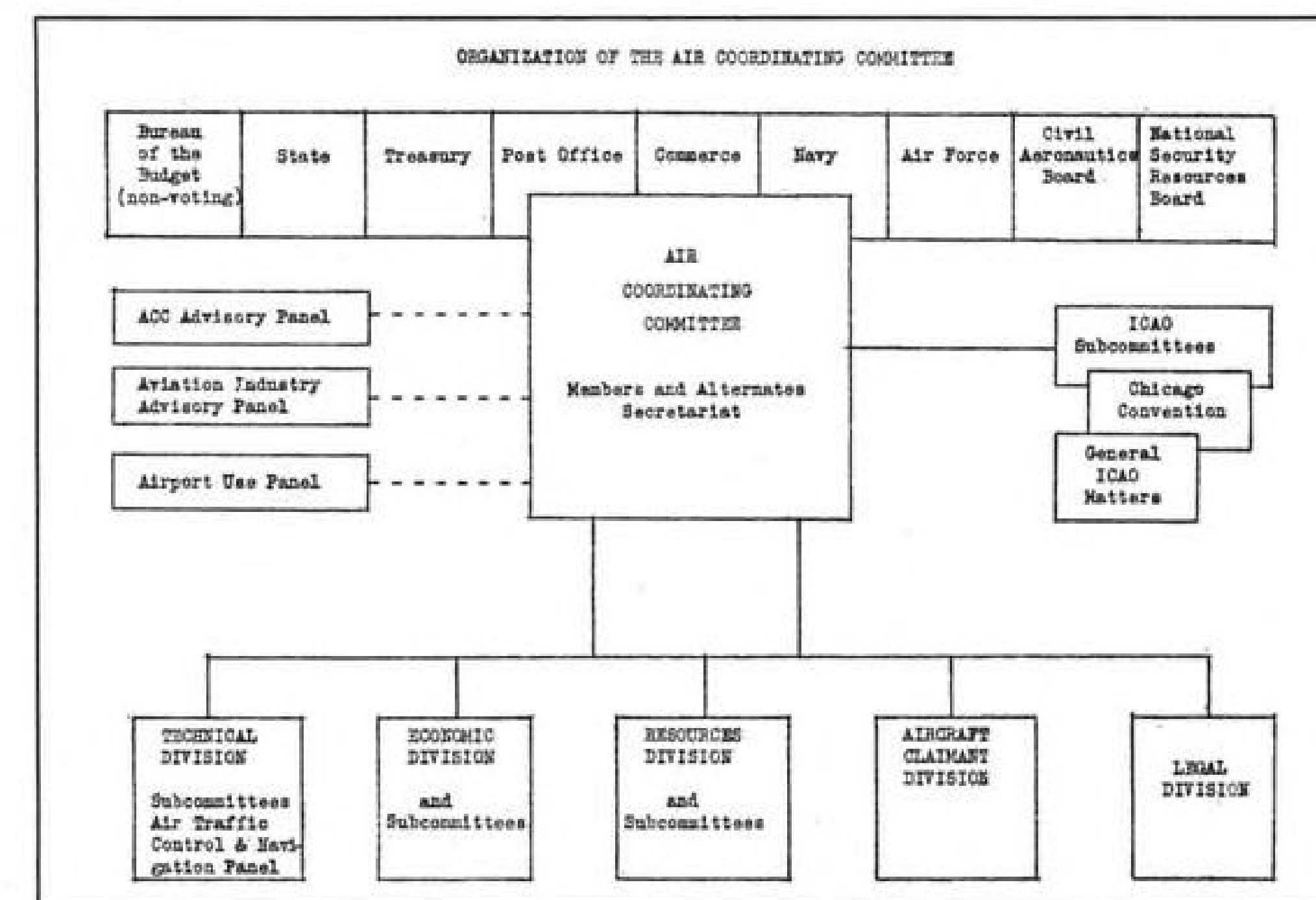
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AIR TRANSPORT



CHIEF CIVIL-MILITARY COORDINATOR of aviation is the ACC.

Higher Subsidies for More Planes

Air Coordinating Committee prominent in military-civil program to obtain funds for expanding transport reserve.

Need for a bigger U. S. military air transport reserve fleet demonstrated in the Korea airlift operation has set top military and civil aviation leaders to work on a new program for increasing air transport subsidies.

If Congress is willing, funds for the proposed program will be the biggest shot in the arm air transport has had in many years.

Most important subsidy increases from the military viewpoint are planned for international routes and for all-cargo operations.

The military services, the Air Coordinating Committee, the Civil Aeronautics Board and the National Security Resources Board are all figuring in the subsidy plans.

About half the programs already have top-level approval; some that need no new congressional appropriations are already underway. Others are being readied by ACC for presentation to Congress.

ACC is in closest touch with air transport build-up plans, as the clearing house of civil and military aviation policy of the government. Through its technical subcommittees, ACC also implements much of that policy after it is established.

The subsidies contemplated or started are:

• **All first-class mail** will move by air. That means 600-700 more transport planes may be needed.

• **Subsidy of international tourist-fare** travel on U. S. carriers. Means is not yet clear.

• **Vast air freight subsidy** in a form not yet fully decided. (Even first-class mail by air would not build international air freight to the desired level.)

• **More military use** of airline services wherever desirable and economically justifiable. This has already started.

• **Accelerated depreciation** rates on new plane purchases.

• **Economic route patterns** for domestic trunklines, keeping unprofitable cities off trunkline service. CAB showed in the recent Southern-Service-to-the-West case that it means to implement that policy.

• **Speed-up in all-weather electronic aid** installations at airports and in planes. Supplemental appropriation bill at this Congress will carry increased airport facilities funds for CAA.

• **Air freight prototype** development. Air Force last month sent to manufacturers its requirements for a 25,000-lb.-payload air freight plane development.

Some of these air transport aids sound like the "national aviation policy" the Congressional Aviation Policy Board presented at the second session

of the 80th Congress. But many are new plans, and all are getting the required military push for the first time.

► **Build-Up Timetable**—Two of these plans for stimulation of airline prosperity and new plane purchases are already going into action: military encouragement and use of airline services, and CAB strengthening of trunkline routes.

The Military Traffic Service is now consciously encouraging military agencies to use airlines wherever possible (AVIATION WEEK Feb. 5). Air Transport Assn. estimates 1951 military travel on airlines at over \$18 million—compared with \$5 million last year.

Civil Aeronautics Board is determined to help the domestic trunklines toward self-sufficiency by cutting down on profitless route services. This, says Chairman Delos Rentzel, will mean better profits, making possible lower fares, making for more traffic, requiring more planes. (This applies chiefly to the domestic trunklines; international carriers may need considerably higher subsidies to bring about the increased profits and lower fares programmed to raise America's international air freight and passenger traffic up to military reserve requirements.)

As to transferring all long-haul mail to air carriers, that depends on the present or a later Congress; without appropriations the Post Office cannot act upon it. The Post Office Department told the 80th Congress Aviation Policy Board such a transfer would add from 600 to 700 more planes to the United States civil fleet. The Congressional Aviation Policy Board commented on this as follows: "To the extent that the air transport reserve required by national security would thus be financed by mail revenue, the over-all defense costs to the nation would be reduced."

Air freight subsidy on a grand scale may be partly accomplished by the air transport of all first-class mail.

A big increase in international airline subsidies to promote tourist-fare air travel demands new money appropriations. This plan has heavy backing of both Air Force and State Department.

► **Depreciation Angle**—Accelerated depreciation of new planes is already being planned at Defense Production demonstration and National Production authority. Five-year depreciation of an entire aircraft appears permissible under the Defense Production Law. Later legislation may even further increase airline equipment depreciation rate for tax purposes. Idea is that the airlines could buy new equipment whenever confident they will not run into an economic slump in the near future; if a bad slump in airline business occurred perhaps three years later, the plane would already be written off.

Two proposed big stimulants to future airline business and to transport

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implies a mid-wing or high-wing craft.

Finally, the plane is designed for air freight; the exclusively military features

CAB Examiner F. Merritt Ruhler wound up hearings on the common fares investigation last week.

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WAL Purchasing Unit Feels Pinch

Traffic build-up and "mobilization scarcity" add up to a king-size headache for Western Air Lines purchasing department.

Before Korea, WAL's director of purchasing, Harrison Mahan, figured he had it made. Western's Los Angeles headquarters was a highly diversified area and supplied most of WAL's needs. Western had 1600 local suppliers, only 600 elsewhere. Its plane makers, Convair in San Diego and Douglas in Santa Monica, likewise were nearby.

This cozy supply situation enabled Western to keep one of the lowest inventories in the industry. Western kept a maximum of 45-60 days supply on general supplies, turned over its entire inventory three times a year.

Now Western expects it will have to search far afield, accept many substitutes, build bigger inventories, and pay more for the thousands of things it needs to keep flying.

► **Lead Time Up**—Mahan's ideal set-up developed cracks even before Korea. First, traffic increases required higher inventories. But scarcity and hard-to-get items which started turning up in late summer posed the biggest problem. Lead time of all manufacturers has gone from 45 to 90-120 days and in some cases to 180 days. As a result Mahan now tries to anticipate his needs

6 to 9 months in advance instead of the former 3 to 4 months.

Scarcity also brought with it the substitute bogey. Mahan says this is ruining Western's standardization program. Though Western carries 37,500 items on its Cardex system, uses about 1700 to 2000 expendable items, it was able to build up a standardization program which "meant a lot to us." Now Mahan will have to build a bigger inventory to cover substitutes.

Another aspect of scarcity already showing up, Mahan says, is the disappearance of name brands. "You can't always get the Doe Co.'s So-and-So, but you can get practically the same thing with another brand name and at a higher cost."

► **Costs Up**—Mahan figures supplies and equipment will cost Western 20 to 25 percent more overall. That is, things he bought last year will cost that much more. How much more he'll have to buy because of increased traffic loads and longer lead time, he doesn't know.

The airline operates 10 Convair 240s, 6 DC-4s and 10 DC-3s. Its modernization program is complete and it doesn't plan any additional high density conversions because of increased business.

Traffic in the winter months already is up sharply. January was 14.3 percent over the previous year. For the first nine months of 1949 Western reported a 48.9 percent increase in reve-

nue-passenger-miles, and a doubling of cargo ton miles. Mobilization is bound to build traffic even more. WAL's route system serves a big proportion of the western states' military installations, marine bases, navy bases, and procurement offices. Its industrial sales reservations have doubled in recent months. Big companies are sending their people out to scrounge for materials wherever they can find them. They get better results by flying visits than they do by letters or phone calls.

Another traffic booster is the placing of a "little capital" in San Francisco. Los Angeles businessmen, who already commute heavily on the high-density Los Angeles-San Francisco run, will need to make more trips to the regional capital.

PanAm Seeks to Open Operations to Tahiti

Once-isolated Tahiti now is attracting the attention of U. S. airlines.

Most recent development is that Pan American World Airways has sought CAB permission to operate there. PAA would connect Tahiti with Hawaii, Canton Island and American Samoa and says it can start a month after approval is granted.

A new airline, Tahiti-Hawaii Airways, made the first Honolulu-Tahiti round-trip in January, using a chartered Transocean Air Lines DC-4. It plans monthly flights from now on (AVIATION WEEK Feb. 12).

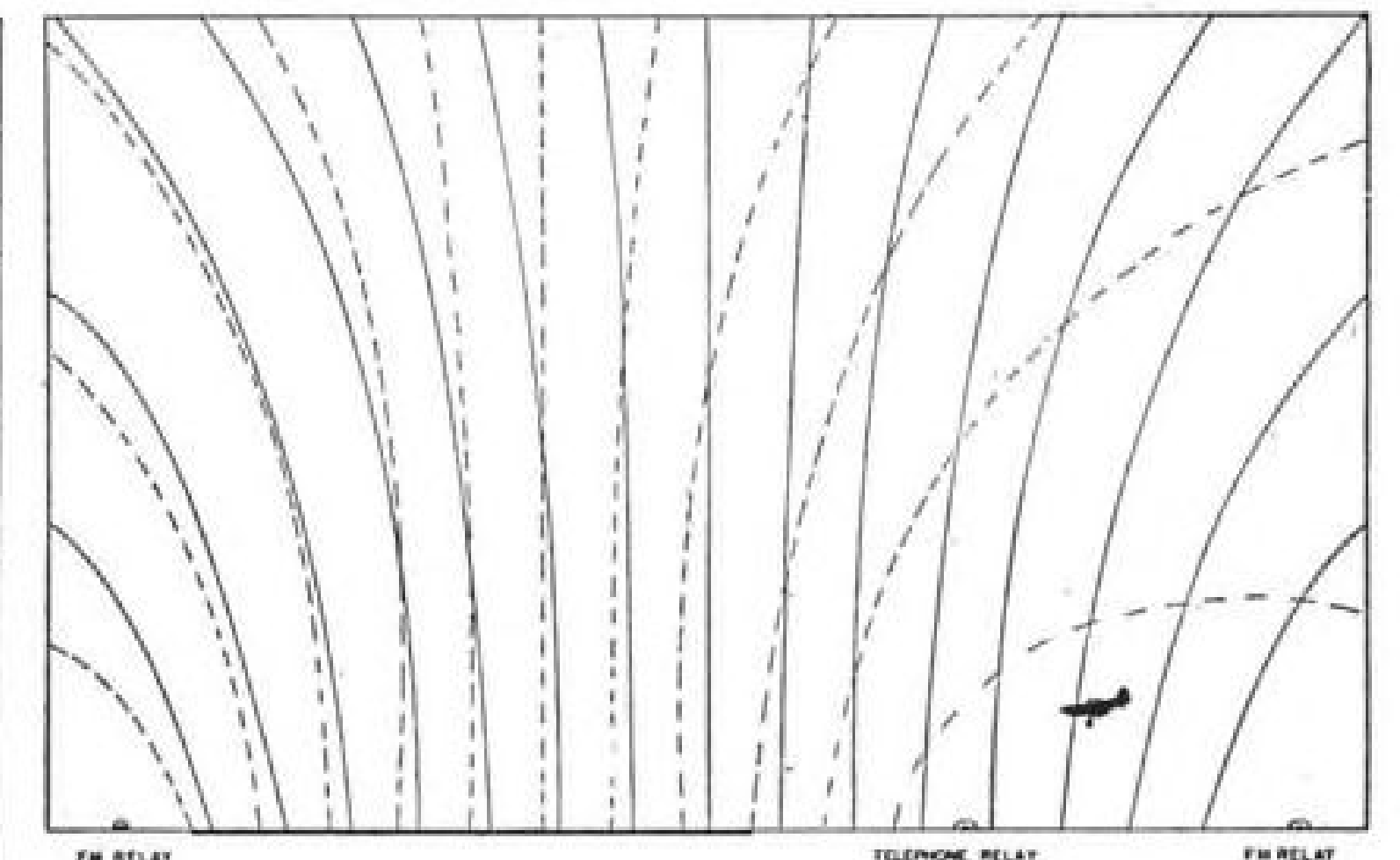
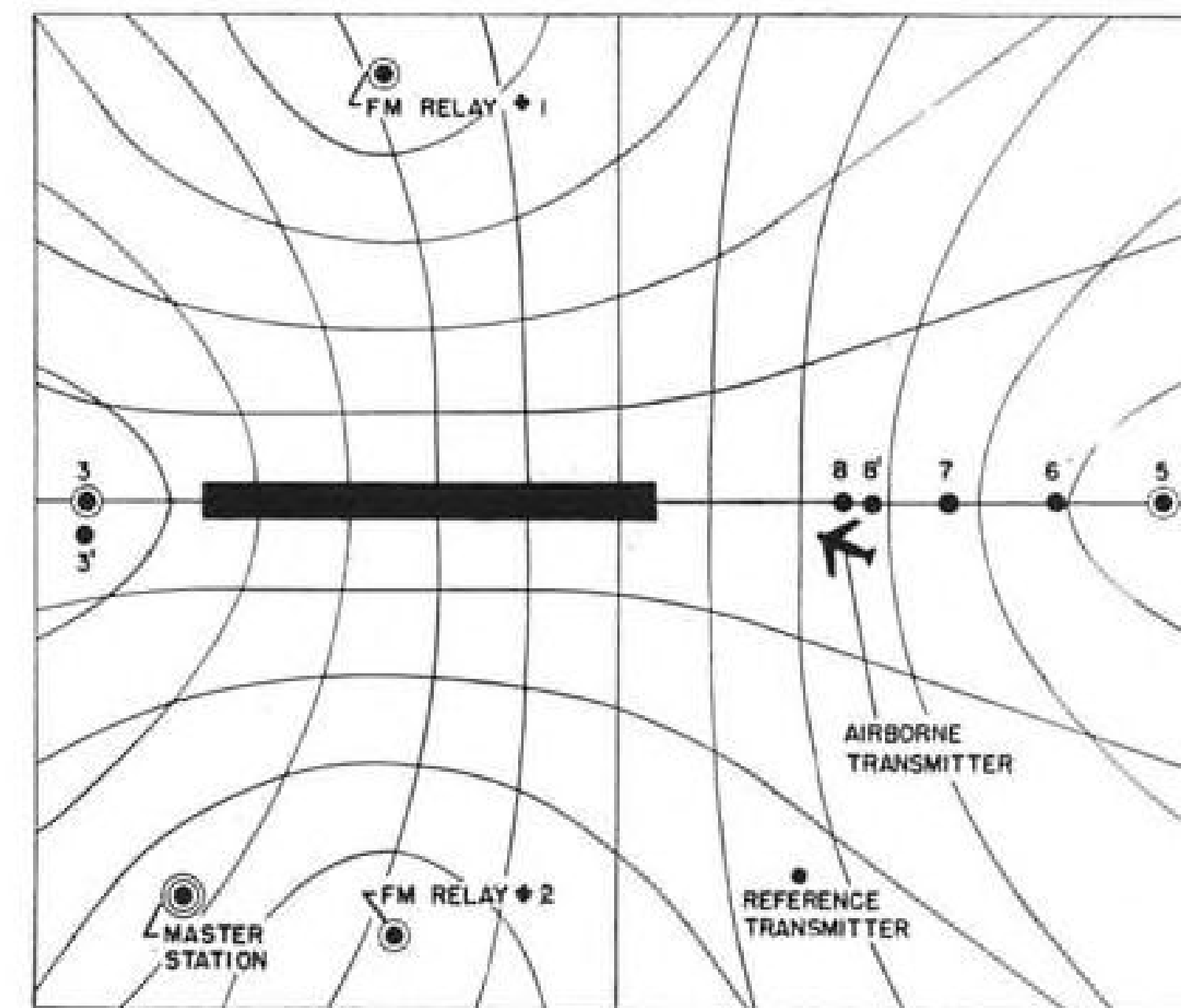
After PAA made its announcement, THA announced receipt of a French government franchise to operate the Honolulu-Tahiti route and said it will operate as a French corporation. It is now a Hawaii partnership.

THA also announced purchase of a Grumman Mallard amphibious plane for \$150,000 to use for inter-island service between Bora Bora and Papeete, a 150-mi. flight.

CAB Issues Findings On Michigan Crash

Findings of the Civil Aeronautics Board on the Northwest Airlines DC-4 crash June 23, 1950, at Benton Harbor, Michigan, fatal to all 55 passengers and crew of three, are:

- There is not enough evidence to assess one probable cause of the accident. Time of crash is estimated at 35 minutes before midnight June 23.
- Crew was thoroughly briefed before takeoff, including a forecast of thunderstorm activity and possible development of a line squall.
- Squall line was described and located in a radio forecast issued one hour, 40 minutes before the accident.



RAYDIST PLAN VIEW (left) shows how plane is tracked through thousands of hyperbolic lines that form a grid. Altitude measurement by Raydist (top) completes the three-dimensional grid that locates any object in space, with one-foot error per mile distance.

Raydist

New position-measuring device claimed to have error of 1 in 5000 ft.

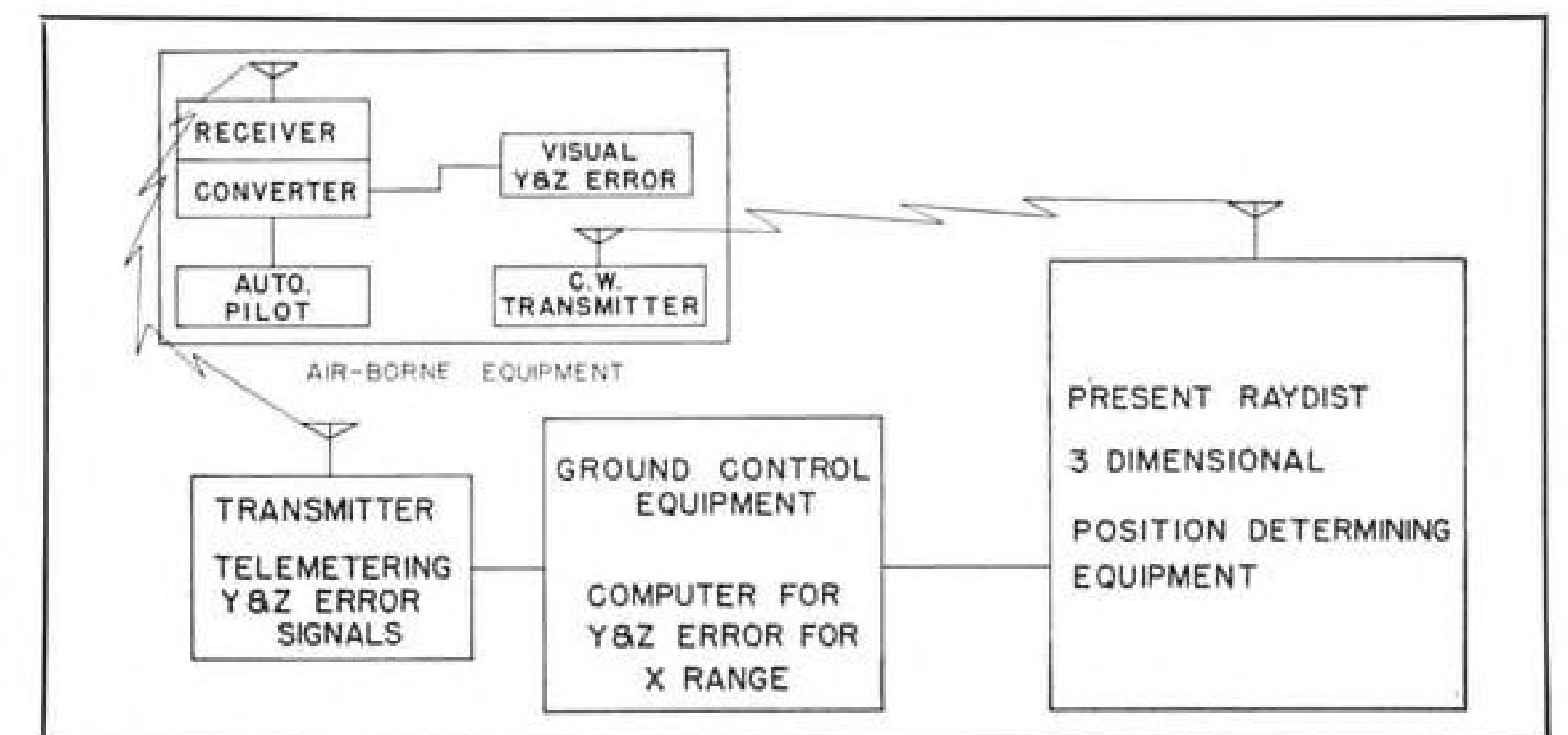
A new highly accurate aircraft position-measuring device was delivered to Wright Field All-Weather Flying Division last week by Hastings Instrument Co. The development contract for the new equipment—called Raydist—was let by All-Weather and sponsored by Air Navigation Development Board.

Raydist will measure position with an error of only one foot for every mile the plane is from the ground station. Air Force will use Raydist's extreme accuracy to evaluate operational and development models of the ILS, PAR, GCA and other gear that must project or indicate positions in space, where accuracy is very hard or impossible to check (AVIATION WEEK Feb. 12. All-Weather has also ordered from Raydist a flat-surface plotting board to track aircraft positions as given by Raydist readings.

Altitude measurement with Raydist is still somewhat cumbersome, demanding a number of relays to achieve accuracy at different points. But altitude measurement application of Raydist is brand new and may be expected to become simplified through development.

► **Many Uses**—High accuracy of the Raydist system, regardless of ground or weather conditions, makes it a candidate for many air and surface jobs, including missiles tracking and direction. Current ranges used with Raydist are up to 170 mi. But increased power output can raise the range, as Raydist depends on low-frequency radio, which curves around the earth's surface.

Some current applications of Raydist: • **Surveying.** A standard line of Raydist navigation gear for hydrographic sur-



PROPOSED AUTOMATIC LANDING system by Raydist plus conventional equipment.

veying has been developed for commercial use and is used by the Corps of Engineers.

• **Surface navigation.** Hastings in 1949 developed an automatic navigation and tracing system for Navy Bureau of Ships.

• **Piloted craft.** The aircraft position measuring equipment installed at Wright Field last week is the first official three-dimensional position measuring equipment developed and delivered by Hastings. With this gear to demonstrate accuracy of one foot error per mile range, Hastings now hopes to get into automatic aircraft testing, navigation, landing, taxiing, and other applications.

► **How It Works**—Raydist is a system of electronic surveying. A ground station with two or more small relay stations takes a carrier wave signal from any transmitter that is turned on in an airplane.

Position is fixed by comparison of the phase angles of continuous waves that follow different hyperbolic paths. It tracks position through a solid grid of radio waves very close together. The system is comparatively new. It was pioneered by the company president, Charles Hastings, and first significant

application was made by Hastings to measure aircraft ground speed on test runs in 1940.

Proposed layout of the system for instrument landing with or without automatic landing coupling involves the following Raydist equipments recently developed for All-Weather Flying Division:

- **Master station**, mounted in the rear of a truck or in a control tower.
- **Airborne transmitter** in each plane, which may be either the existing carrier wave equipment or else a special 12-ounce transmitter developed by Hastings.
- **More than nine relay stations.**

These together give all the signals and readings necessary for instrument landings and even taxiing on the ground, the company estimates. Conventional type computers and autopilot couplers could do the rest, the company says.

Raydist operates on any frequency from 1mc. to 20mc. The equipment recently demonstrated operates on 9.160mc. A complete revolution of the equipment's phase comparison dial indicates one-half wave-length, or 55-ft. change in the difference between the two paths of transmission. The phase



NATIONAL AIRLINES' "BIG WHEEL"

Since this 7-ft. cylinder was installed at National Airlines Miami headquarters a month ago to expedite reservations, any NAL station can confirm space immediately to a party of up to three passengers. Only when a "critical line" is reached must

space be cleared through central control. The "Big Wheel" weighs half a ton but revolves on a discarded DC-4 nose wheel under finger-tip pressure. Its capacity to handle 96 flights simultaneously can be doubled.

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meter dial is divided into 100 parts, so each little marker on the dial indicates a movement of about 6 in. along the line joining relay stations.

Two or more relay stations along the centerline of runway approach give altitude readings. Two or more relay stations one each side of the centerline give azimuth indication for bringing a plane down the centerline.

Overseas War Risk Insurance Coming

Overseas aircraft operators unable to get insurance against war risks from private companies will probably be able to obtain it from the government soon.

Legislation authorizing the Secretary of Commerce to offer such insurance has been approved by Senate Interstate and Foreign Commerce Committee. There is general agreement on the measure, and it will probably be enacted shortly.

Department of Defense now insures aircraft performing defense work under contract. The government insurance is needed for commercial operations.

"If an operator must take the war risk," Air Transport Assn.'s executive vice president, Robert Ramspeck, explained, "he has two alternatives, neither of which is desirable to the operator or in the national interest. First, he may simply cease operations in a danger area, which would throttle the commerce; or he can continue operations and increase his charges sufficiently to compensate him for the risk he undertakes. This would make for a sharp rise in transportation costs, and would be reflected in the cost of the goods carried."

The Secretary of Commerce is already authorized to offer war risk insurance to shipping companies. In the last war, the Marine War Risk Insurance Program turned out to be a profit undertaking for the government, with premiums more than balancing claims paid.

War Damage Corp., it is anticipated,

will be reactivated to offer insurance against war risks of all types in the United States. Because of this, the aircraft war risk measure now pending does not provide insurance for operations wholly within the continental U. S.

Under it, Secretary of Commerce, after evaluations, would set premium rates for insurance and re-insurance for the following:

- American aircraft and foreign-flag aircraft owned by U.S. citizens or engaged in operations considered in the national defense.
- Crews and passengers on such aircraft—against loss of life, injury, or enemy detention.
- Personal effect and baggage of crews and passengers.
- Cargoes, including express or registered mail.

Fiscal Report Shows Tigers Flying High

The Flying Tiger Line grossed \$3,958,923 in the October-December quarter, with net profit of \$356,788. That brings profit for the first half of Flying Tiger's fiscal year to \$879,413 after taxes, or \$1.16 a share.

The air freight company's prospects are for business to hold up at that level in the present half. Tokyo airlift operation of seven DC-4s is helping swell volume and profits.

These earnings are after charging off a reserve of \$600,000 against probable retroactive tax increases.

Volume for the October-December quarter set a new high, but profit was down from the first quarter because of labor cost increases and a retroactive charter price reduction on the Tokyo airlift, charged against the second quarter.

The company on Dec. 31 showed for the first time an earned surplus of \$243,925. Current assets of \$3,203,146 compare with current liabilities of \$1,931,618. The company has no long-term debt, or preferred stock.

SHORTLINES

► **Air Express**—January air express shipments through new terminals totaled 122,151—a new high for January and second highest number for any month, topped only by December. Number of shipments was up 26 percent, revenue (\$553,158) up 41 percent over a year ago.

► **Alaska Coastal Airlines**—ACA traffic in 1950 was best ever for all types: passengers up 13 percent to 26,244; charter flights 222 trips; cargo and mail 1,598,000 lb. . . . ACA now owns 14 planes, including a Catalina and six Grummans. The 1950 payroll was \$388,000.

► **All American Airways**—Company is granting passes to all former employees now on active military duty, to fly the airline free whenever a vacant seat is available, or half-fare rate on a reservation.

► **Boeing Field**—Seattle's King County Airport has but one hard-surface runway and a parallel lightplane strip. Yet its 103,573 landings and takeoffs last year topped the traffic at \$14-million Seattle-Tacoma International, four miles away. Field was not closed down for any 24-hour period in the year.

► **Braniff International Airways**—An economic survey of the states served by Braniff predicts a 10 to 15 percent gain in retail sales and 18-25 percent in industrial production for the region. Braniff has put out an attractive booklet on the economic study. . . . BIA has signed a five-year contract to carry Panama mail.

► **British Overseas Airways**—BOAC Stratocruiser fleet has flown 3.7 million miles since introduction on trans-Atlantic routes December, 1949.

► **Colonial Airlines**—Bermuda traffic of Colonial in 1950 gained 88 percent over 1949. Despite current record advance bookings, Colonial will keep the \$85 fare it started last spring.

► **KLM Royal Dutch Airlines**—Cut-rate 23-day excursion fares Glasgow-Amsterdam on Convair-Liners will reduce fare 25 percent to 18 pounds 10 shillings for the return trip, starting Apr. 15.

► **International Air Transport Assn.**—Four European airlines are using mileage instead of money for figuring interline ticket debits and credits. They are BEA, Swissair, KLM, and Danish Air-

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—snugging up cone retaining nuts on a jet engine, before tensioning. A Snap-on Master Ratchet with 3/4" socket, and an XV-1618 Offset Boxsocket, team up perfectly. Photo by courtesy 126th Fighter Squadron, Wisconsin Air National Guard.

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lines. . . ICAO is watching this as a test operation for possible general introduction internationally.

► **National Airlines**—Immortalizing its heroic stewardess who died trying to save a child in the recent Philadelphia landing accident, National has started a Mary Frances Housley Memorial Fund. Variety Children's Hospital is beneficiary. NAL has given a sizable sum and asks further contributions to swell the fund—with checks payable C. B. Cuinn, treasurer of the fund.

► **Panagra**—A \$500,000-engine and propeller conversion program on all Panagra DC-6s will install Pratt & Whitney R-2800-CA-15 engines and Hamilton Standard reversible pitch aluminum props.

► **Pan American World Airways**—PAA will use Stratocruisers instead of DC-6s on West Coast-Australia flights starting this week. New routing cuts scheduled time to Sydney to 37 hours from 49 hours. . . . Salesmen of PAA are shooting for an average 60-percent passenger load factor for 1951, and total cargo quota of 29,263,000 ton miles. . . . Company has switched advertising to J. Walter Thompson Co.

► **Sabena**—Belgian airline expects this year to equal last year's 7872 trans-Atlantic passengers. . . . Sabena will soon again have four DC-4s on the Tokyo airlift, following overhaul of two. . . . Sabena's airlift crews have been averaging 175 hours flight time per month; cargo load per plane has averaged close to six tons.

► **Scandinavian Airlines System**—SAS last week opened service Stockholm to Santiago, Chile. Scheduled at 38 hours, this flight is the fastest connection, Scandinavia-Chile. Stops are Copenhagen, Geneva, Lisbon, Dakar, Recife, Rio de Janeiro. . . . SAS now serves 63 cities in 34 countries on five continents.

► **United Air Lines**—Traffic in January was up 55 percent over a year ago for United, to 124,394,000 passenger miles. Freight was up 27 percent to 2,126,000 ton miles, express up 63 percent to 962,000 ton miles, and mail up 36 percent to 1,235,000 ton miles. . . . United's Mexican affiliate Lamsa showed a 40-percent gain for the year 1950 over 1949, and a 100-percent January gain, 1951 over 1950. One big reason: free-husband plan, allowing husband to travel free in winter, if with his wife.

► **Western Air Lines**—About 14 percent more passengers traveled on Western this January than last; revenue other than mail increased 44 percent.

AVIATION CALENDAR

- Mar. 8-9—Eastern regional meeting, Institute of Navigation, Shoreham Hotel, Washington, D. C.
- Mar. 12-13—Short course on uses of aerial equipment in agriculture, Purdue University, West Lafayette, Ind.
- Mar. 16—Sixth annual flight propulsion meeting, Institute of Aeronautical Sciences, Hotel Carter, Cleveland.
- Mar. 19-23—Seventh Western Metal Exposition, Oakland Auditorium and Exposition Hall, Oakland, Calif.
- Apr. 16-18—Society of Automotive Engineers aeronautic and aircraft engine display, Hotel Statler, New York.
- Apr. 19-21—Airport Operators Council annual meeting, Hotel Peabody, Memphis, Tenn.
- Apr. 24-26—ATA annual engineering and maintenance conference, Hotel Drake, Chicago.
- May 12-13—Airlines Medical Directors Assn., eighth annual meeting, Hotel Shirley Savoy, Denver, Colo.
- May 13-14—Airline Medical Examiners Assn. fourth annual meeting, Hotel Shirley Savoy, Denver, Colo.
- May 14-16—Aero Medical Assn. 22nd annual meeting, Hotel Shirley Savoy, Denver, Colo.
- May 17-19—Annual convention of the Women's Aeronautical Assn. of the U. S., Little Rock, Ark.
- June 11-15—Second annual conference on industrial research, conducted by Columbia University Dept. of Industrial Engineering, New York.
- June 13-16—Aviation Writers Assn. convention, Hotel Commodore, N. Y.
- June 15-July 1—International aviation display, Grand Palais and Le Bourget Airport, Paris.
- June 18-22—Private seminar on organization and operation of company standardization work, to be held by Dr. John Gaillard, Engineering Societies Bldg., New York.
- June 18-July 6—Three-week Air Age Institute course, Parks College of Aeronautical Technology of St. Louis University, East St. Louis, Ill.
- June 23—1951 British National Air Races, Hatfield Aerodrome, Hertfordshire, for light, heavy craft, and jets. Entry blanks available from National Aeronautic Assn., 1025 Connecticut Ave., N.W., Washington 6. Closing date for receipt of entries is May 1.
- June 25-29—1951 summer general meeting of the American Institute of Electrical-Engineering, Royal York Hotel, Toronto.
- Sept. 7-11—Third annual Anglo-American Aeronautical Conference, convened jointly by Royal Aeronautical Society and IAS, Brighton, England.
- Oct. 3-6—Society of Automotive Engineers aeronautic and aircraft engine display, Hotel Statler, New York.
- Oct. 31-Nov. 1—Society of Automotive Engineers fuels and lubricants meeting, Drake Hotel, Chicago.

PICTURE CREDITS

9—(center) Wide World. (lower right) Keystone; 39—Air Coordinating Committee.

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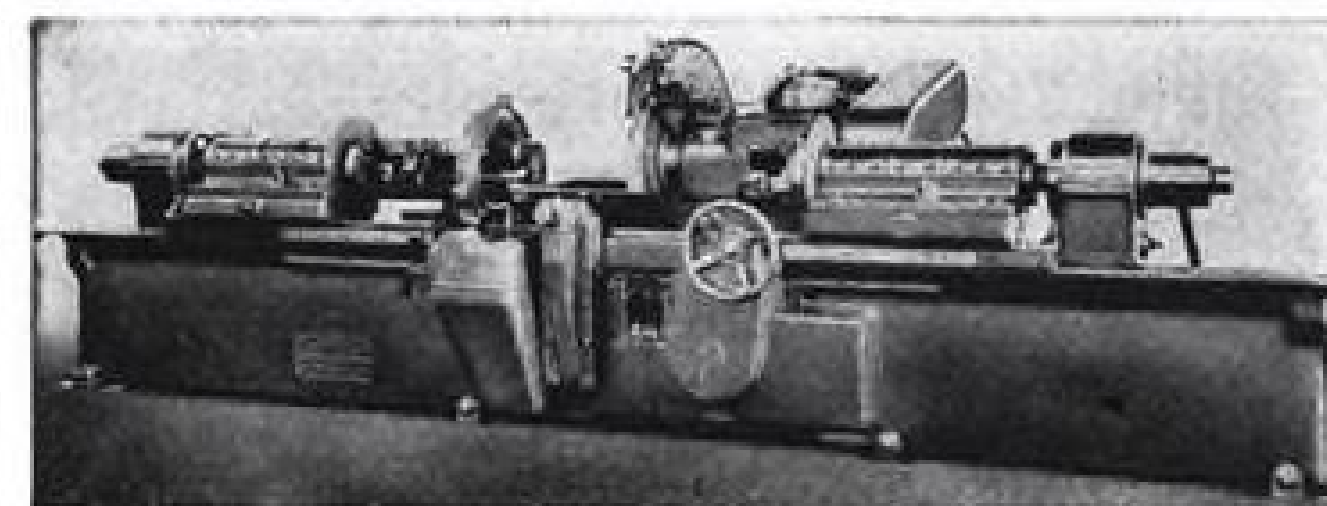
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1600	11210	Cover
100	11762	Guide
7	26456-2	Bearing
1157	35787-5	Bushing
2174	35787-10	Bushing
39	35807-8	Stud
814	35814	Blower Assy.
3967	35817	Spring
280	35855	Cap
2446	35924	Washers
4200	35932	Gasket
6	37751	Cover
15	37993	Housing Stud
28	38314	Rod Assy. Comp
20	45213	Cover
182	46400E	Liner
30	48346	Cylinder
1	48347	Cylinder
1475	48360	Bearing
53	48362	Shaft
175	48363	Shaft
3	48388	Sump
100	48389	Fitting
909	48390	Retainer
56	48392	Sump
533	48447	Bushing
107	48457	Adapter
76	48458	Bushing
390	48461	Gear
149	48468	Bearing
90	48468B	Bearing
389	48469	Bearing
470	48470	Bearing
75000	51506	Plug
395	54847	Clamp
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530	564-2	Pioneer Oil Separator
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80	AN3213-1	Scintilla Ignition Switch
2000	AN3096-4	Light Assembly
800	AN3096-5	Light Assembly
380	AN3096-6	Light Assembly
75	EE-709M2	Air Associates Motor Assy.
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STRICTLY PERSONAL

(Without the slightest difficulty, we have persuaded Herr Doktor H. A. Von Fluglen, M.B.S., to produce today's column. We present the good Doktor:)

* * *

JUNE IN JANUARY—While you easterners bask in sub-zero breezes coming up from Florida I send along the following, in anticipation of the coming summer. In journalism, we call this a scoop:

"It's not the heat: it's the humidity!"
Those are words of sheer stupidity.
Now if you'd say it as you oughta,
Say, "It's not the temperature: it's the watahl!"

* * *

READ THE METER, MATER, PLEASE—One John A. Lemuel of Murphy, Miss., has taken umbrage at one of my poems which ran in this estimable page of **AVIATION WEEK**, and I address to him these words:

"Please be advised that I am very sensitive about my poems, I have two methods of 'measuring' poetry: (1) I make 'em fit into a Gilbert & Sullivan melody, or (2) I count 'em off on my fingers. The poem to which you made reference was 'measured' by the digital method and, when I sent it in to the editors, the meter was correct—I think. The trouble is, my editor has only nine fingers on his left hand and, since he checked the fifth line on his right hand and the sixth line on his LEFT hand, the results in print were slightly asymmetrical. If he were NORMAL like I am (10 fingers on each hand) he would not have deleted that one syllable word from the last line. P.S. Your Community Chest may auction this letter off ANY time.—(Signed) H. A. Von Fluglen."

Or, quote:
Poetical license, a horrid excuse
For indulging in terrible lingual abuse,
Is something THIS writer would like you to note
Is absent from anything he's ever wrote!
Unquote.

* * *

MY LETTER TO LIFE MAGAZINE—I have sent the following letter to the publishers of Life Magazine. It was several months ago but my editors in New York have just uncovered this previously forgotten addition to the Von Fluglen private correspondence:

"Gentlemen! It was with the greatest reluctance that I finally laid aside the Oct. 9 issue of Life, containing that inestimable thesis, **GEOGRAPHY OF THE UNIVERSE**.

"As you are undoubtedly aware, Van Der Schlemmer, Von Schussnig, McGillicuddy and the undersigned were among the first to attempt to assimilate the spectrographic hypothesis as promulgated by that eminent astrophysicist early in the spring.

"Although certain of the more conservative galaxial astronomers have posed the question, 'Can the inverse differentiation of the third order actually produce nebular constipulation?', this writer is in a position to state unequivocally, **MAYBE**.

"The above facts, combined with the so-called 'indeviated' mathematical manipulation of certain infinite series, has resulted in one of the most startling developments to date, the stipulation of the non-homogeneous contra-rotating galaxial nebulums.

"These matters are brought to your attention in order to avoid any possible impression—as a result of your excellent coverage of the conflagration—that inverse spanwise distribution of the nebular pervement may, at some time in the foreseeable future, cause a condition of galaxial constipulation."

Well, to my surprise, I got a nice dead-pan letter back from Williston Rich, assistant to the publisher, saying he has put me on their mailing list to receive preprints of their science articles. What I want to know is, who is kidding who?

* * *

MOST SENSIBLE STATEMENT OF THE WEEK—We've been asked to withhold his name because he works for a certain govt. agency, but he said it while discussing the new Part 8 of the civil air regulations: "Why with that, they can get along without the CAA just as well as with it."

* * *

MAKE HAY WHILE YOU, ETC.—Al Minott, the aircraft powerplant expert, is usually inclined to take advice of salesmen with a grain, particularly when they're trying to sell HIM. However, while discussing properties with a real estate sales person recently he picked up a tidbit he finds agreement with. Said the real estate salesman, "Young man, I'd advise you to get a lot while you're young.

* * *

GIVING HIM THE GREEN LIGHT—For you fun-loving readers we suggest this little gag to play on your mate next St. Patrick's Day, come this March. Helen Lippis, wife of Rocco Lippis, pulled it last year, on the CAA's Region 7 chief of the Aircraft Engineering Branch—her husband. She stayed up after Rocky hit the hay and surreptitiously inserted a green bulb in the bathroom light socket. Next morning, while he was preparing to shave, Mr. L glanced into the mirror, caught a sight of his somewhat bilious reflection and emitted a shriek, saying he was green as a billiard table. "Of course, Darling," Helen replied calmly, "it's St. Patrick's Day."

H. A. Von Fluglen, M.B.S.

WHAT'S NEW

New Books

D. W. Perrie, in **Cloud Physics**, has put together in very readable form a thorough study of the makeup of cloud forms and their actions. The author speaks of his subject from first-hand knowledge, being meteorologist for the British Columbia Forest Service and also a member of the Committee for the Study of Clouds and Hydrometers of the International Meteorological Organization.

Although much space is given to the internal physics of clouds, a substantial portion of the book covers observing, forecasting, and flying. The rare stratospheric nacreous and noctilucent clouds are also described, as are optical and electrical phenomena. A comprehensive chart of cloud characteristics giving detailed specifications is included at the end of the volume. Various cloud formations are illustrated.

Published by John Wiley & Sons, Inc., 440 Fifth Ave., New York 16, 119 pages, including indexes, price \$4.50.

Telling the Market

Handy pocket-size brochure, **Bendix Ignition Analyzer and Associated Equipment**, describes the equipment, using a question and answer format, and includes schematic diagrams. Write Scintilla Magneto division, Bendix Aviation Corp., Sidney, N. Y. . . . 32-page manual, **Its Easy to Bend**, fully illustrated with clear and simple drawings shows numerous production applications of Di-Acro benders is available from O'Neil-Irwin Mfg. Co., Lake City, Minn.

Aluminum alloy protection and paint adhesion coatings are covered in detailed reprint of a paper, **Amorphous Phosphate Coatings for Protection of Aluminum Alloys and for Paint Adhesion**, a paper by Alfred Douty and F. P. Spruance, Jr., presented at national convention of American Electroplaters Society. Write the American Chemical Paint Co., Ambler, Pa.

Detailed planning data for installation of **medium intensity airport lighting** for small fields and for secondary runways and taxiways at large airports can be obtained from Line Material Co., Airport Lighting division, East Stroudsburg, Pa. . . . Technical report containing comprehensive data on new technical developments on **fluid flow rate testing** for the aviation industry can be obtained from Fisher & Porter Co., 3780 Country Line Road, Hatboro, Pa.

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LETTERS

Suppressed Antennas

As a member of a group which has been actively engaged in research and development work on suppressed (or flush-mounted) aircraft antennas for some time, I was pleased to see the publicity given this important field in the Jan. 1 issue of AVIATION WEEK ("Problems of Submerged Antennas," pp. 26-27). I am writing to take issue with two statements in an otherwise excellent article.

The statement is made that "for all their drag, antennas work best when they are hung outside (the airframe)." This is not, in general, true. As an example of considerable practical importance, the tail-cap HF antenna demonstrated by the Communication and Navigation Laboratory at Wright Field in an actual installation on a C-54 is roughly twice as efficient from the point of view of electrical power transfer alone, as the fixed-wire HF antenna normally installed on this aircraft.

A relatively simple suppressed LF antenna on this same aircraft has been shown by our tests to provide electrical performance at least as good as that of a 300-foot trailing wire. Suppressed antenna designs for VHF and UHF consistently equal or exceed the electrical performance of their externally mounted predecessors.

Later in this same paper it is stated that "a suppressed (antenna) designed for one type of aircraft can rarely be used for any other type of aircraft." This may be true in certain instances, but it is not valid as a general comment. Since suppressed antennas, by their very nature, are more intimately related to the airframe structure than are the corresponding external antennas, their mechanical design must be suited to the airframe on which they are to be employed. However, to imply that adaptation to a new airframe is essentially a "cut-and-try" procedure is to overestimate the design problems involved and to underestimate the accomplishments made in this field in recent years.

It is discouraging to note that no U.S. civil aircraft in present production incorporates suppressed antennas for more than a small fraction of the radio equipments carried. The British, on the other hand, have completely equipped the two airliners mentioned in the article, and the Canadians have demonstrated a similar accomplishment in the Avro Jetliner.

J. V. N. GRANGER, Supervisor
Aircraft Radiation Systems Laboratory
Stanford Research Institute
Stanford, Calif.

Flying Autos

The story about the Fulton Airphibian in AVIATION WEEK Jan. 15 regard to certification of "flying automobiles" prompts this letter. I am afraid that this matter of certification for an automobile that flies is considerably more complicated than routine certification of a lightplane.

This all relates to the old question of what is a roadable airplane and what is a "flying automobile." Frankly, the line of distinction is arbitrary, but for lack of a better definition, we have been dealing on the basis of basic utility and mobility.

In the case of the Aerocar, we have built a machine which is completely mobile as you point out in your story. The one fact that has not been put across to the public is the matter of utility.

This has to do with whether the machine is basically an airplane or an automobile. This takes into consideration such things as highway code compliance, flexibility, basic engineering detail such as steering and chassis design as related to road operation tire wear, comfort, etc.

As you can see, the problem is complex, and to put it into a simple sentence, we refer to whether the owner is going to use his machine as a routine automobile or whether he is going to use it more as we do present day lightplanes. The further consideration of mobility, of course, really has a great deal to do with the problem. When you tow your wings, or pile them on top of your car as some concepts of "flying autos" do, then you bring into the picture a lot of new problems of basic airworthiness.

The whole thing really makes a big problem for the CAA and, as you can see when the CAA starts certifying an automobile (not an airplane) as being airworthy, they are biting off a big responsibility.

Take for instance the basic problems arising from one owner operating his automobile on the ground 90 percent of the time and only flying 10 percent. Is his machine airworthy after this sort of average use? Is the one that flies 90 percent and is only driven 10 percent any more or less airworthy?

We have found that a lot of problems are tied up in these questions. It all hinges on the way we are in a habit of operating our automobiles, and also has to do with things like fatigue of aluminum parts under road conditions, etc. I am sure you know the problems of just rough field operations as contrasted with surfaced runway use for a standard lightplane. Multiply this by thousands of chuckholes, railroad crossings, etc., and then think of how long a certificated Cub landing gear will last before it needs rebushing, or how long a set of tires on a certificated Cessna 140 will last even on an airport. Then you begin to appreciate the deficiencies of certification for such a vehicle.

All this has been taken up with the CAA after we began to have failures of parts which had passed CAA static test requirements. This was first noticed in our running gear. Two years of operation have cracked out the fuel tank, and a dozen other things have shown up. The result of all this is that both the CAA and ourselves have reviewed the situation and we believe that more than a routine certification of the machine as an aircraft is going to be required.

Accordingly, the CAA has suggested, and

we agree, that a number of flying automobiles will have to be out and in service use before anyone can say just what the requirements for certification of such a machine might be.

The CAA has gone a step further and have given us formal approval to go ahead and build and sell a limited number of Aerocars to the public for this service test work. The CAA will keep close contact with the owners to determine how the things are working out, and we assume some responsibility for replacement of faulty parts, etc.

Similarly, we are to provide inspection service, etc., to assure the owners of satisfactory service. This is much like the problems presented when the helicopters were first introduced, and it was instantly apparent that an aircraft certification for a conventional plane was not adequate.

Some helicopters had to get into service before the ATC for them could be developed. This was hastened by military use of the machines and, of course, if we can sell some flying automobiles to the Army we will get through this problem quickly.

Meanwhile, the matter of terminology creeps up and since we are in such a habit of thinking of certification as a basic requirement for an aircraft, everyone thinks of it as being necessary before an aircraft can be put into production and sold to the public. Mass production—yes. Limited production—no.

So you see, when you say that the Airphibian is the first automobile to be certificated, the statement isn't as simple as it sounds. The CAA and our company agree that you can't certify the Aerocar right now despite the fact that it has passed the required static tests, drop tests, etc. No doubt it would pass the CAA flight tests, too, although we have not even attempted to get into that matter since the basic problem is one of getting use and experience in this new type machine first anyway.

The result is that we are trying to raise the money necessary to build ten Aerocars for rental to the CAA. They have asked us to supply the units, and they further propose to gain experience with them so that they might find out what the problems of such a vehicle might be. So far we have not been able to raise the money required. The Army Field Forces has shown some interest in flying automobiles and they will probably have a publicity release in this regard soon. At any rate, we are bringing the Aerocar back East along about Apr. 1.

MOULTON TAYLOR, President
Aerocar, Inc.
Longview, Wash.

Ski Fight

The argument you had between Transocean and Alaska Air Lines on your Letters page Jan. 29 sounds to me like a tempest in a ski-pot.

BOB HALPIN
Bethany Airways, Inc.
Bethany, Conn.

AVIATION WEEK, March 5, 1951

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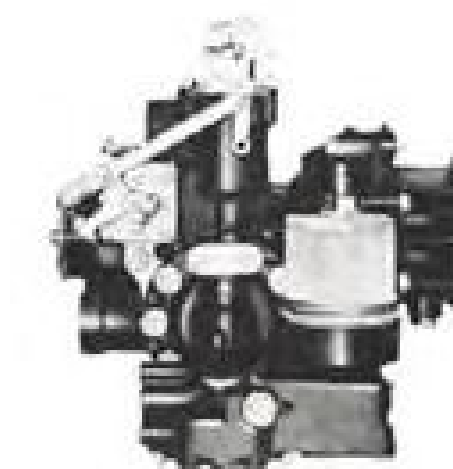
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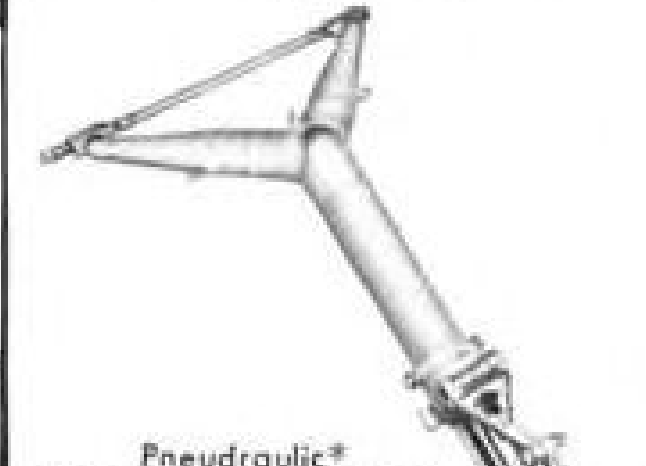
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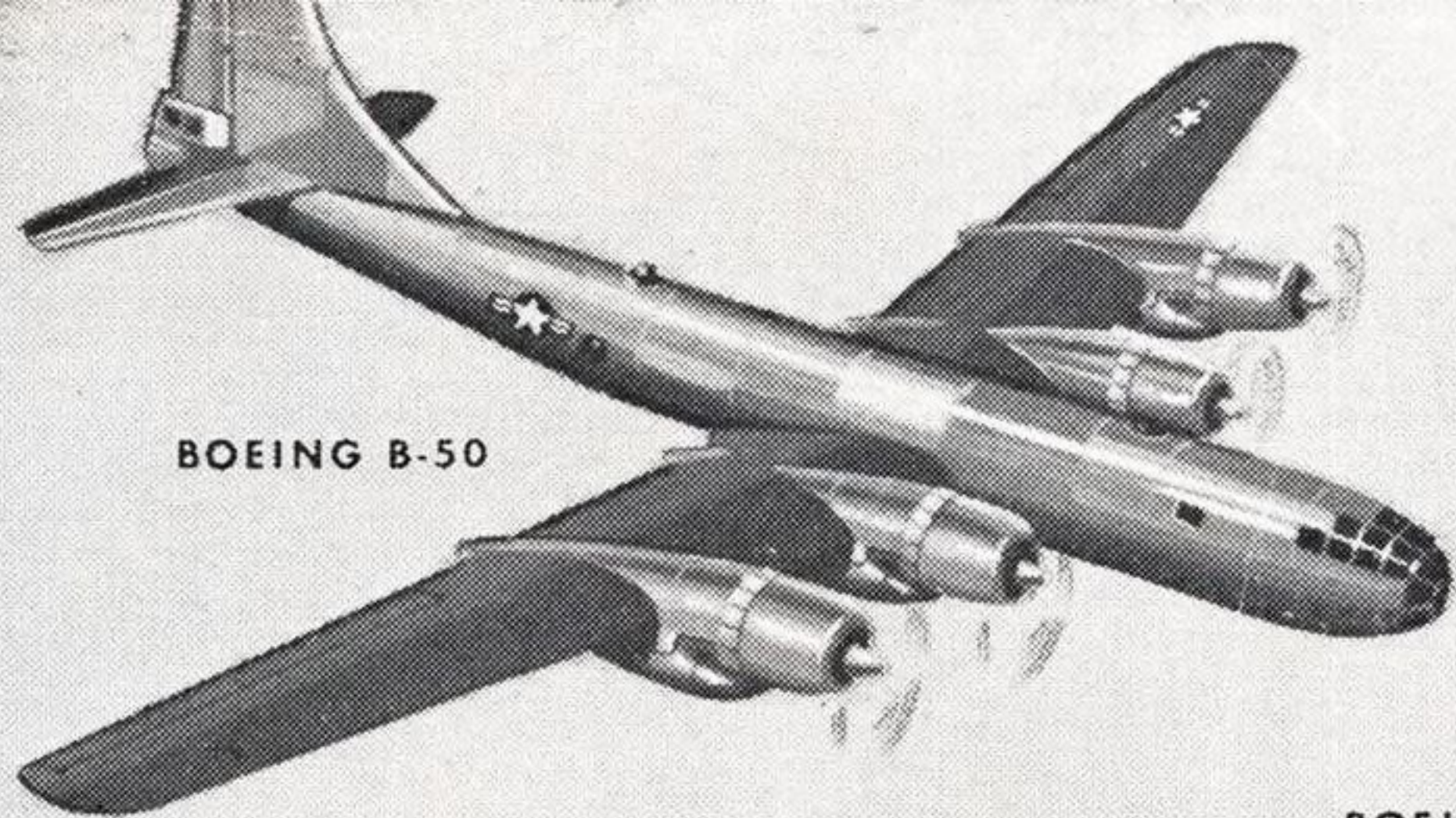


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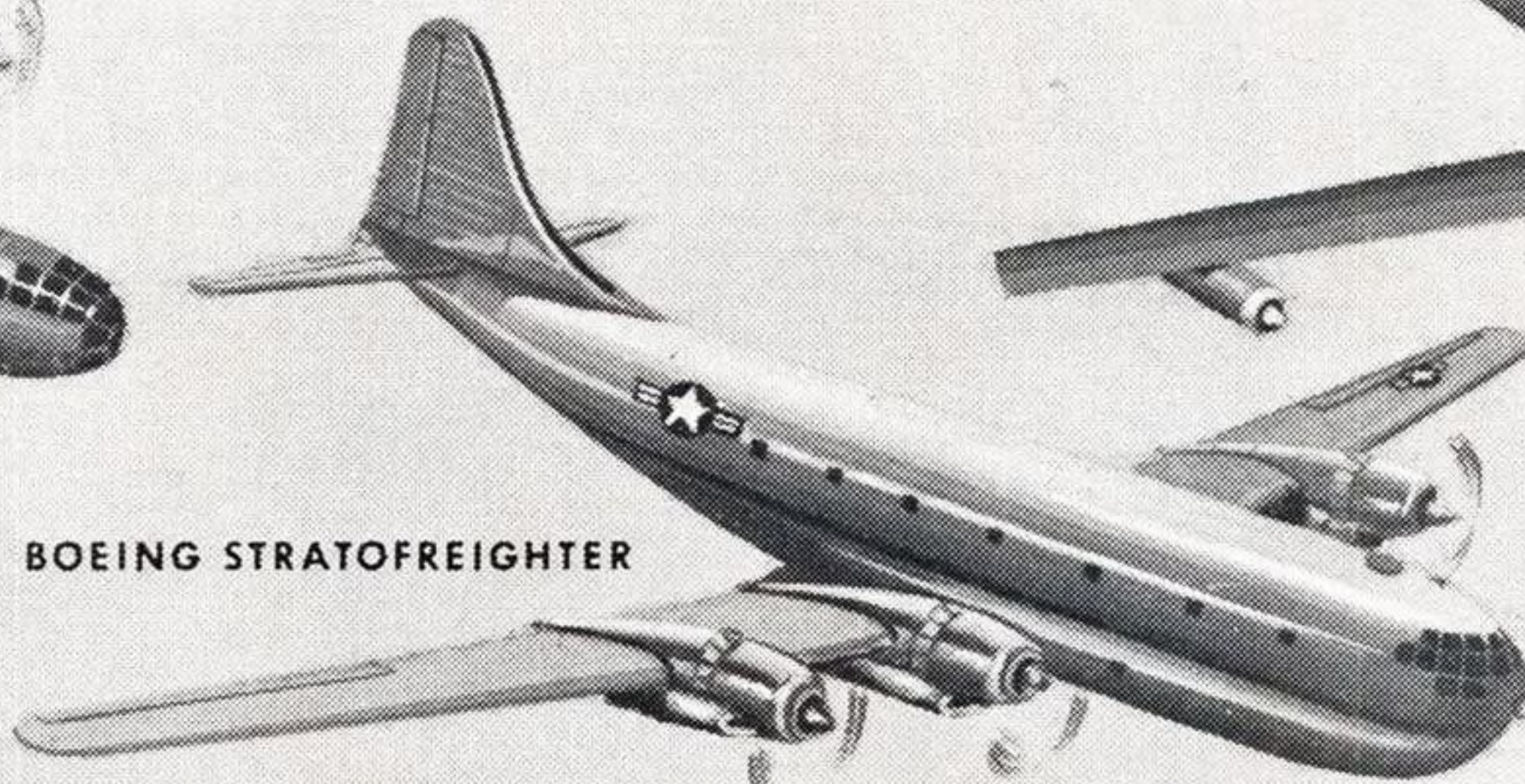


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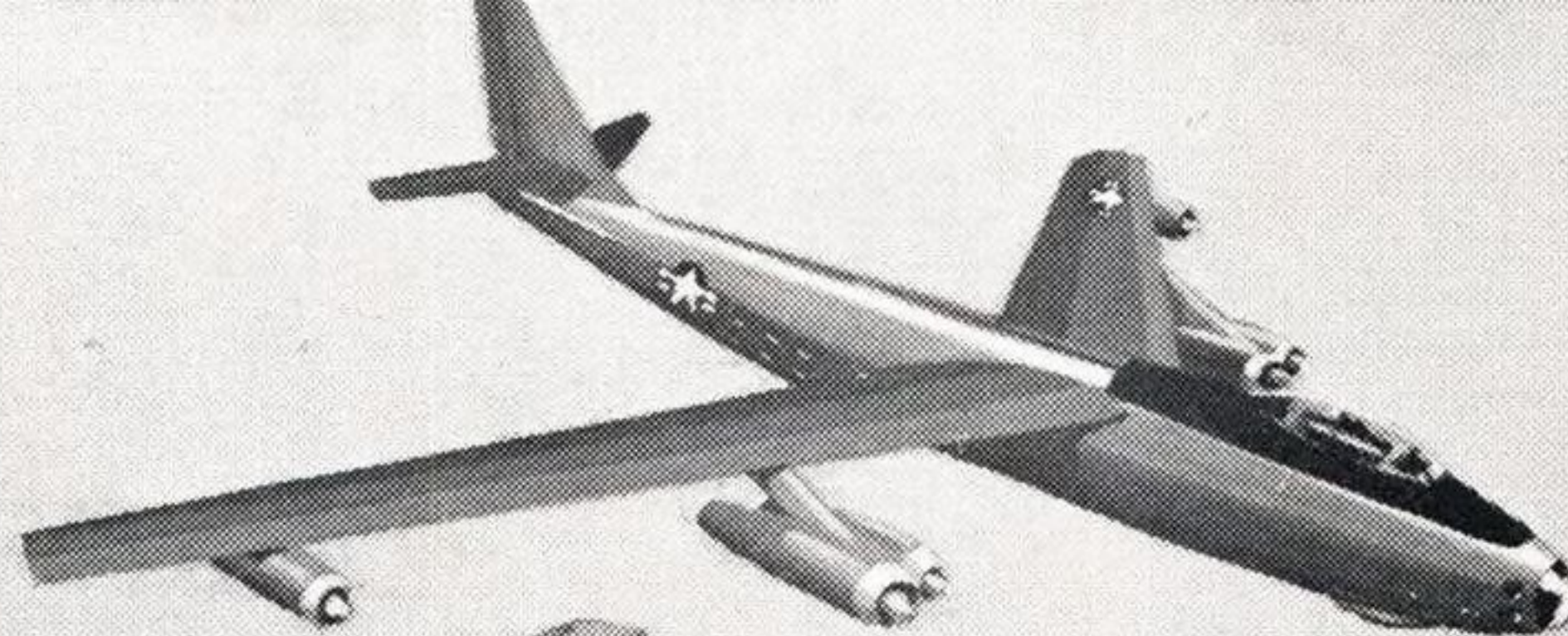
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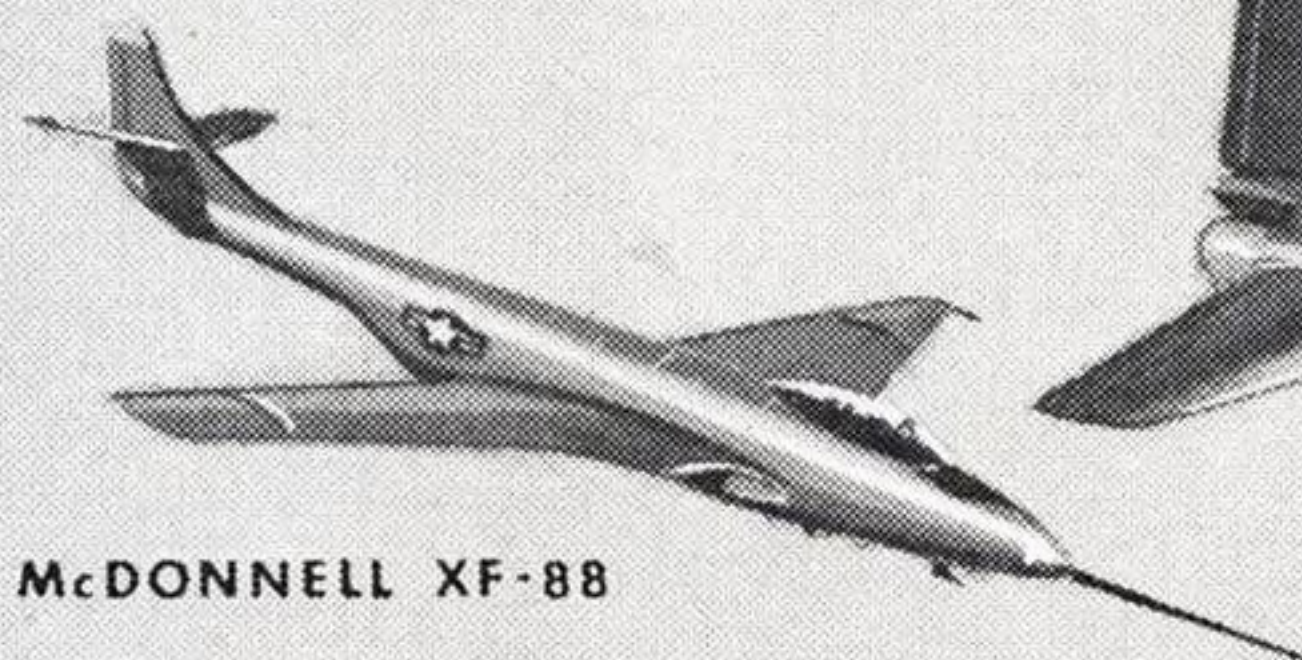
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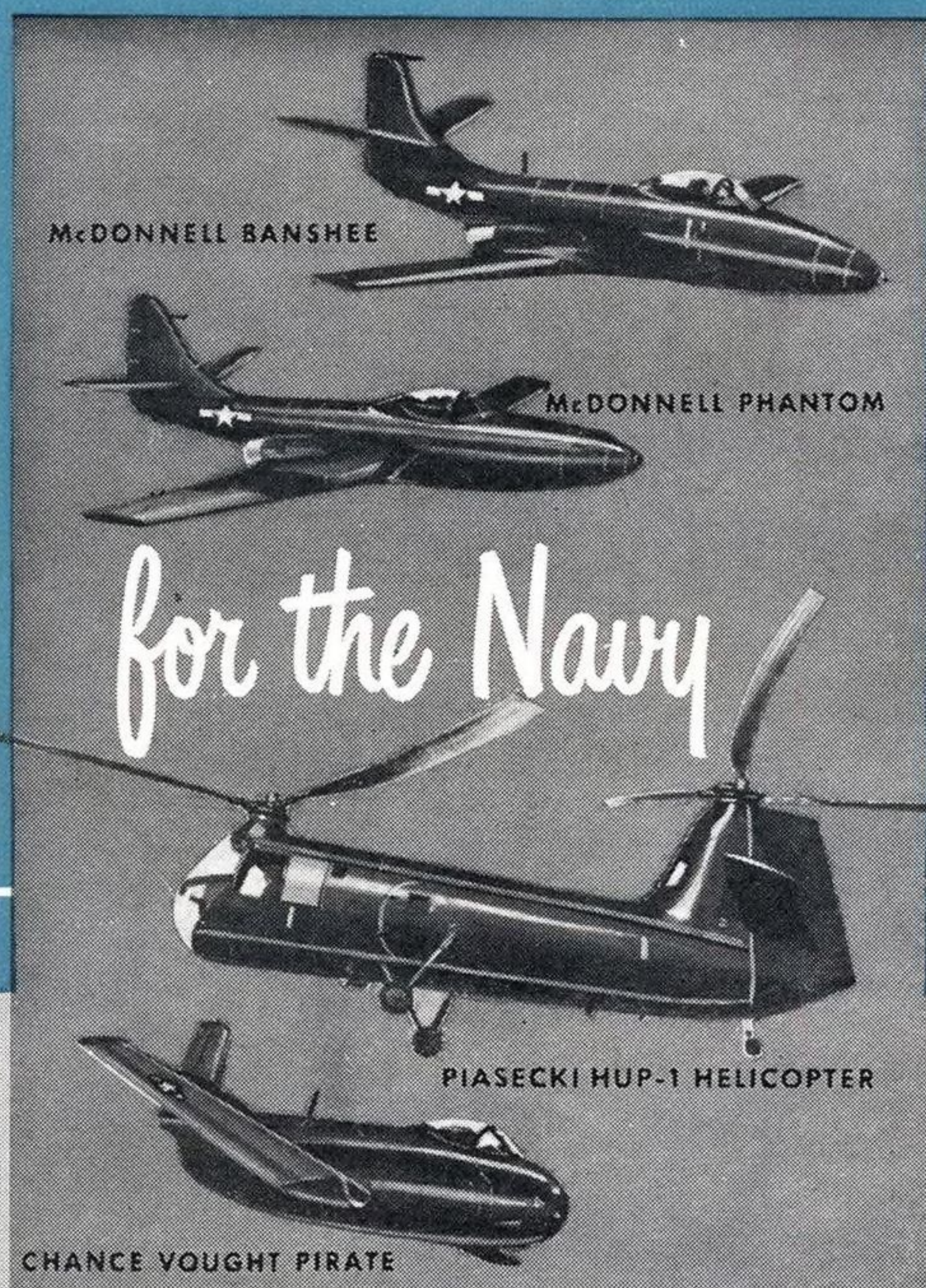
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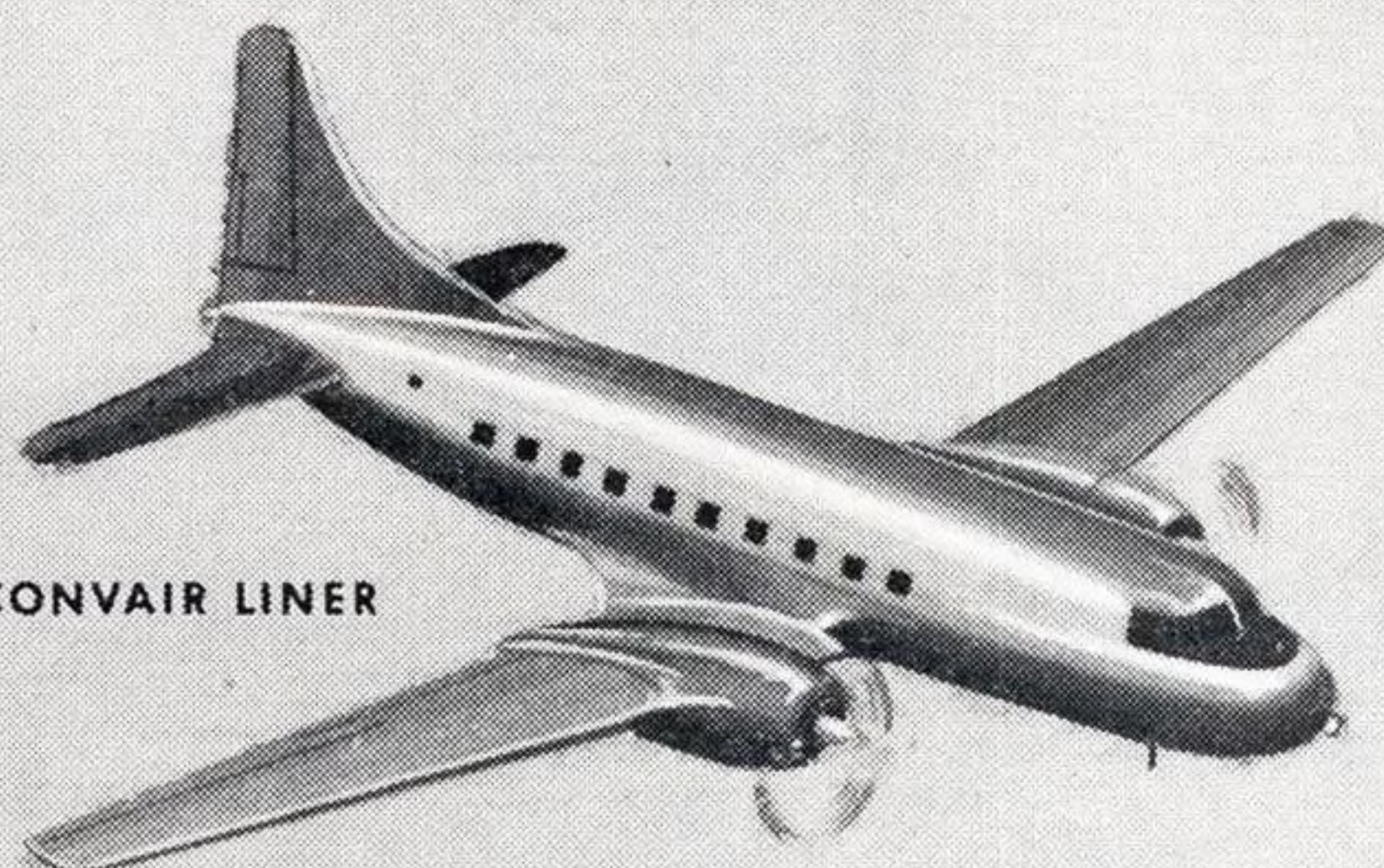
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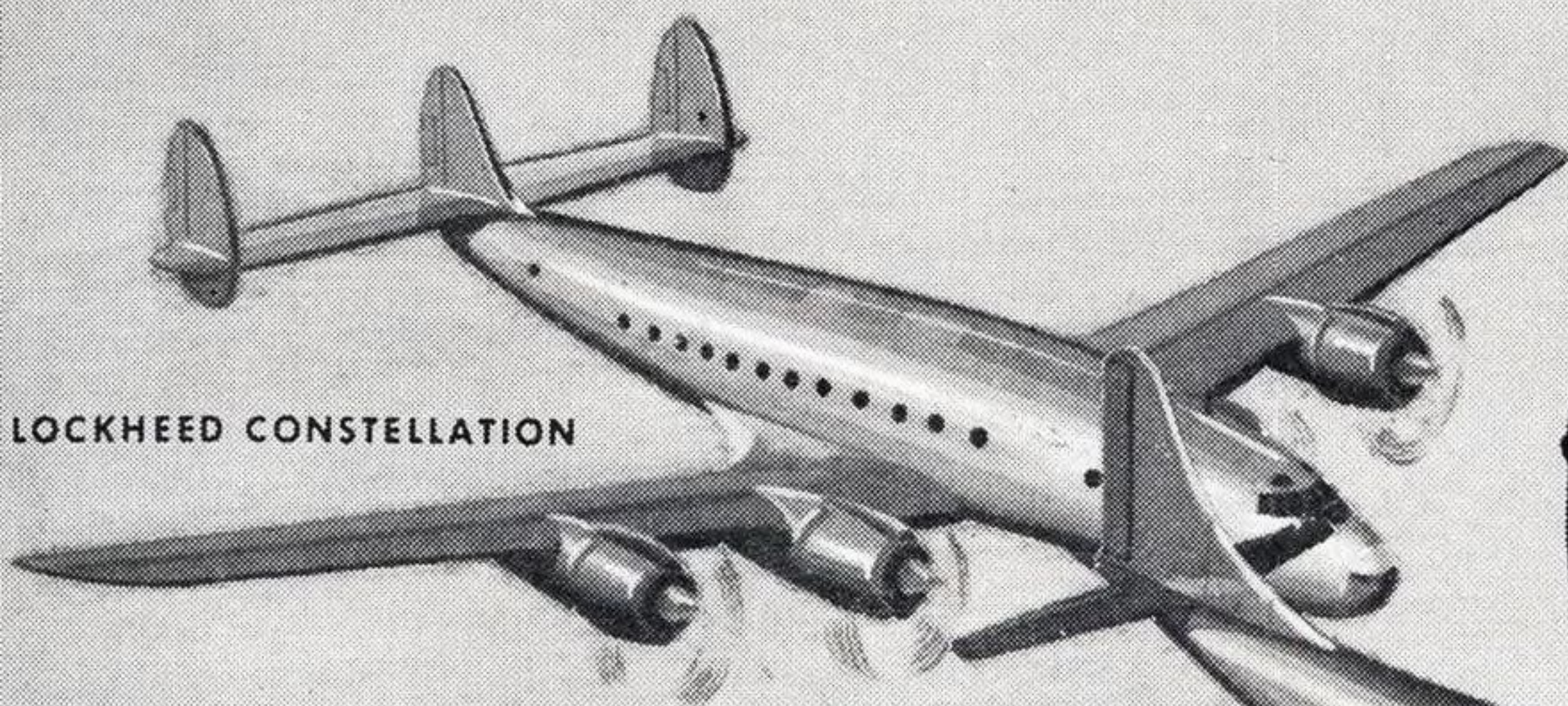
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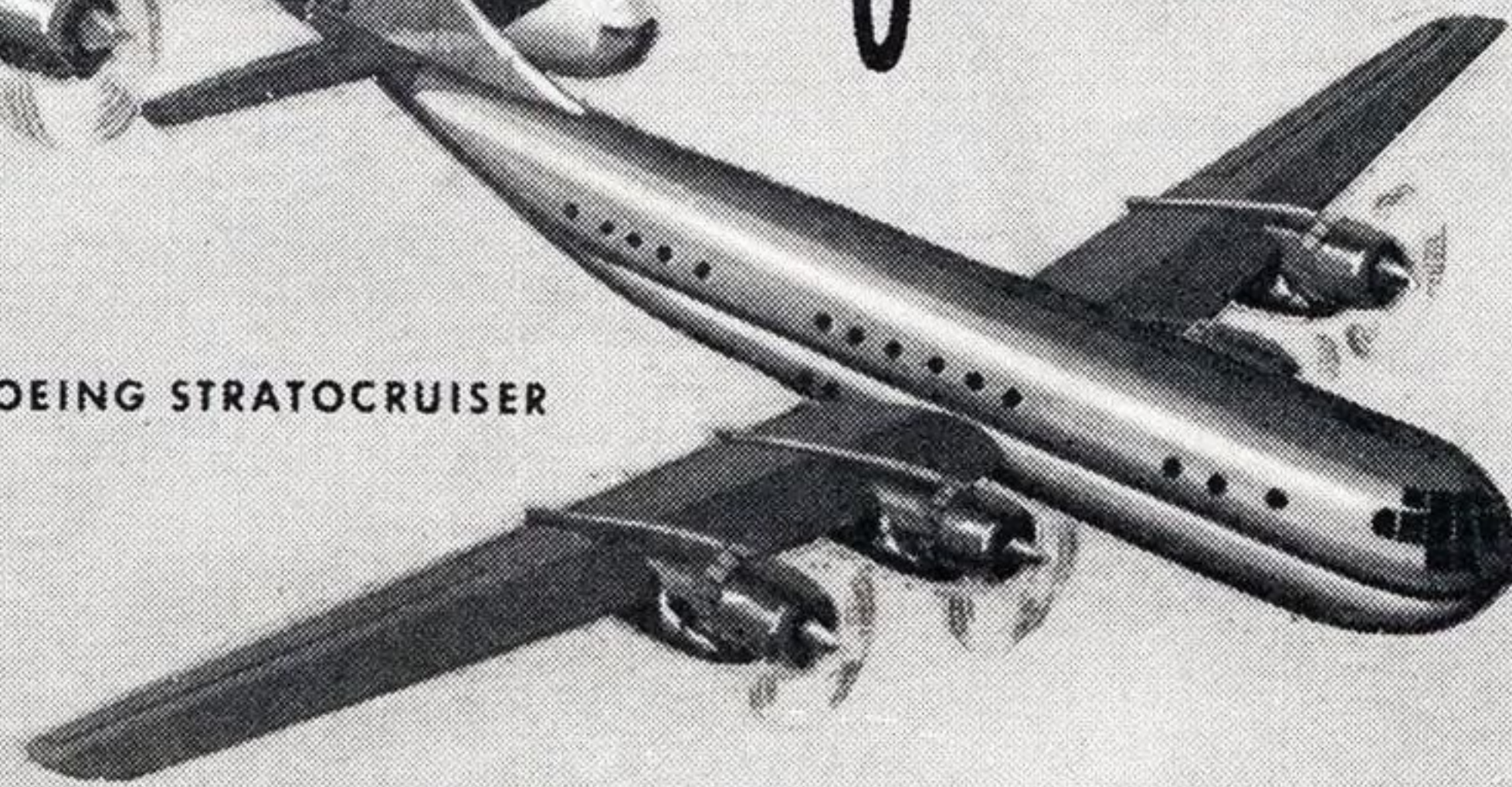


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