

AVIATION WEEK

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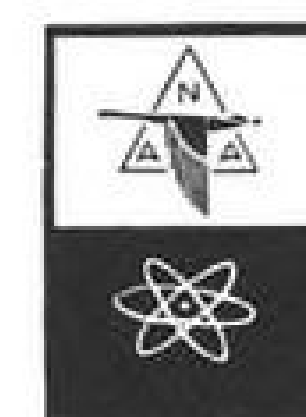
THE PEACEFUL ATOM...IT'S WORKING FOR YOU!

North American Aviation early saw the need for development and application of the atom to peaceful purposes. Using its own funds, the company set up an organization staffed by leading atomic scientists and engineers. This Nuclear Engineering and Manufacturing organization conducts work for the Atomic Energy Commission and has initiated many new developments in nuclear applications.

This continuing effort has produced several types of research reactors. Two important examples of these, produced for the Atomic Energy Commission, are now in operation. One is being used by

the company for advanced developmental study of other reactor designs, and general nuclear research is being done with the other. Other North American designed reactors for industrial and medical research will soon be in operation.

Still another example of North American's advance in this field is the "Sodium Reactor Experiment," a new reactor concept in atomic power. This development is being jointly financed by the Atomic Energy Commission and the company. From this will come many answers to the problem of producing economical electricity from the atom.



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In these five Kardex Imperial cabinets, William Esch, cost accountant for Warner Brake & Clutch Co., has at his finger tips the exact cost figures for every job the factory has handled for the past ten years. With this information, it is a simple matter for him to prepare future production cost estimates on the basis of previous performance. That's



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NEWS DIGEST

Domestic

USAF's YC-121F, turboprop-powered Super Constellation, is due for its first flight in March. Air Force has two of the 75-ton transports on order, powered with Pratt & Whitney T34 engines. First of the aircraft was rolled off Lockheed Aircraft Corp.'s Burbank assembly line last week. Navy version of the YC-121F already is flying.

Latest unofficial climb record was set last week by a Douglas F4D Skyray that streaked from a standing start off a runway at Edwards AFB to 10,000 ft. in 53 seconds. It was the first mark of less than a minute and the third set in less than a month by a Navy fighter (AVIATION WEEK Feb. 21, p. 7).

New supersonic windtunnel is expected to be completed this spring at the National Advisory Committee for Aeronautics' Lewis Flight Propulsion Laboratory in Cleveland. When completed, the tunnel can be used to test guided missile powerplants and ramjet engines that develop the equivalent of 1 million hp. at altitudes of 40,000 ft. or more and speeds up to 2,660 mph. Cost of the windtunnel: \$32,850,000.

Wreckage of a Trans World Airlines' Martin 4-0-4 was found last week on a 500-ft. peak that juts up from a 9,000-ft.-high ridge in New Mexico's Rocky Mountain range. The twin-engine transport crashed Feb. 19 in a snowstorm 15 minutes after it took off from Albuquerque's Kirtland Field for Santa Fe. Sixteen persons were killed.

Northrop Aircraft, Inc., Hawthorne, Calif., has signed two new subcontracts with McDonnell Aircraft Corp. calling for engineering design of portions of a new Navy attack fighter (probably the AH-1) and construction of aft center fuselage assemblies for F-101As. Combined value: Around \$2.5 million.

Automatic flaps will be produced by Lear, Inc., now prepared to manufacture a new control system that will set positions by airspeed related to altitude. The Santa Monica, Calif., company says its automatic flap control system can be adapted to any aircraft.

New guided missile firm has been formed at Pomona, Calif., for design, development and production of ground handling and check-out equipment. Founders and officers of Associated Missile Products Corp.: Raymond Crisp, president and general manager; Dr. Joseph Tampico, vice president-re-



Jet Deflectors Shorten Takeoff, Landings

Gloster Meteor's stalling speed is reduced up to 20% when 60% of its jet thrust is diverted downwards by deflectors located about midway along the engine jet pipes. Jet deflection provides vertical lift in addition to forward thrust, thus shortening takeoffs and landings, the British report following flight tests that began last May. Downward thrust passes through Meteor's center of gravity. Device was designed and built by National Gas Turbine Establishment and installed by Westland Aircraft, Ltd.

search and development; Samuel H. Depew, vice president-customer relations; Earl R. Skaggs, vice president-products engineering, and Robert L. Hull, secretary-treasurer.

New labor agreement was signed last week by Republic Aviation Corp., Farmingdale, N. Y., and the International Association of Machinists (AFL). The three-year agreement provides for hourly wage increases of 5 to 7 cents plus new seniority provisions. It still is subject to ratification by union members.

First Convair C-131B of 36 ordered by USAF's Air Research and Development Command has been delivered, will be used as a flying test laboratory.

Bell Aircraft Corp. will build 24 HTL-6 helicopters for the U.S. Navy under a new contract calling for a portion of the rotary-wing aircraft to be delivered with flotation landing gear, the other with skids. Total award: More than \$1 million, including spare parts and kits.

Mohawk Airlines has purchased three Convair 240s from Maj. Gen. Claire L. Chennault's Civil Air Transport Co. The 40-passenger transports are scheduled to begin flying on the local service airline's routes about July 1 as part of its multi-million-dollar program for increased service in the upstate New York and New England area.

Brig. Gen. George F. Schulgen (USAF Ret.), wartime assistant se-

cretary of the General Staff and postwar deputy director of public relations for the Air Force, died Feb. 17 at Suttons Bay, Mich.

Brig. Gen. A. W. Martenstein (USAF Ret.), 61, vice president of Hayes Aircraft Corp., died Feb. 16 at Mobile, Ala.

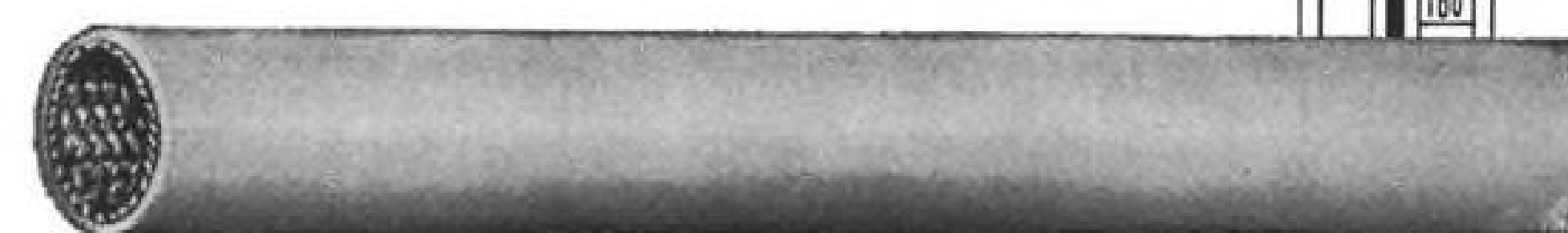
International

Britain's newest aircraft carrier, the HMS Ark Royal, was commissioned by the Royal Navy Feb. 22, got under way three days later for final sea trials. The Ark Royal has a top speed of more than 30 knots and is equipped with a "mirror sight" for landing aircraft, an angled flight deck and two steam catapults. The new ship and her sister, the HMS Eagle, are Britain's two largest carriers.

Sabena Belgian Airlines' DC-6 was found on a peak in the Umbrian Apennines 60 miles northeast of Rome last week, eight days after it disappeared on a flight from Brussels to Leopoldville, Belgian Congo (AVIATION WEEK Feb. 21, p. 7). Dead: All 29 persons aboard.

First production Vulcan, delta-wing member of Britain's three V-class four-jet bombers, has started flight tests at builder A. V. Roe & Co.'s field at Woodford, England. Earliest of the three Vs, Vickers-Armstrongs' swept-wing Valiant, is reported about ready to go into service with the Royal Air Force Bomber Command.

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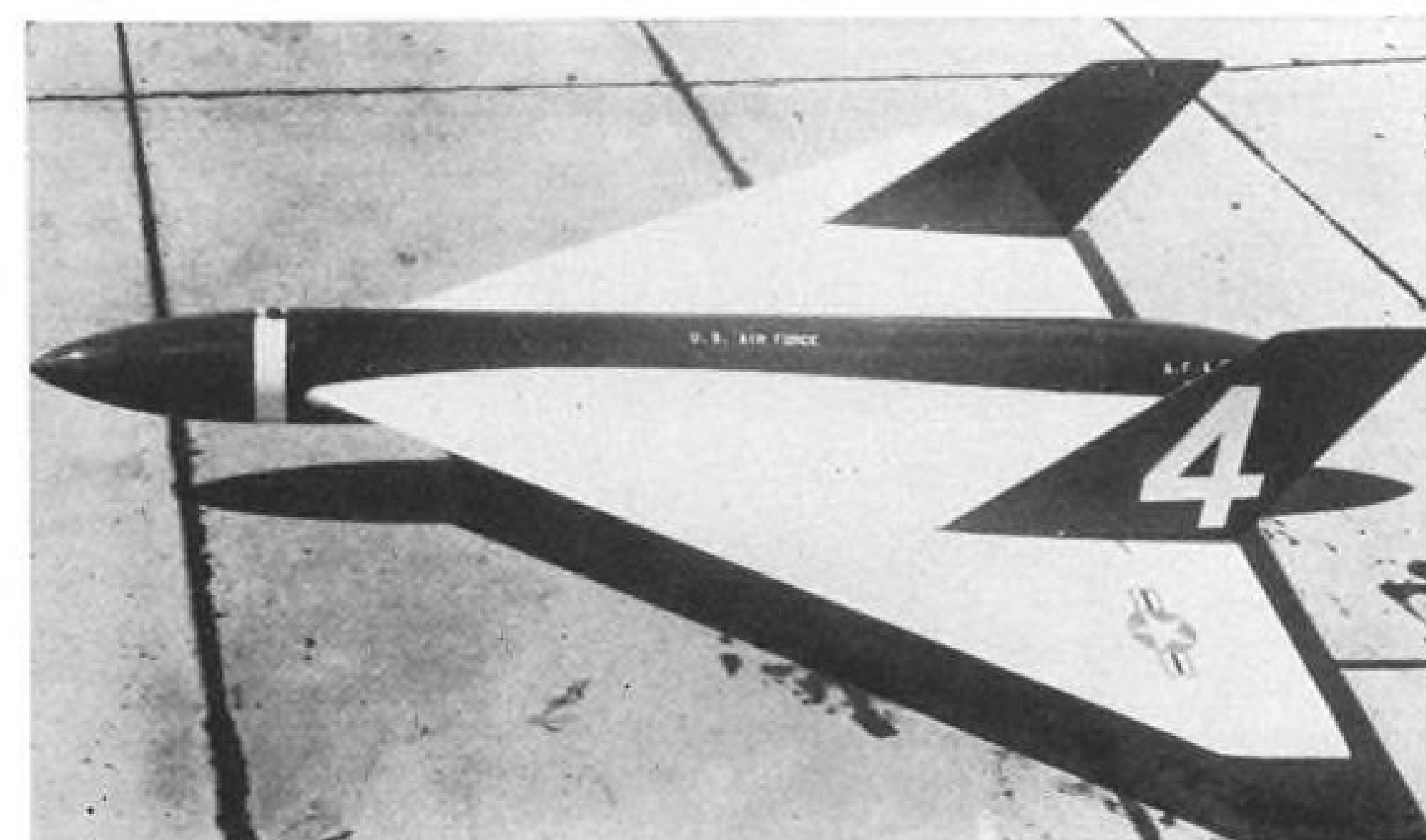


DECK LANDING PRACTICE is built up ashore by Navy pilots flying the Chance Vought F7U-3 Cutlass before they go aboard an aircraft carrier with their twin-jet fighters. Here a landing signal officer watches a Cutlass flash by after a "cut" at NAS Miramar, Calif.

AIR NATIONAL GUARD is receiving new sweptwing Republic F-84F Thunderstreak jet fighters like the one pictured at right with Pennsylvania ANG markings. F-84Fs have been assigned to Guard units in Philadelphia, Pittsburgh and Chicago. They are scheduled soon for a Springfield, Ill., unit.

USAF and Navy Add 'New Faces' To Jet Fleets

DEL MAR DELTA is a new tow target being tested by USAF for use at speeds exceeding 600 mph. Other firms making highspeed targets include Goodyear, Bellanca and East Coast Aeronautics. The devices are essential for testing today's complex fire-control systems. As an example of equipment's requirements, not only must it record hits but also show by how far the target was missed. One system to do this under test is the Acoustical Firing Error Indicator. AFEI "listens" for near misses, measures the distance and angle and passes these data to the ground via a telemetering link.



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WHO'S WHERE

In the Front Office

Lester J. Brain, chief executive of Trans-Australia Airlines since its formation in 1946, has joined de Havilland Aircraft Proprietary of Australia at Sydney as managing director.

James T. Duffy, Jr., has been elected president of Kellett Aircraft Corp., Camden, N. J., succeeding the late W. Paul Jones.

Jack W. Hale is new vice president and general manager of Chamberlain Aviation, Inc., Akron, Ohio. W. B. Carrell has moved up to executive vice president.

H. Erich Nietsch has become vice president-project development for Robinson Aviation, Inc., Teterboro, N. J. Frank T. Donahue has been appointed treasurer.

Ernest G. Loeb has been promoted to executive vice president of Chicago Aerial Industries, Inc., Chicago. Other changes: George H. Hoeck, secretary; Robert A. Willard, treasurer; Robert A. Maisner, vice president-operations; Edwin O. Swanson, vice president-manufacturing; Samuel Bou-sky, assistant to the president; Herbert Heffernan, assistant vice president; F. K. Mansfield, assistant secretary, and Hugh Van Cleve, Jr., assistant treasurer.

Melvin L. Jackson, formerly of Airborne Instruments Laboratory, has been appointed a vice president of C.G.S. Laboratories, Inc., Stamford, Conn.

James W. Austin, vice president-traffic and sales of Capital Airlines, has been elected a member of the board of directors.

Honors and Elections

Dr. Vannevar Bush, president of Carnegie Institution of Washington and one-time (1939-41) chairman of the National Advisory Committee for Aeronautics, has been awarded an honorary membership in the American Society of Mechanical Engineers.

Grant McConachie, president of Canadian Pacific Airlines, has won Peru's Order of Merit for "contributions to international relations." CPA started service between Vancouver and Lima last year.

Changes

A. V. Cleaver is chief engineer in charge of de Havilland Engine Co.'s new Rocket Division, Edgware, England.

William E. Hinton has become general manager of Link Aeronautical Corp., Endicott, N. Y.

Hugh Pruss has been appointed chief engineer of Audio Products Corp., Los Angeles.

Ronald C. Hinman has moved up in Western Gear to marketing manager of aircraft products for plants at Lynwood, Pasadena, Belmont and San Francisco, Calif., Seattle and Houston. Paul Patterson is new supervisor of aircraft applications engineering for the southern California area.

Robert A. Anderson is new general sales manager of Resort Airlines.

(Continued on page 74)

INDUSTRY OBSERVER

► Grumman's F9F-9 Tiger is flying at Edwards AFB, Calif., powered by a Curtiss-Wright J65 with afterburner. Total thrust of the J65 with afterburner is 10,000 lb.

► High-strength, high-temperature reinforced plastic work, including experimental use in compressor-rotor blades, is being done at Curtiss-Wright Corp.'s Plastic Division, Carlstadt, N. J., under license from Cincinnati Testing and Research Laboratories, a pioneer in high-heat plastics for aeronautical applications.

► Lockheed is planning a longrange interceptor version of the F-104, its Mach 2 day superiority fighter.

► First production Hurel-Dubois HD-32 commercial transport will be available for delivery early next year under a contract signed recently by the designer and French aircraft manufacturer Sncase. Latter will produce and market 150 of the twin-engine 42-passenger transports which will be offered in two versions: HD-32 powered by Pratt & Whitney 1,200 hp. R1830s and the HD-321 with Wright 1,475 hp. R1820s. The HD-32 is offered as a DC-3 replacement and is priced at approximately \$415,000.

► Convair's turboprop-powered R3Y-1 seaplane has made its first rough water tests at Alameda, Calif., Naval Air Station, where the big transports are scheduled to go into trans-Pacific service this year. The R3Y-1 and the bow-loading R3Y-2 assault version are powered by four Allison T40 turboprops.

► Great Britain will start tests in about three months with new pilotless rocket bomber prototypes at the Woomera Experimental Fields in South Australia. Principal purpose of the tests will be to improve accuracy and range of the new weapons. Range is expected to be about 500 mi. One new type the British consider promising has a narrow delta wing swept back 70 to 80 deg.

► Tail rotor troubles recently resulted in a three-week grounding by Navy of the Sikorsky HSS helicopter.

► Narmco Manufacturing Co., San Diego, Calif., is making components for Convair's supersonic F-102 of aluminum honeycomb sandwich construction. Sandwich components include a rudder assembly, wing tips, elevons, nose wheel doors and wing fences. Narmco also will produce phenolic Fiberglas components for the F-102 ducting system.

► Bailout protection at Mach 1 and higher speeds is not adequate, some engineering test pilots feel. Pod arrangement furnishing complete enclosure protection for pilot, such as Douglas Aircraft is now working on, is seen as an answer to the powerful airstream.

► Revolutionary new milling machine is being built for Lockheed Aircraft Corp. by Cincinnati Milling and Grinding Machines, Inc. Machine will mill almost any contour; the head will move horizontally, vertically and roll with cutter at right angles to the work. It is being built to Lockheed's specifications, and is scheduled for delivery in two months.

► New version of Northrop's F-89 Scorpion, which now carries 104 rockets as armament, will be armed with the Falcon air-to-air missile.

► Britain's Royal Aircraft Establishment is building a windtunnel with test section speeds up to Mach 9.

► Pratt & Whitney Aircraft now is delivering J57 versions producing over 11,000 lb. thrust without afterburner. Meanwhile the newest P&WA turbojet, the 15,000-lb.-plus thrust J75, is nearing the flight test stage. It will make its initial flight in a North American B-45 multi-jet bomber modified as a flying engine test bed.

Mexican Route Pressure

Five Democratic senators from the southeastern states hit the White House with a renewed pitch for a U. S.-flag carrier air service between New York and Mexico City via Atlanta, New Orleans, etc., hot on the heels of the successful approach of the Minnesota congressional delegation for the President to retain Northwest Airlines' services between Seattle/Portland and Honolulu.

Latest group to ask Eisenhower's intercession in the nearly nine-year-old U. S.-Mexico air route problem was led by Sen. Walter George who was accompanied by Sens. Allen Ellender, Russell Long, Strom Thurmond and Sam Ervin. Sitting in with the President at the hastily called conference were Sherman Adams and Samuel C. Waugh, Assistant Secretary of State for Economic Affairs.

The President reportedly expressed surprise that the case was dragging on, indicating he thought CAB should give the matter priority. Key to a quick solution would be a Justice Department ruling on the legality of former President Truman's action in terminating the three U. S.-Mexico air permits of Braniff, Eastern and Western Air Lines.

Show Decision Near

Final decision on what the Defense Department will do about the 1955 National Aircraft Show still awaits action by the Armed Forces Policy Council at the Pentagon. This group, composed of the Defense Department Secretaries and Chiefs of Staff, will have before it the first comprehensive report on how much it cost for military participation in the 1954 display. The report is complete, including figures for fuel, housing, manpower and all other accountable expenses. Navy is known to be cool to another show, Air Force enthusiastic. Good bet for the site once the Pentagon approves: Philadelphia.

Armed services relief organizations currently are receiving checks from the 1954 show. For each, Army, Navy and Air Force: \$8,000, a total of \$24,000.

New USAF PIO

Col. Robert L. ("God Is My Co-Pilot") Scott will replace Brig. Gen. Brooke Allen as chief of USAF Office of Public Information. Allen has been in this post since last August when he succeeded Maj. Gen. Sory Smith, who now heads the USAF Pacific Air Command. Scott who is a West Point graduate and has been a colonel since 1942 is stepping into a job that calls for general officer rank. Scott was widely known during World War II as a P-40 pilot and author of books on his exploits in the China-Burma-India combat theater.

Mail Decision Lags

The trans-Atlantic mail rate case, which deals with rates for TWA, Pan American and the merged American Overseas Airlines as far back as 1946, is still apparently far from settlement. Civil Aeronautics Board issued a final decision last December, drastically cutting subsidy for both past and future periods. TWA was put on a rate calculated to remove it from subsidy immediately, and Pan American got the same rate in areas where its operation is comparable to TWA's.

—Washington Staff

Now TWA has filed for reconsideration with CAB, as has PAA, both for itself and for American Overseas Airlines.

The Post Office Department also has asked for reconsideration. Both trans-Atlantic carriers are very unhappy with the findings of the Board. PAA calls it "wholly inconsistent with the sound development of international aviation as a private enterprise under the United States flag."

As an ace-in-the-hole in case the Board turns them down on reconsideration, the three carriers have filed requests for review of CAB's decision with the Court of Appeals. The requests were filed early because of some legal confusion over the deadline for filing a suit after a decision is issued. The court has been asked to hold up action until the Board acts on the reconsideration motion.

ATA Endorsement

Air Transport Assn. is solidly backing the omnibus aviation measure introduced by Sen. Warren Magnuson (see p. 14). Outlook is that there will be strong congressional support for its passage this session.

'Operation Backscratch'

Typical of local service airlines' efforts to develop community participation and interest in their operations is Central Airlines' "Operation Backscratch," already conducted in three cities. Central president Keith Kahle explained its working in Muskogee, Okla.:

"We provided the sales aids and sales personnel in a month-long campaign. Muskogee did its part with free radio spot announcements, free newspaper ads and publicity. Banks, theaters, and stores cooperated fully. The police distributed our posters to business houses. Prisoners in the jail were released to paint Central's name on the sidewalks. These sales efforts raised Muskogee boardings 50%."

Air Force Waste?

Air Force will be put on the spot in the immediate future by a congressional investigating committee, for paying excessively higher than the Navy for rocket equipment. Investigators are now searching for the reasons, and a public hearing is planned.

CAB Democrats?

Ross Rizley's membership on Civil Aeronautics Board (see p. 17) appears to dim the outlook for re-appointment of Josh Lee, an Oklahoma Democrat, whose term expires this year. It is unusual to have two members from the same state on regulatory agencies.

Congressional Democrats are not optimistic, either, that the Administration will renominate CAB member Joseph Adams, whose term expires next year. They say indications so far are that the President prefers to make new selections to fill Democratic posts. This is the policy that has been followed on Federal Power Commission and Federal Trade Commission. Senate Commerce Committee has set Feb. 23 for hearing on Rizley's appointment.

Airlines Back Navy Cargo Fleet Reserve

- Dozen carriers ask to lease 35 DC-6As, 10 DC-4s under experimental freight program started by Slick.
- Full-scale rental plan may be inaugurated after ACC studies problems of allocation, impact on tariffs.

Requests from 12 airlines for approximately 35 Douglas DC-6A and 10 DC-4 type aircraft is the initial reaction to the Navy's six-month lease of a DC-6A to Slick Airways as part of an air cargo experimental lease program.

The Navy is encouraged by this response and anxious to implement a full-scale commercial-cargo lease program. James H. Smith, Jr., Navy Assistant Secretary for Air, has asked for a meeting of the Air Coordinating Committee the week of March 7 to consider problems of this program.

► **Reserve Fleet**—Smith told Robert Murray, who has been serving as ACC chairman and consultant to Commerce Secretary Weeks, that "our program appears to be one practical manner in which to implement the statement of the civil air policy with respect to air cargo. . . . The further development of the air cargo industry, with particular emphasis on all-cargo services, is in the national interest and should be encouraged."

Another objective, Smith noted, would be determination of the merit in presenting to Congress a plan whereby the armed services might be provided with a fleet in reserve of cargo aircraft.

At the proposed ACC meeting in March it is the Navy's desire that the other member agencies will offer possible alternative solutions to the cargo airlift problem or at least be prepared to speak definitely on the Navy plan. As Smith envisions it, the Navy's program would require an assist from ACC on a number of problems including:

- **An orderly allocation** of aircraft to responsible operators with CAB determining the rate of increase in the commercial airlift capability to avoid an uneconomical reduction in load factors.
- **An evaluation** by CAB on the impact of additional airlift on present tariffs and the amount of new traffic that could be induced by reduced rates.
- **Consideration** by the State Department of the effect of increasing air cargo frequencies in the international field.

• **Study** by the Bureau of the Budget on financial implications. The rental income will be returned to the general fund of the Treasury, although the appropriations for the procurement of the aircraft are contained in the service budgets.

Despite such problems, Navy enthusiasm for its plan is running high. The feeling is that some action is better than none or there will be no noticeable increase in cargo airlift. Navy estimates that introduction of approximately \$50 million worth of equipment, the full value of which would be repaid the government in five years, would expand the industry three-fold. Since no production cargo aircraft are scheduled for delivery until mid-1956, the 45 Navy transports requested by civil operators would produce an increase in domestic and international air cargo lift of nearly 200% over the ton-miles flown in 1954.

► **Subsidy Problem**—A final element of concern to the Navy, however, is one of subsidy payments to mail carriers and the effect subsidy might have on fixing air cargo rates. The Navy does not believe that operation of leased aircraft should be eligible for subsidy and would make it a precedent to obtaining aircraft under the program. The problem is to prevent the non-subsidized carrier from being subjected to a rate structure influenced by a subsidized carrier's position, it was indicated.

If the Navy plan is accepted at ACC level, the next step would be an expanded program to include the Air Force. Each service would list the aircraft to be released without detriment to military requirements.

The services would not be committed, however, to honor any or all of the requests for such aircraft. It is Navy's belief, if ACC finds a lease program in the national interest, a major effort should be made to step up utilization and readjust schedules in order to make some aircraft available.

► **Slick Test**—While ACC prepares to review the overall plan and meet each

R7Vs Grounded

Navy has grounded a squadron of Lockheed R7V-1s operating from Patuxent Naval Air Test Center, Md., following two unexplained losses of the transports at sea.

Cause of the two crashes has not been definitely established, but Navy believes they may be due to malfunction of propeller governors. Navy is exploring the possibility that the oil line between the engine and propeller, which governs propeller pitch, may have contained metal fragments thrown off by the engine which would cause the prop to feather or run away. Grounding orders came from the Atlantic commander of the fleet logistics wings.

Lockheed has a technical team at Patuxent assisting in the investigation along with representatives of Curtiss-Wright and Hamilton Standard. The R7V-1 is powered by four R3350-34 Turbo Compound engines.

Two other Navy squadrons using R7V-1s are still operating. They are based at Hickam AFB, Hawaii.

problem in turn, the Navy is making a test run in its lease arrangement with Slick.

The experiment, which runs 180 days ending August 1, is to determine whether naval cargo aircraft, which would be needed in event of mobilization, can be maintained and put to productive use without cost to the government, and yet be immediately available for emergencies. At the end of the test period the feasibility of an overall program of leasing transports will be evaluated.

A favorable report could lead to a reserve fleet of cargo aircraft for which the original capital cost would be borne by the government but the cost of replacement and maintenance would be carried by commercial operators using the aircraft in peacetime. Long-term leases would cover the same items that Slick agreed to in the experimental contract.

Slick is paying a rental rate of \$20,000 a month on a six-month lease of one DC-6A, plus \$23,325 for engines and propellers—a total of \$43,325.

► **Comparable Rent**—The Navy is requiring the lessee to pay a rental comparable to that paid in similar com-

mercial practice (equivalent to normal depreciation for the aircraft type plus return on the government's investment). Slick further agreed to maintain continuously the aircraft in accordance with safety regulations of CAA; that it will be used exclusively for commercial air activities within the U. S.; that full and complete insurance is

carried in favor of the government; and that Slick will be prepared to furnish flight crew with the plane in time of emergency for 30 days.

Slick and the Navy agreed on a 30-day cancellation notice but future lease arrangements would be expected to require more long-term notice from the lessee.

Tigers Want 2nd-Class Airfreight

Robert W. Prescott, president of Flying Tiger Line, last week proposed a second-class air cargo service to boost FTL's freight volume—now showing substantial returns for the first time since its merger with Slick Airways collapsed.

He told a press conference in New York the operation would combine the present first-class overnight freight with second-class, which would be held as backlog on a space-available basis. The airfreight line would charge 7 cents a ton-mile for the new service, compared with 19½ cents for first-class.

"Out of our present capacity of 4 million to 4.5 million ton-miles a month, about 1 million now goes unused," Prescott said. "If we could sell this space at 7 cents, the increased business would total about \$70,000."

FTL's president said delivery of second-class cargo would be guaranteed in at least four days.

► **Volume Increases**—Prescott also reported Flying Tiger has increased its income each month since the airline last October abandoned both its merger with Slick and later plans to become an aircraft leasing company.

"As of Feb. 17, we're 40% ahead of January," he said. "This should mean we've turned the corner and are on the way to making profits for the rest of our current fiscal year. . . ."

"Current revenue is in excess of \$1 million a month and marks the highest peacetime income of the company. This progress, we are sure, should hold true for the entire airfreight industry, and has been made possible largely through vast improvement in both operating and sales procedures."

Prescott said Tiger made its recovery because of these three factors:

• **Douglas DC-6A freighters** that made it possible for the airline to handle transcontinental airfreight on a regular overnight promise of delivery next day.

"With our three DC-6As," he said, "we are carrying freight under cost for the first time. This transport is not the final answer for cargo, but it certainly is a long step forward."

He said the DC-6A operated at a cost of 12 cents per ton-mile, compared with 22 to 23 cents for the airline's seven DC-4s. Tiger's 26 C-46s have been pushed into roles as feeder transports.

• **Employee-executive committee** operated on a basis of "mutual solution of problems by labor and management."

• **First air transport salesmen** to operate on a straight commission and drawing account basis.

"In effect, we have put each of our salesmen into his own business," Prescott said. "If they're going to make money, they have to sell airfreight. Not only have we seen increases in sales, but we also have seen many of our salesmen increase their incomes."

► **Ask Rate Cut**—In an effort to increase gains in airfreight volume, Flying Tiger plans to ask CAB in the immediate future for permission to reduce its ton-mile rates on eastbound flights.

Prescott refused to reveal how much his airline would ask, but said it would be a "fairly substantial cut" of the present 19½-cent ton-mile rate.

"With a lower rate and our DC-6As, we could increase our current volume five times," he said. "We're now in just a high-priced air express business."

The all-cargo airline president said Flying Tiger does not plan to purchase any new equipment in the near future, but expressed interest in Navy's new program of leasing DC-6As to airfreight lines. "Slick already has one," he said, "and we'd like to have four, five or 10 of them. . . ."

"If the Navy buys the planes and we lease them, then the transports would be ready to operate an emergency military airlift if war breaks out. In the meantime, we'd be paying for the planes as we go."

Magnuson Proposes New Subsidy Basis

Subsidy payments to air carriers would be put on a firm, long-term contract basis—three-year contracts for domestic and overseas airlines and five-year contracts for international carriers—under an omnibus aviation bill introduced by Sen. Warren Magnuson, chairman of the Senate Interstate and Foreign Commerce Committee.

The airlines would have to refund net profits in excess of 10% of capital investment. Only "mail" carriers would be eligible for subsidy.

► **President's Power Cut**—The measure

also explicitly limits the President's jurisdiction over international route cases to matters affecting the national defense or foreign policy. CAB decisions on economic aspects would be final. The bill would remove completely from any requirement for Presidential approval cases of transportation to the territories and possessions.

Magnuson observed that in passing the 1938 Civil Aeronautics Act "it was the intention of Congress . . . to limit the requirement for Presidential approval (in international cases) to matters of national defense and foreign policy."

But, referring to the recent Pacific case in which the White House originally reversed several economic recommendations of CAB, he added: "Because of the broad grant of authority in the 1938 Act, it has been construed as including approval of economic determinations which already had been passed upon by the CAB. . . ."

► **Similar Provisions**—Other provisions of the Magnuson bill are an outgrowth of lengthy hearings on legislation rewriting the 1938 Act, introduced last year by the late Sen. Pat McCarran, and legislation for the separation of air-mail pay from subsidy, sponsored by former Sen. Edwin Johnson, now governor of Colorado, and passed by the Senate in 1949. Many of the provisions are the same as those of the omnibus bill introduced by Sen. John Bricker, ranking Republican on the Commerce Committee, who presided at last year's hearings on the McCarran measure (AVIATION WEEK Jan. 17, p. 16).

Key provisions of Magnuson's bill:

• **Nonscheduled.** All common air carriers, including present nonscheduled operators, would be required to obtain certificates of convenience and necessity. CAB's authority to exempt carriers from this requirement would be limited to those utilizing aircraft of 12,500 lb. gross weight or under. Authority of nonscheduled airlines to operate under CAB exemptions would expire one year after enactment.

• **Contract carriers.** CAB would be given economic control over the operations of contract carriers in addition to the 1938 Act. All contract carriers would have to obtain "licenses" in proceedings similar to that for certificates.

• **Mail pay.** The lenient standard of "fair and reasonable" is set for the determination of mail pay rates. CAB and Post Office Department favor a more rigid standard of "cost" of performing the service, plus reasonable profit.

In addition, the measure would make international air carriers eligible for a service mail rate equal to the Universal Postal Union rate. This averages over \$1.50 per ton-mile, compared with the average 88 cents a ton-mile CAB has set as an adequate "service" rate for U.S. carriers.

Feeders Win Certificate Support

Favorable congressional action in the near future is indicated, despite opposition from CAB and Commerce.

By Katherine Johnsen

Local service airlines renewed their plea for permanent certificates before receptive House and Senate Commerce Committees amid strong indications of favorable congressional action in the near future, despite opposition from Civil Aeronautics Board and Commerce Department.

Both Sen. Mike Monroney, chairman of the aviation subcommittee of the Senate Commerce Committee, and Rep. Percy Priest, chairman of the House Commerce Committee, readily anticipated their groups again this year would overwhelmingly vote legislation putting the 14 lines on a permanent basis.

The legislation last year passed the House but failed to get Senate approval in the adjournment rush.

► **Copter Developments**—Moves to expand permanent certification to include helicopter and all-cargo airlines, which would entangle the legislation in controversy, do not appear likely to develop support.

In this connection, there were these two moves:

• **Robert Cummings**, president of New York Airways, a helicopter operator, in testimony before the Senate group objected to discrimination against local service "solely by virtue of the type of equipment employed."

Subsequently, however, he concurred with the view of Monroney and Sen. Andrew Schoeppel, ranking Republican on the subcommittee, that the matter of promoting development of helicopter transport could be dealt with separately at a later time.

Both senators emphasized their interest in nurturing rotor-wing transport. But they pointed out that it is still in an "experimental" stage and that permanent status would be premature at this time.

• **Sen. George Smathers** introduced legislation which would authorize permanent certificates to all-cargo carriers, as well as the local lines. But the subcommittee confined its consideration at this time to legislation by Sen. Warren Magnuson, dealing exclusively with the local lines.

Of the 14 local services lines, all have gone through one certificate renewal, two have obtained second renewals, and four are in the process of obtaining a second renewal.

► **Feeder Progress**—The outstanding record of the lines in 1954 and indications that the 1955 outlook is even brighter

was emphasized by John Floberg, counsel of the Conference of Local Service Lines, in congressional testimony.

He challenged the statements (based on 1953 performance) by CAB and others opposed to permanent certification that local lines are "not progressing toward self-sufficiency" with this report:

• The number of revenue passengers increased 21% in 1954 over 1953, from 1.9 million to 2.4 million.

• Revenue passengers, freight, and express revenues increased from \$23.5 million to \$28.6 million. Passenger revenue alone showed a gain from \$22.6 million to \$27.6 million.

• Total revenue ton mileage increased from 39.6 million to 47.1 million.

Commenting on the contention that local carriers have "nearly reached their peak," Floberg said:

"Since the airlines carry less than 2% of all common carrier passengers on journeys under 250 miles, it seems that better service and better equipment create a great likelihood for continuous growth toward a higher percentage. Just achieving a 4% penetration of this market would mean more than doubling the current volume of traffic, and the market available in the diversion of travelers from private automobiles is practically unlimited."

Six local lines, as well as numerous representatives of local communities and businesses relying on local air service, made individual requests for permanent certification legislation.

Highlights of the congressional testimony included:

• **Frank W. Hulse**, president, Southern Airways, cited the growth of his carrier to "demonstrate beyond any question, public acceptance of local air service."

Since its first full year of operation in 1950, Southern's revenue passengers have mounted from 38,117 to 133,544 in 1954, its revenue passenger miles, from 6.5 million to 22.4 million and its passenger load factor from 17% to 35%.

"The increasing size, capacity, range and speed of equipment used by the trunk carriers make it impracticable for them to provide the smaller cities with frequent and convenient service," Hulse declared. "Furthermore, it is not in the public interest for trunk carriers to use their large equipment and stop their long-haul nonstop schedules to provide the volume and type of service required by these smaller cities."

• **Keith Kahle**, president, Central Airlines, complained that the carrier's first

renewal case was in process . . . and a half years—from April 1951 to October 1953—and cost the company \$80,000. "In less than a year from now," he added, "we will have to start to do it all over again."

Central's 59,209 revenue passengers in 1954 and its expectation of 98,000 in 1955, he pointed out, compare with 10,819 in 1950.

• **Paul J. Rodgers**, executive assistant to the president, Ozark Air Lines, complained that the carrier has been engaged in a renewal proceeding since March 1953 at a cost in excess of \$100,000, although there has been "no serious question of fitness, willingness, or ability . . . The only question raised is in reference to specific communities and certain segments which have not produced traffic in the amount anticipated."

The \$100,000 expenditure, he suggested, "would have returned far greater benefits to the government if it could have been invested in advertising, sales, and promotion to increase our commercial revenues, and thus reduce dependence on the government."

The 156,391 passengers carried by Ozark last year compare with 49,507 in 1951, the first full year of operation, he reported.

• **Dr. Robert Stewart**, president, Lake Central Airlines, pointed out that it will take at least two years before a decision is made on renewal of the carrier's certificate, which expires in September, and added:

"During the interim, it is impossible to actually secure equity capital, although we have promises for the provision of capital if a certificate of sufficient length is provided."

With the uncertainty, he objected, the carrier cannot promote its development and then will be subject to criticism for not doing so.

• **C. A. Mvhr**, president, Frontier Airlines, highlighted the carrier's contribution in bringing new transportation service to isolated communities of the inaccessible Rocky Mountain area: Of the 41 cities Frontier serves, 28 have no other air service, and 14 have no rail passenger service.

Since only 10% of Frontier's route coincides with the Federal Airways System, he pointed out, the carrier installed and maintains over 2,000 miles of new airways, now used extensively by corporation and private aircraft to promote transportation service.

• **Edmund Converse**, president, Bonanza Air Lines, reported that carrier's 17.4 million revenue passenger-miles last year compare with 4.6 million in 1950.

At the same time, he added, Bonanza cut its subsidy from 11.5 cents per revenue passenger-mile in 1950 to 4.8 cents in 1954.

U.S. May Disperse Aircraft Plants

Following swiftly on long-delayed disclosure by the Atomic Energy Commission that radioactive fallout from an H-bomb can pollute 7,000 sq. mi. of territory, both military and congressional action was proposed last week to protect American industry and civilians from the threat.

The AEC announcement, made by chairman Lewis L. Strauss nearly a year after the Pacific H-bomb test at which the danger was discovered, already had been recognized in Washington as one of the motives behind Defense Mobilization and Defense Department efforts to spur industrial dispersion (AVIATION WEEK Feb. 21, p. 12).

Developments last week included:

- **Arthur S. Flemming**, director of the Office of Defense Mobilization, speaking for the Administration, asked Congress to authorize study by a special commission of the industrial dispersal problem. He urged a report, ready for action, not later than June 1.

- **Maj. Gen. William M. Creasy**, chief Army chemical officer, said that artificial smog can shield the population in a target area from 75% of the lethal heat effects of atomic or hydrogen bombs. He said a full-scale test of the Army's idea will be carried out during current Nevada A-bomb explosions.

- **USAF's Air Research and Develop-**

ment Command disclosed that three of its centers are participating in the Nevada tests, two of them concerned with the effects of atomic blast. Data gathered will be used by the Tactical and Strategic Air Commands.

- **Dispersal Lag**—Flemming's urgent program was given to Congress while Democrats, headed by Sen. Estes Kefauver, were reported determined to find out why it took AEC a year to tell the American public the full truth about the H-bomb's effects.

Flemming said it is obvious that there must be a realignment of the country's program for industrial dispersion, which has been lagging even from the announced goal of forcing factories to locate outside a 10-mi. circle drawn around target centers.

He announced that new federal construction will be held up unless its location conforms to dispersion stand-

ards and long-term amortization benefits will be withheld from firms that do not conform to the program.

Flemming did not suggest what new standards he thought will be necessary, however, evidently leaving this conclusion up to the proposed federal commission.

- **Economy Factor**—Defense Secretary Charles E. Wilson said he had known about the fallout threat since last July, but indicated this knowledge had nothing to do with recent efforts to stimulate dispersion of defense industries.

Flemming said former dispersal ideas are outmoded by the Strauss announcement. He declared that any effort to apply a mileage yardstick "would disrupt the economy of some parts of the nation and would fail to take into consideration differing geographic and other factors."

Gen. Creasy, meanwhile, said Army chemical experts can minimize the effect of an atomic explosion. He spoke of two kinds of artificial blanket that can help protect civilians from the heat of a blast.

One is a fog produced by heating oil and passing its vapor into the air, where it condenses. This scatters radiation, just as fog weakens the beam of an auto headlight.

The second method is to use carbon smoke—the "smog" familiar to Los Angeles and other cities. This absorbs radiation. It will be tested in Nevada, using coal and oil burners to produce the condition.

- **Fallout Program**—Pointing out that 34,000 people were seriously burned at Hiroshima in 1945, Gen. Creasy said it would be possible to spread a protective layer of smog over a city of that size in 15 minutes.

He added that the Army is working on methods to minimize the effect of radioactive fallout, but the general did not give further details on the new program.

Lt. Gen. Thomas S. Power, Air Research and Development Center commander, disclosed that air crews are in Nevada from:

- **Special Weapons Center**, Kirtland AFB, N. M., which has assigned 50 planes and 750 airmen. In addition to operating test aircraft, they provide aerial support and control all flying in connection with the tests.

- **Wright Air Development Center**, Dayton, Ohio, which is handling eight projects. Representatives are concerned with the effect of atomic blasts on both planes and buildings.

- **Cambridge Research Center**, Mass., Geophysics Directorate, which is concerned with two projects. They are gathering data on blast overpressures and documenting the evolution of atomic clouds.

Rizley Opposes CAB Party-Line Caucuses

There will be no party-line caucusing at Civil Aeronautics Board if he takes over the part of new chairman, Ross Rizley says.

The question was raised at a friendly session of Senate Interstate and Foreign Commerce Committee on Rizley's nomination to Board membership by two Democratic senators:

Sen. Warren Magnuson, chairman of the full committee, and Sen. Mike Monroney, chairman of the aviation subcommittee.

- **No 'Star Chamber'**—Pointing to reports that the majority of the Board has developed the practice over the past two years of meeting and making determinations separately, the senators asked Rizley to assume he would be named chairman and comment as to what he would do about the practice if he were.

Magnuson referred to the meetings as "strategy conferences" and "party caucuses"; Monroney, as "private caucusing" and "star chamber conferences."

Rizley's response was firm: "I am very definitely opposed to the Board meeting in sections. If I have anything to do in handling the matter, we would have meetings of the Board—with all the members of the Board present."

- **Favors Competition**—Rizley's generalized answer to committee questions was that he "favors competition" and has "no preconceived ideas."

Two questions posed by Monroney were:

"Do you favor a 'chosen instrument' over international air routes?" Rizley qualified that he hopes subsidies can be reduced, but added, "I still favor competition."

"Are you opposed to new entries into the trunkline industry? Do you think a new entry should be discouraged if the party can show willingness, ability and a need for the service?" Again, observing that he "favors competition," Rizley said that he had no "preconceived ideas" on the matter.

'Biological'

Chairman Magnuson opened Commerce Committee's session on confirmation of Ross Rizley with a slip of the tongue:

Committeemen and pressmen, the senator noted, already had printed statements of basic "biological" data on Rizley. The statements listed such biographical data as date of birth, marital status, number of children and lodge memberships.

- **No Outside Direction**—Rizley did indicate that he looks with some favor on permanent certification of local service airlines, which the majority of the Board now opposes.

He commented: "It would seem to me that if the carriers had stability it would be advantageous. . . . They would have a better chance to secure financing. . . ."

Rizley said he "would welcome the advice" of the Under Secretary of Commerce for Transportation, but that he considered the Board an independent quasi-judicial agency and "wouldn't take directions from him."

The committee quickly approved the nomination of Rizley to the Board and that of Louis Rothschild to be Undersecretary of Commerce for Transportation.

Rothschild pleaded that he had no aviation background, anticipated that he would become chairman of the Air Coordinating Committee, and said that he would not participate in air transport matters "except on the broadest policy lines."

Western Electric Gets Radar Fence Contract

Construction of the distant early warning (DEW) line in Canada will be done by Western Electric Co., Inc., as prime contractor. Western Electric is the manufacturing and supply unit of Bell Telephone System.

The DEW line has been divided into three areas—Western, Middle and Eastern—and construction in these sections will be done by subcontractors under the direction and supervision of Western Electric.

- **New York Office**—A joint project office, under executive management of USAF's Air Research and Development Command, has been set up in New York City. Office is composed of representatives of Air Materiel Command, Continental Air Defense Command, Royal Canadian Air Force, Canadian Department of Defense Production and Western Electric.

Responsibility for the construction and installation belongs to the U.S., although both Canada and U.S. will participate in the project.

The DEW radar line is designed to detect enemy aircraft and flash a warning to command centers in the U.S. and Canada.

An airlift to supply construction materials to the radar sites has been arranged with both U.S. and Canadian carriers participating.

Meanwhile, proposal to supply radar equipment and generators to Norway costing about \$800,000 was opened to U. S. bidders by the North Atlantic Treaty Organization.



USAF Accepts Modified F-100 Super Sabre

First production North American Super Sabre F-100 with modified tail and control system was accepted by USAF recently.

New tail is increased in height and area to delay onset of unusual stability and control problems that appear at Mach numbers above 1.4. Extra area has been added to the wing-tips and the power control system of the supersonic fighter has been modified.

Redesign of the affected parts followed months of intensive flight and ground testing of the North American plane, grounded since last Nov. 11. USAF, NACA and North American pilots flew three Super Sabres between the grounding and the recent ungrounding order to investigate the unusual phenomenon that caused former NAA chief pilot George Welch's death (Aviation Week Feb. 14, p. 13).

Test flights with the new configuration have shown that uncoordinated high-rate rolls can be performed without trouble inside the current speed range of the F-100.

Aviation Procurement Funds

The three military services had an unobligated balance Jan. 1 of more than \$7.1 billion on hand for aircraft and guided missile procurement and an unexpended balance exceeding \$21.6 billion. Details on net obligations incurred through contract letting and expenditures for the first half of fiscal 1955 are:

OBLIGATIONS		
	Obligations July 1-Dec. 31, 1954	Unobligated balance Jan. 1, 1955
Aircraft, engines and initial spares		
Army	\$111,071,000	\$103,578,000
Navy	714,101,000	1,035,892,000
USAF	2,632,190,000	5,185,366,000
Total	3,457,362,000	6,324,836,000
Guided missiles		
Army	217,532,000	156,334,000
Navy	63,490,000	134,996,000
USAF	129,984,000	520,192,000
Total	411,006,000	811,522,000
Electronics and communication equipment		
Army	45,569,000	204,315,000
Navy	61,134,000	99,852,000
USAF	313,560,000	697,422,000
Total	420,263,000	1,001,589,000
EXPENDITURES		
	Expenditures July 1-Dec. 31, 1954	Unexpended balance Jan. 1, 1955
Aircraft, engines and initial spares		
Army	\$19,713,000	\$370,203,000
Navy	864,942,000	5,648,964,000
USAF	2,942,288,000	13,766,018,000
Total	3,826,943,000	19,785,185,000
Guided missiles		
Army	18,178,000	601,877,000
Navy	86,143,000	436,521,000
USAF	128,126,000	802,077,000
Total	232,447,000	1,840,475,000
Electronics and communication equipment		
Army	57,354,000	603,731,000
Navy	81,837,000	447,610,000
USAF	179,533,000	1,327,950,000
Total	318,724,000	2,379,291,000

transports sold by the aircraft industry of this country in 1954. Our share of this business was \$145 million, out of the total of \$240 million spent by domestic and foreign airlines for American-made non-military transports."

► **Slight Backlog Drop**—Douglas reported that the company entered 1955 with a slight reduction in its backlog, down from \$2,214 million a year ago to \$2,035 million.

Of the company's military sales, the larger share was to the Air Force—\$405,782,692. Navy accounted for \$274,704,535. Planes included bombers, photo reconnaissance bombers, fighters, attack bombers, transports and cargo planes. One product is the Boeing-designed B-47 jet bomber made in the Douglas plant at Tulsa, Okla.

Douglas reported that work on missiles is of "growing promise to our future" and listed progress made on the Nike, Honest John and Sparrow.

► **50 DC-7s Delivered**—He also said the company has made advances on its design for a commercial turbojet transport, but emphasized that the plans are not frozen and will be modified as engines are improved.

"We are confident," he said, "that when the Douglas jet transport is placed on the market it will be the most modern in the field."

Meanwhile, the report said, sales of the DC-7 series of Douglas transports continue at a high rate. At the end of the fiscal year, last Nov. 30, there were 66 on order after delivery of 50 in the 12-month period.

The company's working capital at year-end was \$71 million. Net worth was \$120,891,000, compared with a 1953 figure of \$98,603,000.

Total employment at close of the fiscal year was 71,900, an increase of 5,400 over the previous year.

P&W Gets \$44-Million Navy Order for J57s

Navy Bureau of Aeronautics has awarded a \$44,473,857 order for J57 engines to Pratt and Whitney Division of United Aircraft Corp.

Other Navy orders include:

Sperry Gyroscope Co., Garden City, N. Y., ship's course indicator, \$152,951.

Lockheed Aircraft Corp., Burbank, Calif., P2V-7 aircraft, \$10,478,881.

Palmer Service Co., Inc., East Orange, N. J., electrical equipment, \$253,024.

Hamilton-Standard Division, United Aircraft Corp., Windsor Locks, Conn., propeller assemblies, \$406,700.

Texas Instrument Co., Dallas, research and development, \$100,000.

Sperry Gyroscope Co., Great Neck, N. Y., analyzers for S-2 compass system, \$304,538.

Lockheed Aircraft Corp., Burbank, Calif., spare parts, \$168,034.

Grumman Aircraft Engineering Corp., Bethpage, N. Y., kits of spare parts, \$115,419.

McDonnell Aircraft Corp., St. Louis, Mo., kits of spare parts, \$114,460.

Douglas Reports 1954 Was Best Profit Year

Douglas Aircraft Co. had the most profitable year in its history in 1954. Sales of \$915,216,000 resulted in net earnings of \$36,156,000 or \$14.70 a share. Military procurement accounted for 82% of the sales dollar.

Douglas stockholders in 1954 benefited from a two-for-one stock split and then collected \$6.50 a share in dividends. Effective Feb. 2 of this year there was three-for-two stock split.

► **Commercial Sales Peak**—Last year's sales and earnings figures compare with 1953 sales of \$874,515,000, earnings of \$18,586,000 and dividends of \$3.25.

Donald W. Douglas, president of the company, told stockholders in his annual report last week that the com-

mercial sales figure for 1954—\$159 million—is the highest in history, despite the fact \$756 million of the sales were to military customers.

This, he said, "serves to emphasize the company's leadership in the air transport field. Douglas delivered almost half of all the commercial air

New Machine

Automation, revolutionary new industrial art, is being utilized by Douglas.

The company now has an electronically controlled machine which measures, identifies and cuts electrical wire to proper lengths for aircraft.

Savings over the manual method of cutting wire are reported to be substantial.



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THE F-102 IS A RAPIER in the hand of the U.S. Airman.

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AT MINUS 36 DEG., Cold Weather Test Detachment prepares an F-86H for flight.



NO HEATER IS USED to start F-86H Sabre. Ground equipment at left is compressor.

How USAF Tests Planes in Arctic

By Claude Witze

Ladd AFB, Alaska—New USAF equipment ranging from a complete weapons system—the Martin B-57 twin-jet bomber—to 10 types of wire and cable is spending the winter here, 100 miles from the Arctic Circle, under the watchful care of 36 specialists from Wright Air Development Center at Dayton.

So far, men testing the equipment have been disappointed. The weather is too warm. Anticipated normal temperatures ranging from 20 to 50 degrees below zero have not prevailed. There have been days at a stretch when the heat, sometimes soaring above zero, interferes with work.

► **Sabre Tests**—Headed by Maj. C. P. Carter, the WADC Cold Weather Test Detachment has a stern winter's work laid out. In addition to the Martin, the group is scheduled to complete cold weather test work on the North American F-86H Sabre and F-100A Super Sabre.

On top of this the program includes functional evaluation tests (FET) on

prefabricated buildings, printed circuits, radomes, arctic tie-down gear and a nickel-chrome battery. Some are merely staked outside or stored in a shelter to learn how they survive three months in sub-freezing temperatures.

The weapons systems, on the other hand, are being operated. Already passed through the climatic hangar at Eglin AFB by the Air Proving Ground Command, the aircraft now are undergoing operational tests to find out how they bear up for arctic warfare.

► **Fault Search**—WADC's Cold Weather Test Detachment is concerned entirely with making sure the weapon system and all its components run the way they should despite the low temperature. Maj. Carter makes it clear he is not here to determine the suitability of the aircraft, guns, rockets, electronic components and other parts for action in the north. That is up to an APGC group from Eglin working in an adjoining building.

"What we are looking for," Carter told AVIATION WEEK, "are cold weather faults of the aircraft or any of its components. We find out which ones fail

in real operation. You might also say we look for idiosyncrasies in the components. Some of them do things up here that never appear in normal testing or the cold hangar at Eglin."

Most of these discoveries come under one of three headings:

- **Components** that work well separately in sub-zero temperatures but do not function together in the weapon system.

- **New problems** resulting from the fact that different materials have a different co-efficient of expansion, a physical fact that sometimes balks at operation as the equipment goes through a range of temperatures.

- **Moisture condensation** resulting from temperature changes can produce faults in operational service not suspected or detected in any other type of service testing.

- **Special Tools**—Aircraft used in the Ladd AFB tests usually are out of the first 10 produced under the Cook-Craigie plan, while full-scale production awaits results of the program.

For this reason, contractors have technical representatives present to speed requisition of parts, help in troubleshooting and keep the factory posted on what is learned. Frequently this involves development of special tools needed to maintain the aircraft in arctic operations.

Maj. Carter's group includes, in addition to the tech reps, pilots, engineers, mechanics and an instrument specialist—all from WADC headquarters at Wright-Patterson AFB. They try to bring all necessary supplies and equipment with them when they arrive about Jan. 1, prepared to stay until mid-March. When support is necessary for maintenance, supplies and personnel, it is given by the 5001st Air Defense Group, based at Ladd.

► **Ideal Test Base**—Cold weather experimentation at Ladd goes back to 1940, when two Boeing B-17 Flying Fortress bombers were put through their paces. During the winters of World War II, the base was used for delivery of lend-lease aircraft to Russia and is the point where Soviet pilots were checked out ready for their flight north to Siberia.

Until the United States built its base at Thule, Greenland, Ladd was the northernmost air base in the world. It proved ideal for cold weather testing because the temperatures normally run around 35 below zero without high winds that make outdoor work nearly impossible.

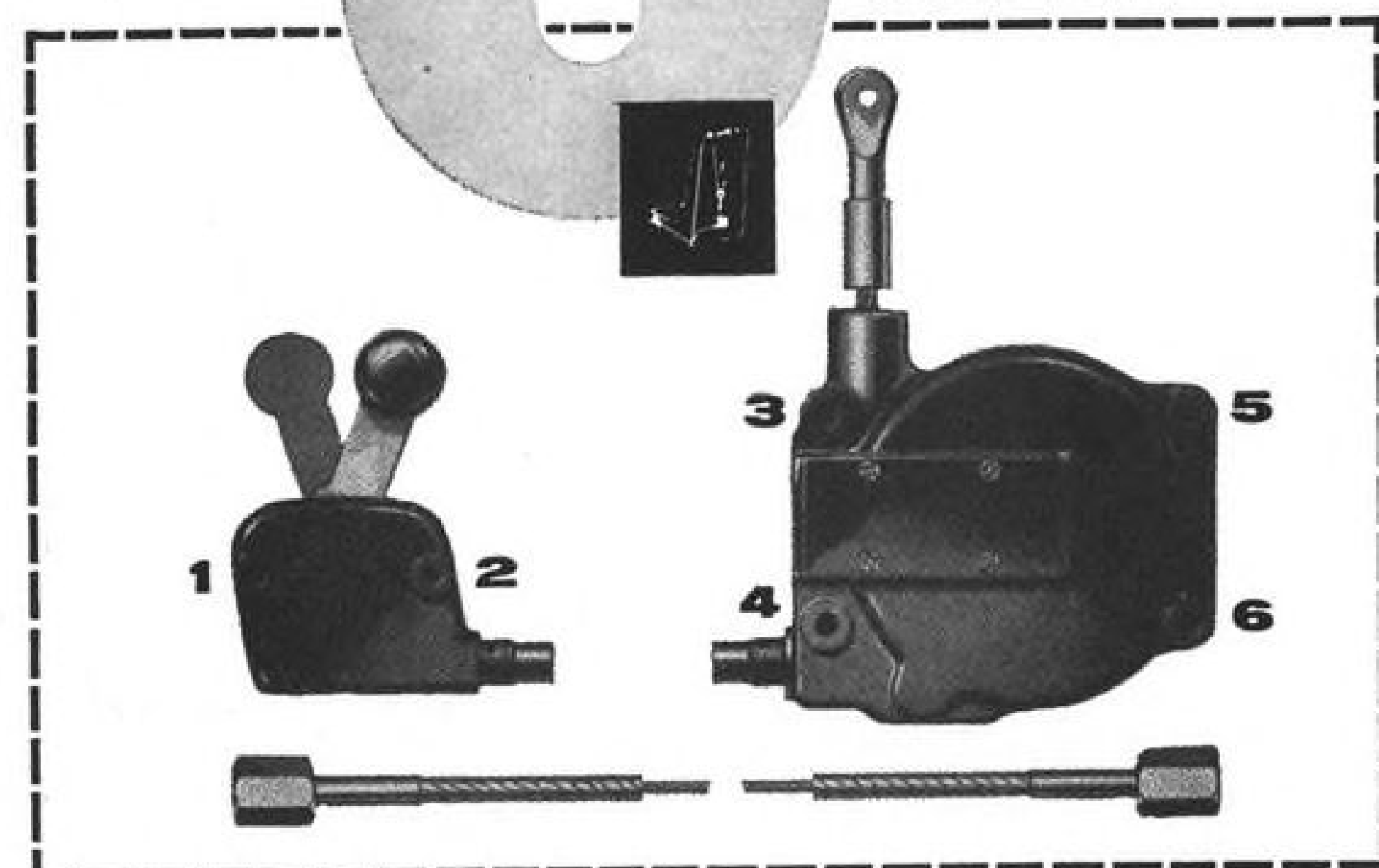
So far, no work has been done at Ladd on guided missiles. Maj. Carter said WADC is deciding how and where they will get a cold weather rundown. Anything sent to Ladd, he said, gets the true test.

"If it works here, it ought to work anywhere."

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mount the Pacific Shoulder Harness Reel. No switches, no hydraulic or electrical power needed. Completely automatic. Completely self contained. May be pre-flight checked, in seconds, by manually jerking the shoulder harness.



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Navy Plane Policy Cuts Field Changes

U. S. Navy has adopted a new aircraft procurement policy that delays full production and assignment of planes to the fleet until test work is completed and necessary assembly-line changes made.

Called the "Murphy plan," the program is similar to USAF's earlier "Cook-Craigie" procurement policy (AVIATION WEEK Apr. 12, 1954, p. 13). It is named for Capt. J. Murphy, who drew up the original schedule and presented it to the Navy's Air Board about two years ago.

► **Less Field Changes**—Gist of the plan is that a new plane is held to a low rate of production for the first three years, while the first flight articles—about 23 aircraft in a typical case—are put through a fast shakedown to uncover discrepancies or "bugs." This eliminates a long list of major "fixes" required after the plane is assigned to combat units, effects vast economies.

The Navy program requires a larger number of aircraft to carry out the test flights and keeps the brakes on the assembly line until the product is perfected. Fleet deliveries naturally are delayed, but when combat squadrons get the aircraft it is a better one and demands far less field modification.

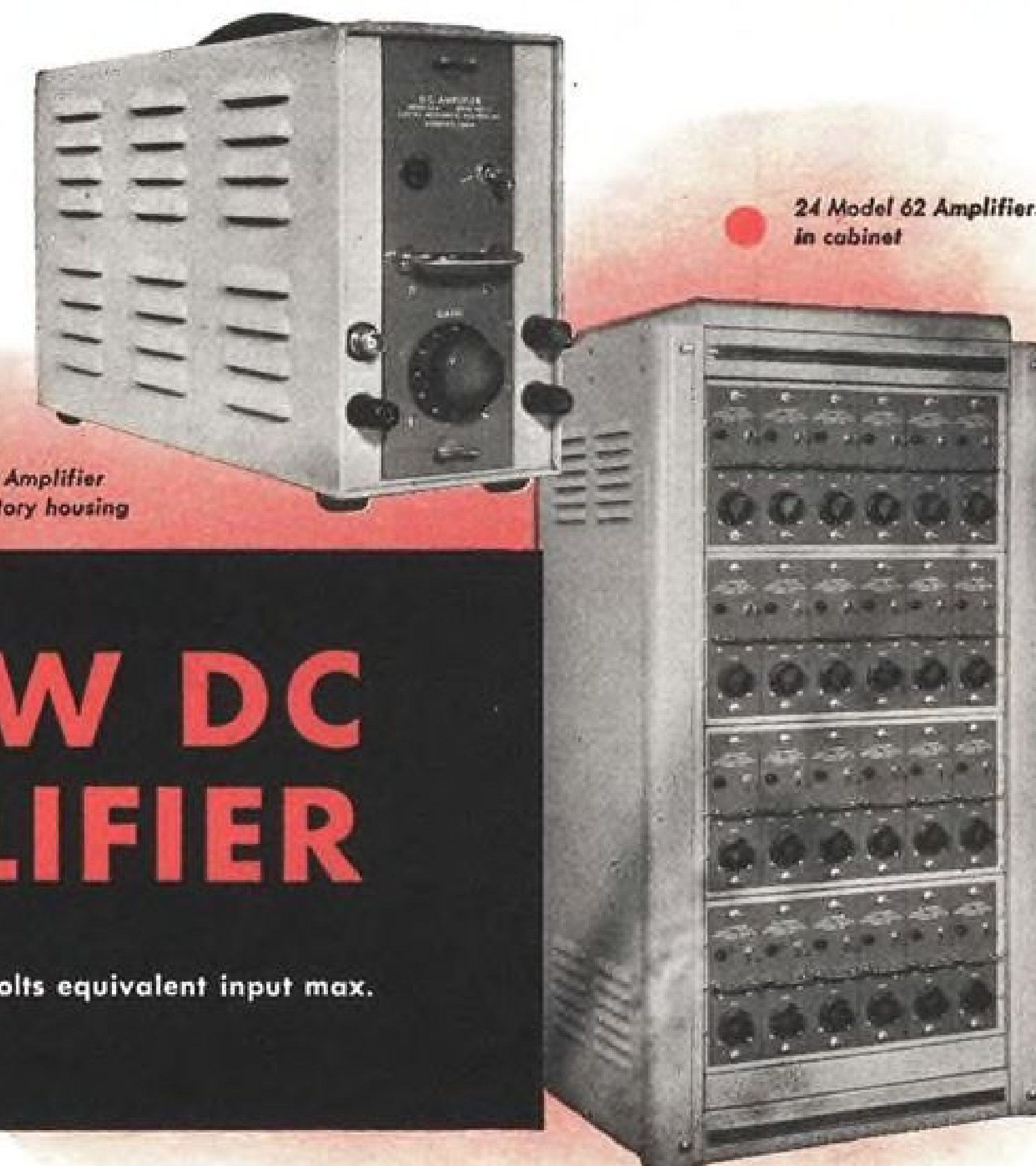
Typical schedule for new carrier fighter as outlined by Bureau of Aeronautics:

- First six aircraft bailed back to contractor for general performance and safety check.
- Next seven aircraft to Navy Board of Inspection and Survey to make sure they meet guarantees and test for fleet suitability.
- Next four aircraft to Naval Air Test Center, Patuxent River, Md., for accelerated evaluation and development service tests.
- Next six aircraft to fleet introduction test program. This involves both suitability to perform mission and training of personnel. First Navy production plane to come under the Murphy plan from the beginning was the North American FJ-3 Fury carrier fighter, although the program was introduced partially for the earlier Grumman S2F-1 submarine hunter.

► **Easy Acceleration**—The FJ-3 program at Patuxent lasted from Aug. 7 to Sept. 17 last year. Both fleet and service test pilots were used to run up more than 800 hours of flying time on six aircraft in six weeks. The plane was ready for service soon after the test.

BuAer says production can be accelerated with ease once these tests are finished because the manufacturer has had a generous period to prepare for faster output. Changes later found

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- Pass band DC to 25Kc
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The Model 62 Amplifier contains its own power supply. It is designed for general laboratory use and for multi-channel instrumentation applications when microvolt input signals must be amplified. Typical uses are the amplification of outputs from DC-excited strain gages, thermocouples, and other transducers capable of providing intelligence signals down to DC.

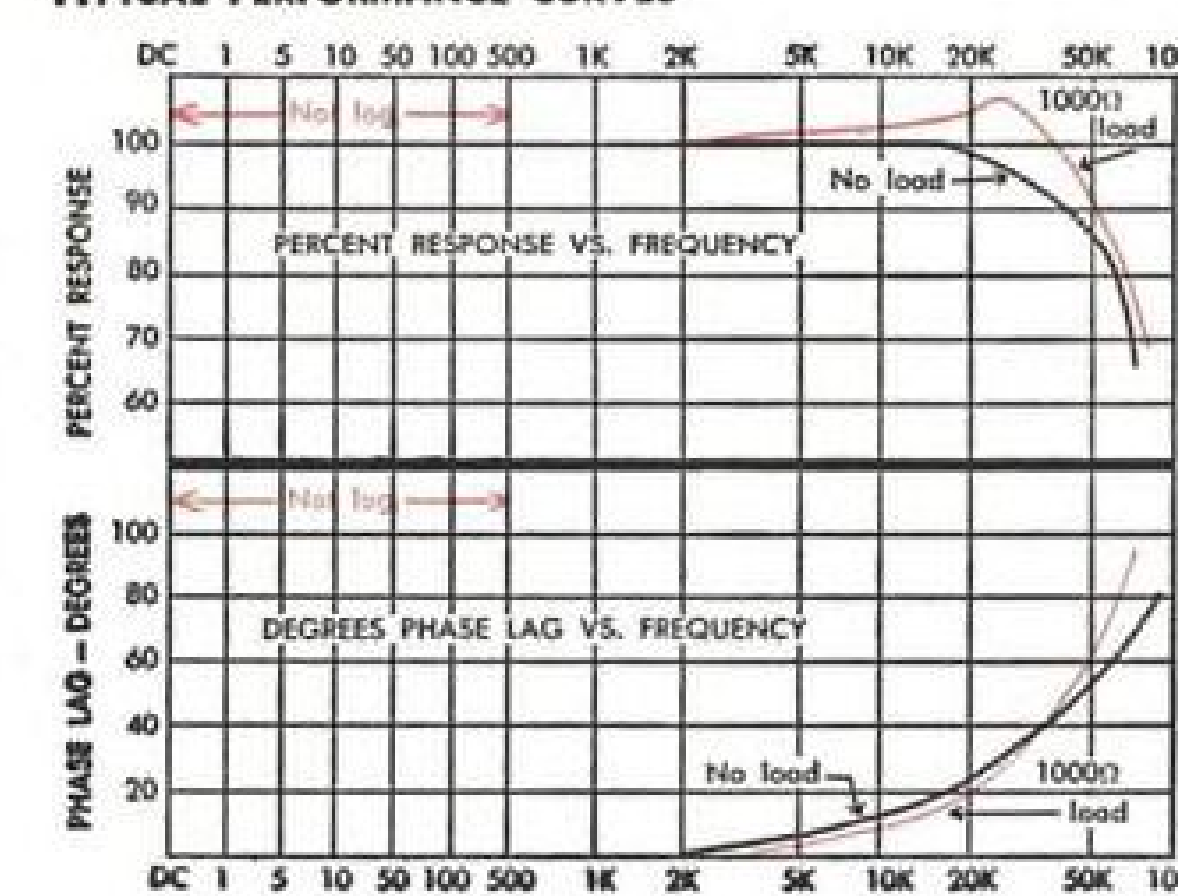
Inquiries for further information will receive prompt attention. Write to Sales Engineering Department, Electro-Mechanical Research, Inc., Ridgefield, Conn.

CHARACTERISTICS

Gain	1000 ±1%.
Input impedance	200,000-ohm calibrated input potentiometer provided.
Output range	0-±5 volts max. for load impedances greater than 1000 ohms. 0-±5 ma. max. for load impedances in range of 1000 to 250 ohms.
Stability	Output zero offset never exceeds ±20 μv referred to the input, after 5 minutes warm-up, if line supply is 115 volts regulated. ±10 volts variation in 60-cycle supply results in additional zero shift of less than ±25 μv.
Chopper intermodulation	Less than 2% of actual signal level. Occurs only in the vicinity of 60 cps and its harmonics.
Noise	Less than 15 μv equivalent input.
Linearity	±0.25% of full scale.
Frequency response	Flat within ±2% from DC to 10,000 cps.
Dimensions	Basic amplifier: 2 3/4" W x 8" H x 12 1/4" D. Laboratory housing: 4 3/4" W x 8 1/2" H x 14 1/2" D.

Accessories include laboratory housings which provide front panel input and output connections, rack adapters to permit accommodating up to six amplifiers in 8 1/4" panel space of a standard rack, strain gage bridge balance and supply, and an output amplifier to permit driving pen motor recorders or high frequency string galvanometers.

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necessary can be incorporated with ease. If serious deficiencies are found, production can be held up pending modification without serious economic loss.

Most important of all: The fleet gets a plane ready for combat.

Navy also emphasizes economies for manufacturers that are inherent in the fact that prototypes no longer need to be custom made with the waste that comes with make-shift tooling that is of no use in regular production.

Greater stress is being placed on design of the original article for quantity production. Although this increases initial tooling costs, manufacturer can recover the investment when full output gets under way.

ODM Grants Republic \$3.1-Million Writeoff

Republic Aviation Corp., Farmingdale, N. Y., has been granted a certificate of necessity of \$3,150,000 with 55% allowed for accelerated tax amortization.

Other recent certificates of necessity issued by the Office of Defense Mobilization include:

George W. Kanarr and Charles B. Kanarr, trading as Kanarr Machine Specialties, Wilkes-Barre, Pa., aircraft parts, \$27,000 certified with 55% allowed.

Sheridan-Gray, Inc., Torrance, Calif., research and development, \$247,945 certified with 65% allowed.

Cessna Aircraft Co., Wichita, military aircraft, \$125,000 certified with 60% allowed; military aircraft, \$190,000 certified with 60% allowed.

Curtiss-Wright Corp., Wright Aeronautical Division, Wood-Ridge, N. J., military aircraft engines, \$283,438 certified with 60% allowed.

United Aircraft Corp., Pratt & Whitney Aircraft Division, East Hartford, Conn., military aircraft engines, \$96,000 certified with 65% allowed.

Lockheed Aircraft Corp., Burbank, Calif., military aircraft, \$105,868 certified with 65% allowed.

Sylvania Electric Products, Inc., Mountain View, Calif., research and development in electronics, \$137,103 certified with 65% allowed; Boston, Mass., research and development in electronics, \$204,005 certified with 65% allowed; Bayside, N. Y., research and development in electronics, \$72,932 certified with 65% allowed.

George W. Borg Corp., Janesville, Wis., military electronic equipment, \$10,799 certified with 65% allowed.

Northrop Aircraft, Inc., Hawthorne, Calif., military aircraft, \$90,000 certified with 60% allowed.

Telecomputing Corp., Burbank, Calif., electronic equipment, \$11,656 certified with 70% allowed.

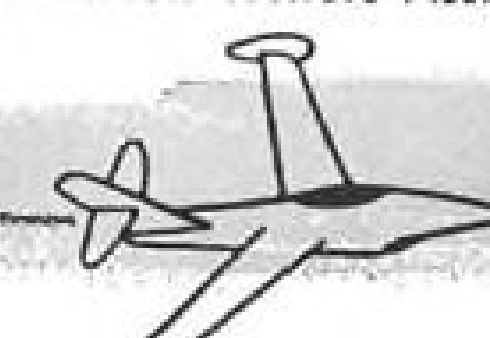
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Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,

Senior Member, Aviation Writers Assn.



If my figures are correct, this is the 79th appearance of Valve Talk in Aviation Week and a good time — I trust — to ask what you think of the column.

As you probably have realized, there has been no attempt to delve into technicalities, even those involving aircraft valves. Rather the design of Whittaker's presentation has been largely three-fold:

To tell the company story, present some of its achievements and explain various problems in the valve field; to commend a job well-done in any phase of aviation whether by individuals, groups or companies, and occasionally to picture personalities and events, the developments, the drama and the color that make up this vital and vibrant industry.

Topics, as you may recall, have ranged from valve torture chambers to hotrod fighters, from quality control to predictions on the future. We have sought to vary the presentation, to pick the subjects for interest and timeliness. And it must be acknowledged, too, that we've editorialized now and then.

Naturally, aircraft valves have been the chief subjects of our semi-monthly visit which I hope has explained something of this amazing business and the role it plays in the panorama of American aviation successes.

Like any other manufacturer, Whittaker is proud of its achievements and of the people who made them possible. But the company admits, too (and this I admire), that there have been failures to overcome and problems to iron out. Thus I have written about both the highs and the lows in the Whittaker story as clearly and honestly as I can, hoping to personalize this valve concern and make it as interesting to you as it is to me.

One thing, I've learned a whale of a lot since I started digging!

If, over the years, the column has been informative, then it has succeeded. If it has given you a better idea of the many facets in the valve field and the inter-relationship between Whittaker, the prime manufacturers and the military services, it has accomplished a purpose. If it has occasionally spurred your imagination, taken you aloft for a supersonic dive or a carrier landing, it has achieved an aim. Even if it has sparked disagreement editorialwise, this, too, is success.

But we can't know unless you — the judges — tell us. We'd appreciate your comments and your suggestions.

Were you particularly interested, for instance, in the various stories of individual valves and their develop-

ment, or in the work of the Whittaker field engineers? Did the yarns on company personalities catch your eye, or the discussions of purchasing, production or mistakes?

Maybe it was the piece on valves in the B-47 or the F-86 that interested you most. Or was it the reflections on public apathy, airport noise, or industry entertainment? Could be that you agreed with the commendation for "little people" in the industry, or with the praise for test pilots, both military and civilian. Or perhaps it was the tribute to the Air Research and Development Command, or the analysis of guided missiles or helicopters.

Many a varied subject has been presented — a discussion of the speed rivalry between the United States and Great Britain, the value of experience in valve manufacturing, the Douglas DC-7, chemistry in aircraft valves, Russian air power, young executives in the industry, the significance of motor-operated valves, the research of aero medicine, the merits and means of price reduction, the role of air defense, the gyros in the Nike, the pros and cons of the vertical riser, the Air National Guard —

Did Dell Phillips' new fuel pump intrigue you, by chance? Did you balance the arguments for design bulletins against catalogues? Did you go along on that flight to 53,000 feet, or ride with the USAF interceptors?

If the design of Valve Talk has pleased you, we're happy. If you have comments, criticisms or suggestions, we'd like very much to receive them. Perhaps you'd like more of this and less of that. Or vice versa. If you'll write us we'll be grateful — and we'll do our best to oblige. Valve Talk, Wm. R. Whittaker Co., Ltd., 915 N. Citrus Avenue, Hollywood 38, Calif.

AERONAUTICAL ENGINEERING

On the Research Frontier . . .

Engineers Probe Barriers to IBM Flight

By David A. Anderton

Engineering acceptance of the concept of the intercontinental ballistic missile (IBM) indicates a growing confidence in all phases of missile system design.

It means recent research advances have been made in hypersonic flow, thermal shock, high-temperature materials, accurate guidance techniques, high-energy propellants and extremely large rocket motors.

It implies that contemporary missile technology has reached a new peak from which the answers to the manifold prodigious problems of longrange ballistics can be seen—although only faintly—on the distant horizon.

It hints at a spectacular future—eventual extrapolation of IBM techniques to produce an earth satellite vehicle or space traveler.

► **Status Today**—The IBM is a step beyond the cruise-type, longrange missiles such as Northrop's Snark now undergoing evaluation prior to service use.

It is a part of the theory of massive retaliation, primarily because of the inherent inaccuracy of the missile which makes its use against pinpointed distant targets a matter of luck.

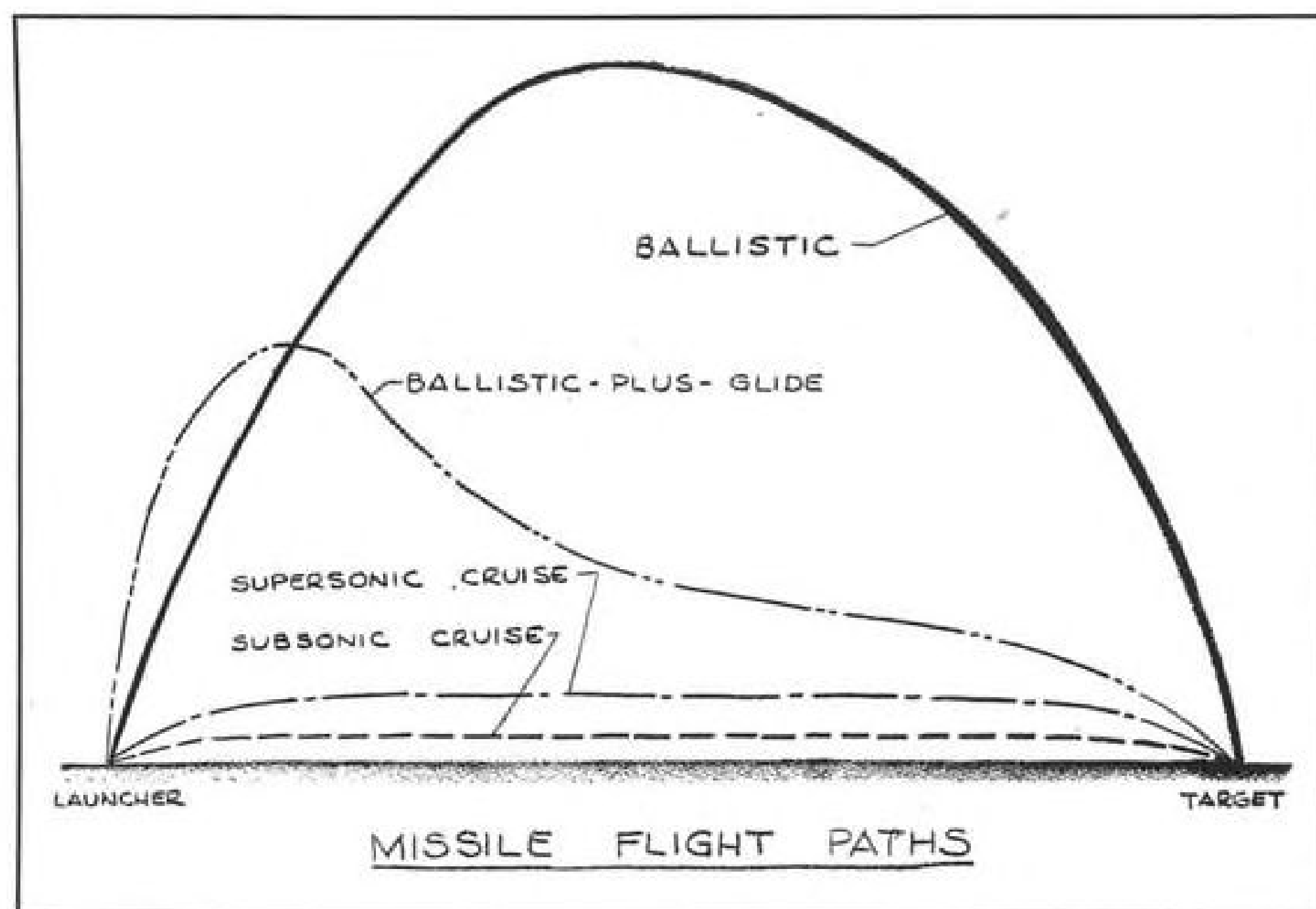
The reason for its inaccuracy lies in the peculiar flight path of the IBM. In its fall back to earth from its peak, it quickly reaches hypersonic Mach numbers. It hurtles through the atmosphere in seconds, and its shell heats near incandescence.

Its point of entry into the atmosphere has been fixed by the conditions when it first left the atmosphere, and by the earth's rotation. For accurate impact, the missile has to be guided during that last downward leg.

It is the problems of guidance and structure during the last few seconds that have been the biggest drawbacks to the development of an IBM.

► **Two Alternatives**—If the pilotless bomber is accepted as the near-ultimate weapon for intercontinental warfare, the designer has only two alternatives.

• He can build a cruise missile, restricted to the sensible atmosphere and powered by one of several air-breathing engines. This class of missile gets its name from the flight path, a level cruising course at altitude with one or more of the flight parameters of altitude, Mach number or power held constant.



Climb to altitude and dive to target may use propulsion systems different from those used for cruise.

• He can build a ballistic missile, unhampered in flight by the need for or the presence of atmosphere, and powered by a rocket engine. This category of missile is named by its flight path, similar to that of an artillery shell. Powered only during its flight through the atmosphere, the IBM's range is determined by its velocity at motor burnout (analogous to muzzle velocity) and flight path angle (analogous to elevation angle).

The designer's choice is a difficult one; most engineers agree the IBM poses a more severe set of requirements.

Whichever missile he chooses, his design difficulties will stem from the peculiar flight path of his choice.

► **Time Effects**—Time and its transients circumscribe missile designers from the start.

For a cruise missile, flight time is measured in hours and the external transients are measured in seconds. The long flight time means large quantities of fuel, prolonged high-temperature operation, continual navigation and the risk of early warning to the enemy.

For a ballistic missile, flight time is scaled in minutes and the transients are in fractions of a second. The short time still requires large quantities of fuel, means sudden and enormous ther-

mal loads and almost no time to navigate. But there is no early warning and no defense in sight.

A detailed examination of typical flight paths points up some of the built-in trouble spots that must be cured by design inventiveness.

• **Subsonic cruise path**, typical of the short-range Martin Matador and the longrange Northrop Snark. Launching can be from a runway, a ramp or a zero-length rig. After accelerating to speed, the missile climbs steadily to cruising altitude of about 30,000 ft. With constant power, the missile will continue to climb slightly as it loses the weight of burned fuel. Near the target, the missile is pushed over into a dive and impacts the target at a low supersonic Mach number.

• **Supersonic cruise path**, typical of North American Aviation's Navaho. Launching is rocket-assisted, either by jettisonable stages or integral units. The missile reaches high altitude and speed rapidly, and levels off. Its cruise path will be supersonic—Mach 2 or so if it is turbojet-powered; up to Mach 4 if ramjets are used. Altitude will be above 50,000 ft., may touch 100,000 ft. Push-over, dive and impact are also supersonic.

• **Ballistic trajectory**, typical of Convair's Atlas. Launching is from a vertical position, using rocket power, in the familiar manner introduced by Ger-

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The new Aer-O-Com automatic antenna tuner is the complete answer to antenna tuning for all commercial aircraft, for it tunes all fixed wire antennae, grounded or open, on all aircraft from DC-3's to B-377's!

It's the lightest on the market—just 16½ pounds. It tunes rapidly and effectively. Its simplicity means lowest cost and easy maintenance.

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Operates efficiently into all fixed wire antennae, grounded or open, over the frequency range 2-22 mcs, for all sizes of aircraft ranging from DC-3 and CV-340 to DC-7, L-1049 and B-377.

Simplicity, dependability, light weight. Rotating circuit parts consist of one standard type variometer, one standard type variable air capacitor, and one element selecting switch. Uses only one vacuum tube, 2D21 (5727). Dependability assured by simplicity of parts and design.

Average 5 seconds tuning time for typical international frequency plan (2-22 mcs) on DC-6B. Maximum tuning time 15 seconds.

Requires no frequency information from transmitter or selector switch, therefore can be used with any type of H.F. transmitter having a 52 ohm coaxial output, a nominal carrier power of 50 or 100 watts, and providing necessary control for the tuner.

Requires only 27.5 VDC primary power (1A standby and transmitting, 3A tuning); 50 MA at 400 VDC for only 1 second during tuning cycle.

External RF relays not required, even for dual installation. Tuner is fitted with two front panel mounted RF relays for optional use. One relay operates with P-T circuit and may be used to transfer antenna directly to receiver input circuit; the second relay is used in a dual installation, to ground the antenna when the other transmitter is being used.

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Here are the companion pieces to the Model AAT, Type 4 Automatic Tuner: all of which operates on 27.5 VDC (no 400 cycle power required)

Model AT-144 Airborne Transmitter: Frequency range 1.6 - 1.75 and 2.0 - 22.0 mcs covering 144 independent crystal controlled frequencies. Weight 44 lbs. Separate transmitter and receiver permit cross-band operation.

Model AR-144 Airborne Receiver: Has a frequency range of 2.1 - 18.5 mcs, covering 144 crystal controlled frequencies. Weighs 33.2 lbs.

Model DPU Power Unit: Proven dynamotor type, 33 lbs.



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PLUS these features:

- **ILS Localizer** for accurate runway approach guidance.
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- **INSTALLATION EASE**. The Omnigator is compact for glove compartment mounting. Thousands of Omnigators in use in multi- and single-engine business aircraft. Priced far lower than any comparable equipment. See your NARCO dealer today.

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many's V-2 a decade ago. Burning time is on the order of 10 minutes, during which time the rocket has climbed through the atmosphere and has turned to the proper flight path angle. It coasts to its peak altitude and then falls, tail first, back toward the atmosphere. Speed builds up during the fall to maximum values of Mach 10 to 15 and at that speed, the missile hits the atmosphere. Instantly it weathervanes to a nose-down attitude and plunges to impact the target. Its final speed is somewhat lower than the peak value reached during the downward leg, because of the high absorption of energy in the form of drag.

● **Ballistic-plus-cruise path**. This kind is a hybrid cross of the ballistic and the cruise missile paths. It is ballistic up to the point of re-entry into the atmosphere, but at that point, the missile—equipped with lifting surfaces—pulls out of the dive and glides at Mach 15 or less, losing speed as it flies, to a final low supersonic impact at the target. This approach has been studied, notably by Saenger in Germany, who proposed a piloted bomber using this kind of flight path. At least one U.S. study has been made: General Electric Co.'s Hermes C, dating back to 1946. Inclusion of the ballistic-cruise path here is largely of academic interest; there is little current interest among defense officials in this technique.

► **What Is Known**—The problems of the cruise missiles are fairly well under-

stood. This is not to underrate them, because even subsonic aerodynamic and structural problems are still imperfectly solved.

With a ballistic missile, the problems are of a different order of magnitude. Once the designer gets away from the requirements of tactical missiles, such as the Army's Corporal or Honest John, he is in a new world.

First, he is dealing with a large missile, one that might stand 75 or 100 ft. high, have something more than 500,000 lb. of thrust and require a supporting fleet of tank cars, trailers and wheeled vehicles.

Second, he is designing a superspeed vehicle, which spends most of its time at hypersonic speeds, in an altitude range where conventional aerodynamics no longer applies and where air molecules behave as isolated projectiles rather than as a homogeneous mass.

► **Magnitude**—Size alone is not defeating; there have been huge airframes and structures built before. It is the problems introduced by size—the volume of fuel, the thrust of the motor—that present the complications.

One technique suggested is to group rocket motors, as the chamber of a revolver contains a group of shells. A honeycomb mesh, or a "six-shooter" configuration of rocket motors, each with the 100,000-lb. thrust figure now being obtained in at least two types of engines, are possible arrangements.

► **Simple Fuel Handling**—The obvious



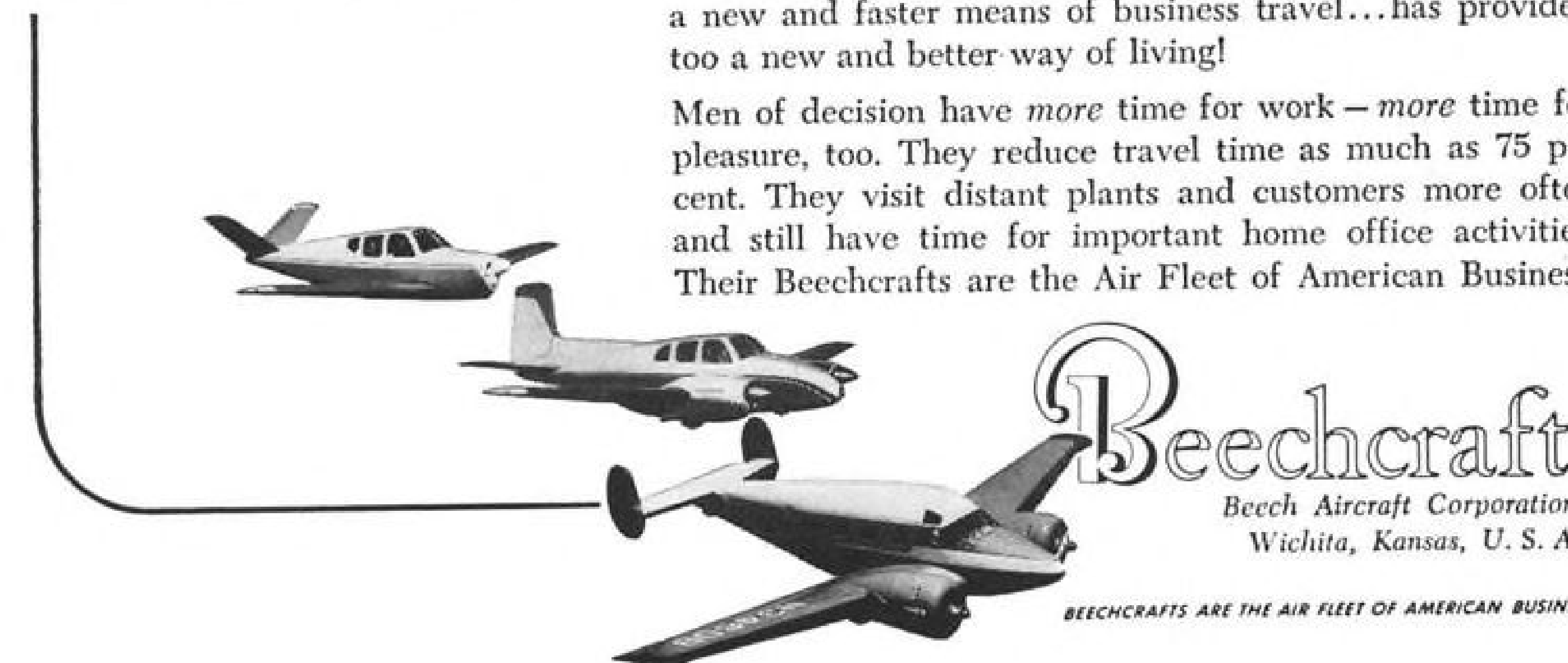
Britain Clears Super Sprite for Production

First British rocket engine to pass type-approval tests of the Ministry of Supply and be cleared for production and general use is the de Havilland Aircraft Co.'s Super Sprite assist-takeoff unit. Rated at 4,200 lb. thrust for 40 sec., the Super Sprite uses

a cold cycle: Hydrogen peroxide is decomposed by a solid metal catalyst to give a jet of superheated steam, augmented by afterburning of kerosene or gasoline. Shock diamonds appearing in the jet exhaust are typical of supersonic flow condition.



Fly into Action



Many a successful man works hard at being successful... only to find he has no time for what success is supposed to bring: The thrill of going places; the enjoyment of friends, of sports, of pleasure, of weekend relaxation.

But for thousands of men, ownership of a fast Beechcraft has enabled them to "FLY into action"...has provided them a new and faster means of business travel...has provided too a new and better way of living!

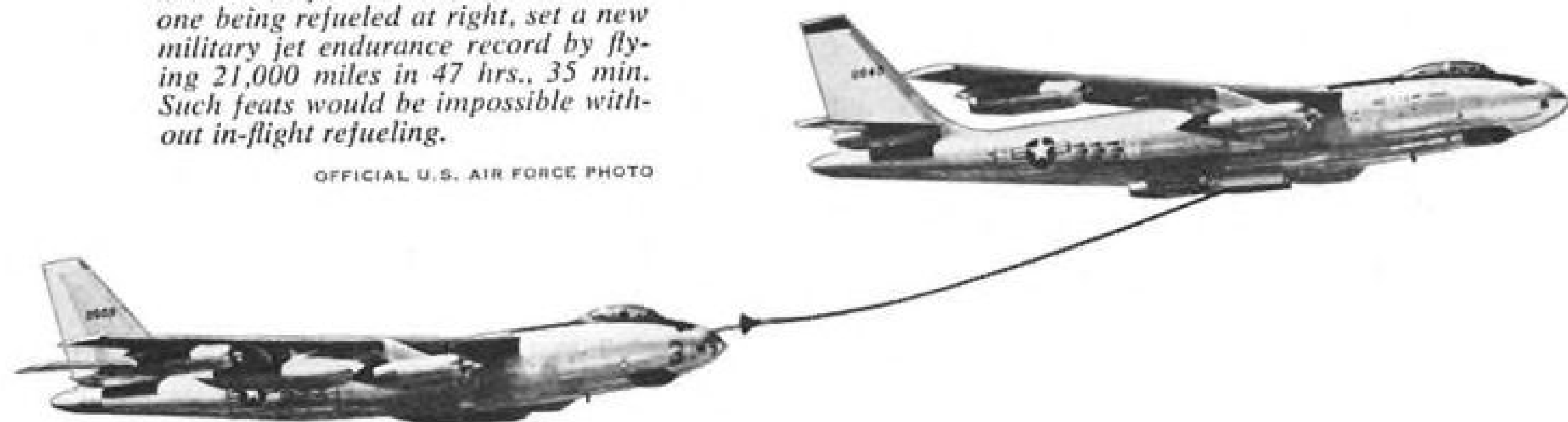
Men of decision have more time for work — more time for pleasure, too. They reduce travel time as much as 75 per cent. They visit distant plants and customers more often and still have time for important home office activities. Their Beechcrafts are the Air Fleet of American Business.

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BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

November, 1954—A U.S. Air Force B-47 Stratojet bomber, similar to the one being refueled at right, set a new military jet endurance record by flying 21,000 miles in 47 hrs., 35 min. Such feats would be impossible without in-flight refueling.

OFFICIAL U.S. AIR FORCE PHOTO



advantage of such a grouping is that it allows the use of a developed powerplant in multiple installation, instead of forcing the enormous development project that a single motor would require. But there is a dividend: Pumping and handling of fuels is simplified. Instead of requiring fuel lines the size of a storm sewer, IBM fuel lines need only be about 6 in. in diameter to feed the multiple powerplant.

Grouped motors also can mean grouped tanks instead of a single huge vessel to hold the tons of propellants.

Logistic support of such an outsized weapon is a formidable undertaking, almost equal in magnitude to the task of providing the original structure.

► **Trouble Begins**—But it isn't until speed and altitude enter the picture that the real difficulties plague the designer.

An aerodynamicist wants to know the lift, drag and moment coefficients of the body alone, and the body plus fins over the speed range from Mach zero to Mach 15, to choose an arbitrary upper limit.

He wants that data for the region of the atmosphere where air is homogeneous and for the region where it becomes individual particles with a path between molecular collisions measured in feet. And he wants that dope for a range of angles of attack.

It's no news to him that the data doesn't exist, or if it does, that it is most spotty. Even if he had that kind of fundamental data, he would still be unhappy, because he lacks pressure distributions, without which he can't figure the loads acting on the missile for structural design.

Until recently, his aerodynamic data would be little more than educated guesses. Quite recently, the first data at speeds up to Mach 15 has become available; it's very basic material, more qualitative than quantitative, but it's a start.

► **Heat Transfer**—The aerodynamicist, the structures engineer and perhaps an aerothermodynamicist get into a huddle about the heat transfer during the downward leg. Again, there is little data to go on, although here also, the first test points are being plotted today in tunnels.

The issue is this: During the mad dash earthwards, the missile absorbs an enormous amount of heat from skin friction. What kind of skin friction—laminar or turbulent? What is the coefficient of emissivity for the material? Whose laws or approximations or hypotheses apply? Again, the problem is approached with an educated guess.

There are two schools of thought on the best way to handle the last leg of flight.

One says to rip right on through at whatever speed happens to come up,

and let the outer casing of the missile melt away. You can figure that one roughly.

The other school says that you don't have to come all the way through the atmosphere. They point to the effective lethal radius of thermonuclear weapons, and state that radius is radius, whether it's measured along the surface of the earth, or down from the altitude of an air burst.

Whichever decision is taken, the design problem is still tough.

► **Guidance**—For precision, any missile must be steered right into the target; controls must work until the instant they are destroyed in the warhead blast.

With the IBM, steering is a unique problem during the last few minutes of flight.

Traditionally, rocket-powered missiles are steered in one of two ways: by vanes in the exhaust jet blast, or by aerodynamic surfaces. The former requires an operating motor, the latter requires atmosphere and some kind of power.

Again there are two schools of thought. The first maintains that some fuel should be kept in the rocket, to make a short burst of power available on the way down for last-second corrections using jet-vane or aerodynamic steering. Such control, they say, would

26

26 YEARS OF PROGRESS

...in-flight refueling



OFFICIAL U.S. AIR FORCE PHOTO

January, 1929—The U.S. Army Air Force crew of the Fokker C-2 Army Transport "Question Mark" is shown after establishing a refueling endurance record covering 11,000 miles in 150 hrs., 40 min. Pictured, left to right, are Sgt. Roy Hooe, Lt. Elwood Quesada, Lt. Harry Halverson, Capt. Ira Eaker and Major Carl Spaatz.

In 1929, the historic flight of the "Question Mark" focused attention on air-to-air refueling. Recognizing the strategic importance of this concept, the U.S. Air Force has devoted an ever-increasing effort to the perfection of in-flight refueling.

At Fletcher Aviation, design and production engineers are currently working with the U.S.A.F. in the development of improved equipment to hasten this vital step toward maximum global mobility.

With its wealth of experience in design and manufacture, Fletcher is well qualified to participate in this program. The aim of the entire Fletcher organization is to contribute to the strength and security of America.

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Cozy

M O O D B E A M S # 3

Being cozy isn't just a case of mind over matter.

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Like with an airplane: To be real silky up there, your rig should have **FACTORY-NEW PARTS** and **FACTORY-AUTHORIZED SERVICE**. (Otherwise, you must flannel your way along on antique war surplus).

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be positive and rapid, two essential characteristics.

The second school is made up of the same group that doesn't worry about heat transfer, either. They answer by citing the lethal radius of nuclear bombs.

This concentration with terminal guidance should not imply that there are no problems in initial guidance. There are, but perhaps they are better known. But surveying errors of almost negligible error at the launching site can throw off a 5,000-mi. missile by several miles. The earth's rotation, long believed an unvarying cycle, has been found to change non-uniformly. This can play havoc with accuracy.

If the missile does plunge through the atmosphere and in so doing, loses some of its surface by melting, then its aerodynamics are no longer those of the smooth-skinned model in the wind-tunnel.

What about accuracy then?

► **Larger Problems**—These are design problems, tough to solve, but eventually they will give way to the answers. We will have an IBM test vehicle to launch, at a cost of perhaps four or five million per shot.

Normally, the test engineer expects everything to be a little under calculated performance; some minor thing happens and the missile doesn't quite meet expectations.

For the IBM, a launching-site accident will be a disaster. That will be bad enough.

But back in the mind of test engineers there is always the memory of one rocket, one missile, one airplane that worked a little better than anyone expected. For the IBM, this too may be a disaster, because a true intercontinental missile is only a slight step removed from a possible satellite. Its final velocity is near the escape value of about seven miles per second.

If an IBM gets away, it may circle the earth for a day, or a year or a century, and it can't be destroyed nearly so easily as the birds that get out of hand at Holloman AFB and White Sands Proving Ground and Patrick AFB.

► **Final Answer**—These are some of the rough outlines of problems inherent in the design of an intercontinental ballistic missile, a beast that will carry a thermonuclear warhead to a target 5,000 mi. or more distant from its launching site.

It's another great adventure on the engineering frontier, partly because it is such an extrapolation of today's technology, and partly because it brings the next frontier of space that much closer.

A successful IBM will be far more than just another missile; it will be an unmanned spaceship, performing just a little under its peak.



ON BEACHING CRADLE, Convair R3Y-1 Tradewind taxis down ramp under own power.

Four-Man Cradle Handles R3Y 'Boat'



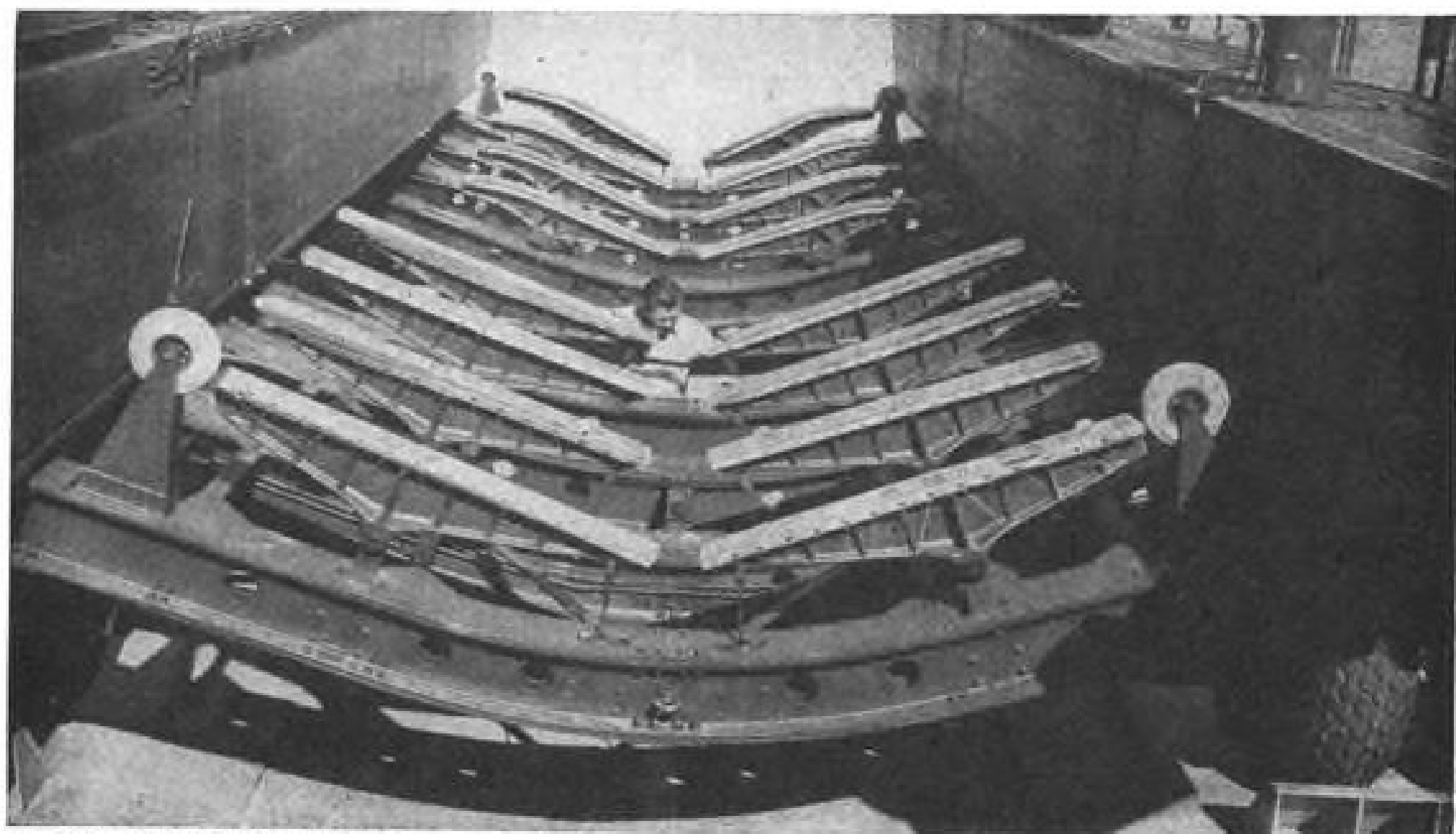
COCKPIT OF BEACH CRADLE has controls for land steering. Operator coordinates maneuvers with plane's pilot via radio.

Beaching time for large seaplanes has been cut from about one hour to less than 10 min., using a new mobile cradle developed by Convair Division of General Dynamics Corp., San Diego, Calif.

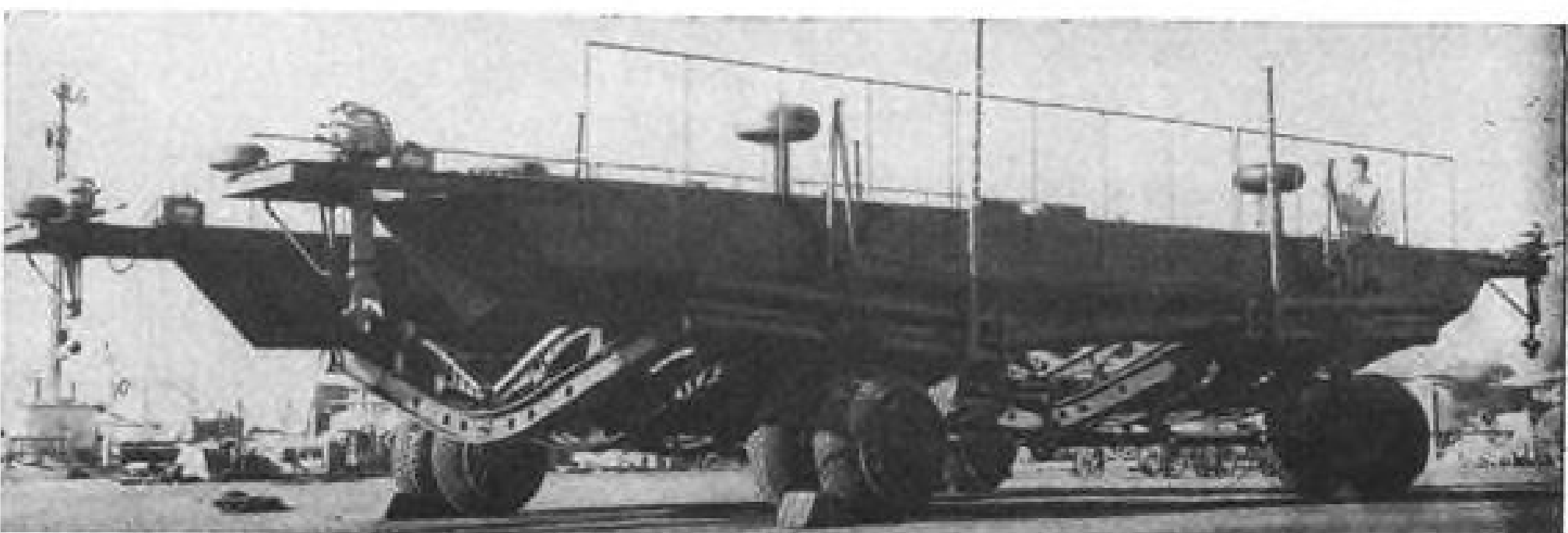
Also, only four men are needed for the task instead of 15 or more previously, Convair notes.

Mostly of aluminum construction, the cradle weighs about 25,000 lb. and can be disassembled and airlifted inside an R3Y turboprop-powered flying boat.

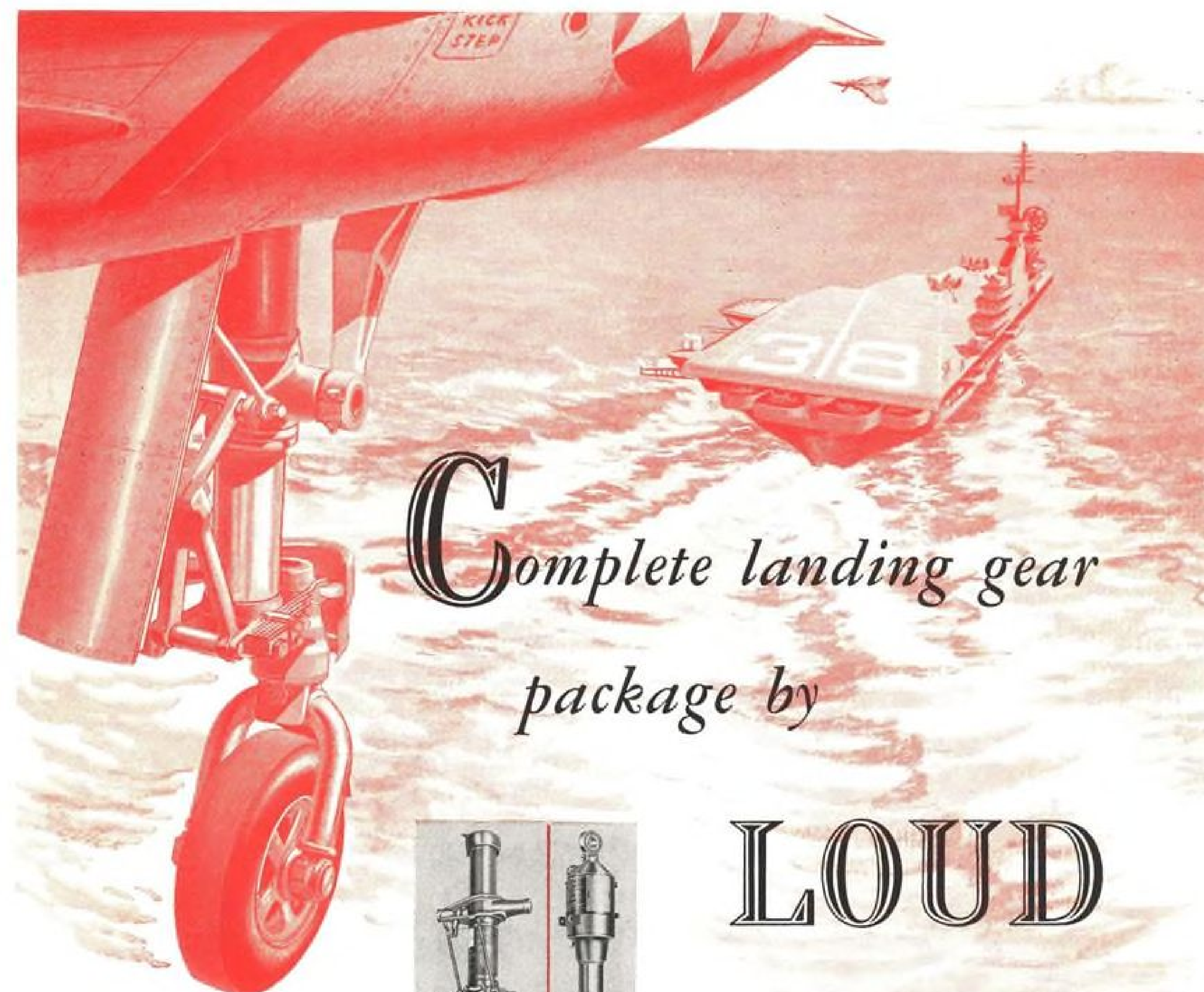
In the water, the pontoons are submerged and the R3Y taxis free. The eight large wheels have power steering and braking.



CROSS-MEMBER PADS have plastic covering to prevent binding of R3Y hull to the cradle.



JOHNSON OUTBOARDS at each corner of cradle maneuver it in water after plane has left.



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ables... at half the weight of glass.

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IAS Summaries

The recent four-day meeting of the Institute of the Aeronautical Sciences heard approximately 80 papers, ranging from Aircraft Design, Aeroelasticity, and Aerodynamics, through Structures, Stability and Control, and Meteorology.

AVIATION WEEK published, in the issues of Feb. 14 and Feb. 21, summaries of 25 of these papers. The series is continued here, with publication of 10 more, on Aircraft Noise, Aeroelasticity, Flight Propulsion, and Meteorology. It will appear in succeeding issues until all briefs made available to AVIATION WEEK by IAS have been printed.

Aircraft Noise

(In Cooperation with the Acoustical Society of America)

► **A Comparison of British and American Work on Jet Aircraft Noise.**—Peter J. Westervelt, Asst. Prof., Physics Dept., Brown University.

Several theories for the generation of aerodynamic noise have been published since the appearance of Lighthill's classic work on this problem.

Some of these more recent theoretical attempts are either in error or less general than Lighthill's original work. For example one theory predicts the generation of noise by turbulence to be proportional to the

rate of viscous loss of kinetic energy, leading to conclusions which are at variance with reliable experimental results performed with subsonic jets. It is pointed out on theoretical grounds why noise measurements obtained on a jet engine operating in a test cell are so difficult to correlate with measurements obtained under free field conditions.

Suggestions are offered for improving this correlation which, it is hoped, will remove some of the discrepancies existing between British and American published results on jet engine noise measurement.

► **The Influence of Turbojet Engine Design Parameters on Noise Output.**—D. M. A. Mercer and Ira Dyer, Bolt Beranek & Newman, Inc.

The total acoustic power radiated by a turbojet engine appears to be a function of several variables. The most satisfactory approach to correlation between engine operating parameters and noise output is dimensional analysis; the application of this technique is examined in some detail. Some 40 acoustic measurements of different engines and conditions are available.

A single variable such as thrust gives unsatisfactory correlation; several dimensionless quantities are examined, and one, using kinetic energy in jet stream, jet temperature, and diameter, gives good correlation not only for engines but also for model air jets.

This conclusion is also substantiated by experiments in which engine operating conditions were carefully controlled over a small range. Precautions necessary to obtain meaningful values of engine operating parameters are discussed.

There are several noise-producing components in a turbojet engine, and in some cases mechanisms other than that associated with the jet stream may be important. These are briefly examined.

► **Recent NACA Investigations of Noise Reduction Devices for Full-Scale Engines.**—Edmund E. Callaghan, Head, Aerodynamic Noise Research Sect., and Newell D. Sanders, Chief, Physics Div., and Warren J. North, Lewis Flight Propulsion Lab., NACA.

The latest available data on jet noise generation for both air jets and engines are reviewed briefly to provide further verification of Lighthill's theory that the total acoustic power radiated by a jet discharging into quiescent air varies directly as the eighth power of the jet velocity and the square of the jet diameter.

Noise and engine performance data are presented for a number of devices that have been investigated in an effort to reduce the noise generation of jet engines. Toothed nozzles, ejectors, and screens are discussed in detail with respect to the changes in total acoustic power, directionality pattern, and spectrum distribution radiated by the engine. Several installations which resulted in resonant operation are discussed to show the possibility of noise generation much greater than that predicted by the theory of Lighthill.

► **On the Acoustic Radiation from Boundary Layers and Jets.**—Hans W. Liepmann, Prof. of Aero., CIT.

The sound field radiated from a flat plate boundary layer is interpreted as a pressure



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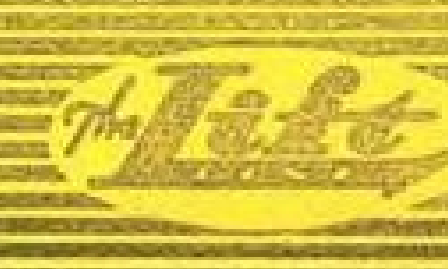
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field due to displacement thickness fluctuations. These fluctuations determine a statically distributed downwash field in the plane of the plate from which the potential and hence the pressure can be determined by Rayleigh's formula. The sound intensity is thus obtained in terms of a surface integral containing the space time correlation function of the downwash velocity field.

The same concept can be applied to the acoustic field of wakes and jets. In the case of axially symmetrical flow displacement area fluctuations appear and the formalism is closely related to nonstationary slender body theory.

The connection between this approach and Lighthill's theory of aerodynamically created sound is discussed as well as the relation to experimental measurements and results.

Aeroelasticity

► **Experimental Pressure Distributions on Oscillating Low-Aspect-Ratio Wings.**—William R. Laidlaw, Gr. Leader, Dynamics Sect., North American Aviation, Inc., and Robert L. Halfman, Asst. Prof., Aero. Engrg., Aeroelastic and Struct. Research Lab., MIT.

A technique for the experimental determination of pressure distributions on oscillating wings has been developed. Rectangular, sweptback, and delta planforms, and a wing tip tank configuration, were tested. Measurements were made in the MIT 5 x 7½-ft. lowspeed flutter wind-tunnel and in still air, as the wings performed simple harmonic pitching and vertical translation motions. The pressures, so obtained, were integrated numerically to yield lift and pitching moment distributions; and total lift and pitching moment coefficients.

The final results have been compared with theoretical aerodynamic data wherever possible; and a number of important conclusions regarding the status and validity of existing lifting surface theories have been obtained. Included in this review have been (i) the two-dimensional thin air-foil theory of Küssner, (ii) Reissner's high-aspect-ratio theory, (iii) the low-aspect-ratio theory of Lawrence and Gerber, (iv) the slender-wing theory of Garrick and Voss, (v) a

low-aspect-ratio theory by one of the present authors, and (vi) the sweptback-wing theory of Ashley.

► **Coupled Bending and Torsional Deformations of Rotating Beams Under Arbitrary Loading.**—John C. Houbolt, Langley Aero. Lab., NACA.

A general deformation analysis is made of a twisted rotating beam subject to a torque loading and to loadings both in and out of the plane of rotation. Energy relations for the system are derived, and through the variation principle differential equations of equilibrium are established. Particular attention is given the coupling that exists between the bending and twisting displacement as a result of centrifugal forces.

The reduction of the general equations to the simpler well known special cases is indicated. Also, a modal expansion procedure is indicated for solving the equations for various phenomena of concern to the designer, such as static loadings, natural vibration, divergence, and flutter. Several example applications are included to show the degree-of-coupling effects due to centrifugal forces.

Flight Propulsion

► **Structural Design Problems in Gas-Turbine Engines.**—P. N. Bright, Gr. Proj. Engr., Struct. Design and Weight Control, Allison Div., General Motors Corp.

The structural design of gas-turbine-engine components has been handled to a large extent by very conservative stress-analysis methods. There are several reasons for this—principally the lack of long experience in designing aircraft gas-turbine engines, the difficulty in determining the maximum loads to be encountered, and the necessary complexity of the parts which makes analysis very difficult.

Specific structural design problems are discussed describing stress analysis methods now in use at Allison and indicating where new methods are being developed or are needed. Design development of several parts is described showing the value of accurate stress analysis procedures.

Problems discussed are: rotating disk stresses, blade retention, bearing supports,

split-line flanges, stress and deflection analysis of turboprop interconnecting structures.

Static test results verifying some of the methods described are included. It is not the intent of this paper to be all inclusive, but merely to describe some of the problems encountered and how they may have been handled. Problems are limited to those involving static and dynamic loads only.

► **The Control of Turbojet Engines.**—Donald F. Winters, Aircraft Gas Turbine Div., Westinghouse Electric Corp.

The evolution of modern turbojet engine control is illustrated. This paper shows that the control system must become more complicated each time engine performance is improved. Control evolution is followed from a simple, low-pressure-ratio turbojet engine through engine design improvements to a modern, high-performance engine.

To relieve pilot responsibility, an engine acceleration control is necessary. An afterburner is added to improve thrust, therefore an afterburner fuel control is necessary. For effective afterburning, a variable area exhaust nozzle and control is required. For airplane and pilot protection, an afterburner blow-out switch is added. To improve performance still further, temperature trim is used. A high-pressure-ratio compressor for improved economy requires a compressor flow control. For engine protection at high flight speeds an engine pressure limiter is essential.

The once simple powerplant is now overburdened with controls, overrides, and overrides on overrides. Two avenues of potential simplification are given.

Meteorology

(In Cooperation with the American Meteorological Society)

► **Some Recent Reports of Severe Air Turbulence and the Problem of Their Interpretation.**—Patrick J. Harney, Geophysics Research Directorate, Cambridge, Mass.

Five encounters with severe turbulence reported by pilots furnish new meteorological information. For the first time lateral forces demand attention from the designer as isotropic eddy structure is verified. Strength requirements are met by modern design but control problems become exaggerated.

The reports are examined in relation to the behavior of airplane instruments and pilot's reaction.

► **The Relationship of Clouds and Atmospheric Electricity to Jet Streams' Wind Maximums.**—Vincent J. Schaefer, Dir. of Research, Munitap Foundation, Inc.

More evidence is presented to show the relationships of distinctive cloud forms and a high level of atmospheric electricity to jet stream maximum wind velocities. Time-lapse motion pictures illustrate some of the spectacular cloud effects which occur. Such observations have now been made in Japan, Idaho, California, New York, the North Atlantic, and Germany. Cloud and condensation trail studies give promise of providing detailed information of the microstructure of jet stream winds.

Unusually high levels of atmospheric electricity may serve to locate wind maxima when cloud forms are absent.



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The skies over Wichita are now echoing the sound of a great new CESSNA achievement, the XT-37.

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Designed to fly at both slow and high

speeds, as well as at high altitudes, the XT-37 will permit smoother, safer transition to jet flying at an earlier phase in the pilot's training cycle. This, in turn, will mean substantial savings in time and training costs for the Air Force.

* * *

It is a privilege for us here at CESSNA to team with the Air Force in its forward-thinking plans for the jet age.

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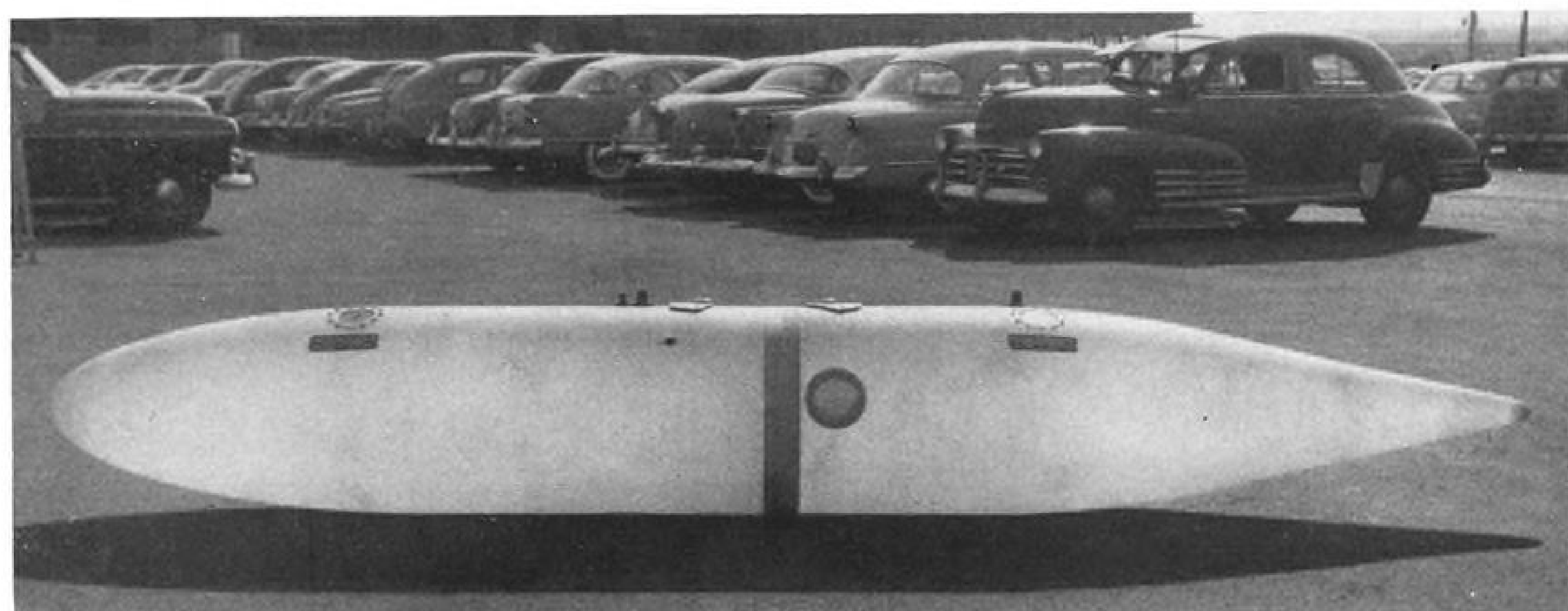


Filipinos Test Bamboo Plane

Reinforced mats made of stripped bamboo provide covering of the new all-wood four-place XL-15 Tagak, built by the Philippine Institute of Science & Technology in cooperation with Philippine Air Force. Weigh-

ing 2,794 lb. gross, the Tagak is powered by a 190-hp. Lycoming and is reported to have a top speed of 120 mph. In some respects Tagak resembles postwar Boeing scout liaison plane, also designated XL-15.

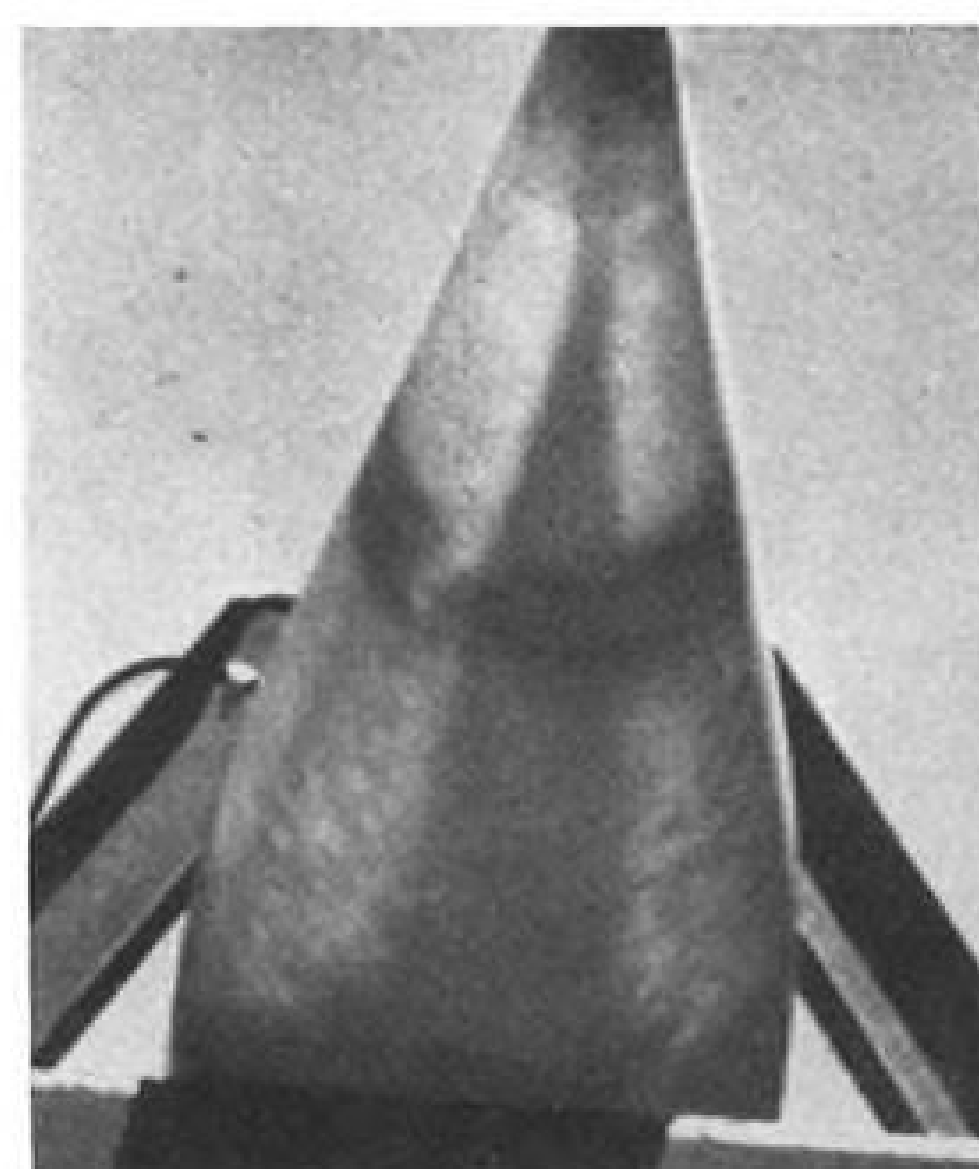
PRODUCTION



TYPE III TWO-PIECE 200-gal. glass-plastic drop tank was fabricated using rotary-vacuum process. It will be flight tested by WADC.



COMPONENTS of three-piece glass-plastic tank at variable capacity.



SLOSH and vibration test of tank. Liquid (dark areas) is readily visible.



DROP TEST has plastic tank rebounding from ground after release from platform.

Glass-Plastic Tank Developments . . .

New Forming Technique Raises Quality

By Irving Stone

Los Angeles—Pastushin Aviation Corp. is working on far-reaching developments in connection with aircraft glass-plastic drop tanks and related force-ejection systems.

- A new, automatically controlled technique for insuring high structural uniformity in the manufacture of jettisonable plastic fuel tanks (AVIATION WEEK Jan. 3, p. 34).

- A "universal" tank ejector package to fit the general run of service aircraft. The company also is working on designs for an expendable-type pylon and on ejection pylons for supersonic aircraft.

Developed over a period of about three years, Pastushin's process for fabricating glass-plastic tanks is still largely under wraps, but AVIATION WEEK has learned that it is ready to be applied as a production method. Units made with the new technique have been qualified to WADC requirements for ground tests—static load, ejection gun load, and slosh tests.

► **Material Distribution**—Essentially, the method is a rotary-vacuum procedure for depositing and holding glass fiber in a controlled, random pattern on a single, inexpensive sheet-metal mold—for nose, center section or aft portion of the tank. This type of mold could

be replaced quickly with another of different configuration, as compared with the relative permanency of the heavy, expensive die-sunk matched mold used in the industry.

The glass fiber (chopped roving) and the resin are successively fed over the surface of the mold through rotary action. Accurate distribution of the glass fiber is insured for uniform strength, and thickness of the glass layer can be varied automatically to provide "beef-up" in the high-stress areas.

The resin, also accurately distributed, is directed through the thickness of the glass layer, so that there is no chance for "washing" or displacement of the

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You can rely on Rheem for the highest quality products.

Rheem personnel and facilities are geared to precision research, engineering and production and their quality control has achieved an enviable record of low cost per unit production and on-time completion schedules.

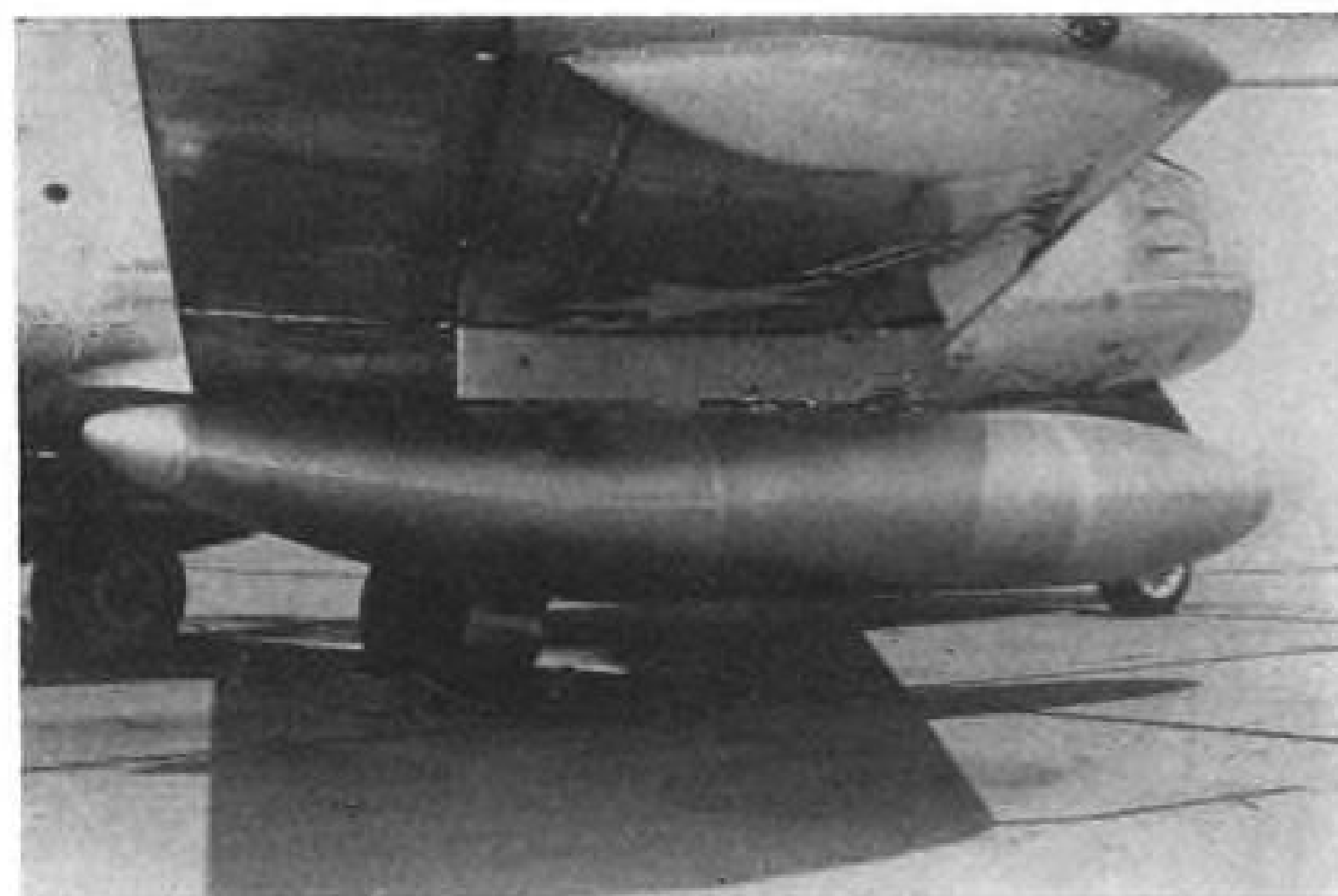
Rheem's integrated Government Products Division facilities...strategically located on both East and West Coasts...are presently in quality production on prime-contracts for the United States Government and sub-contracts for other industry leaders.

YOU CAN RELY ON RHEEM

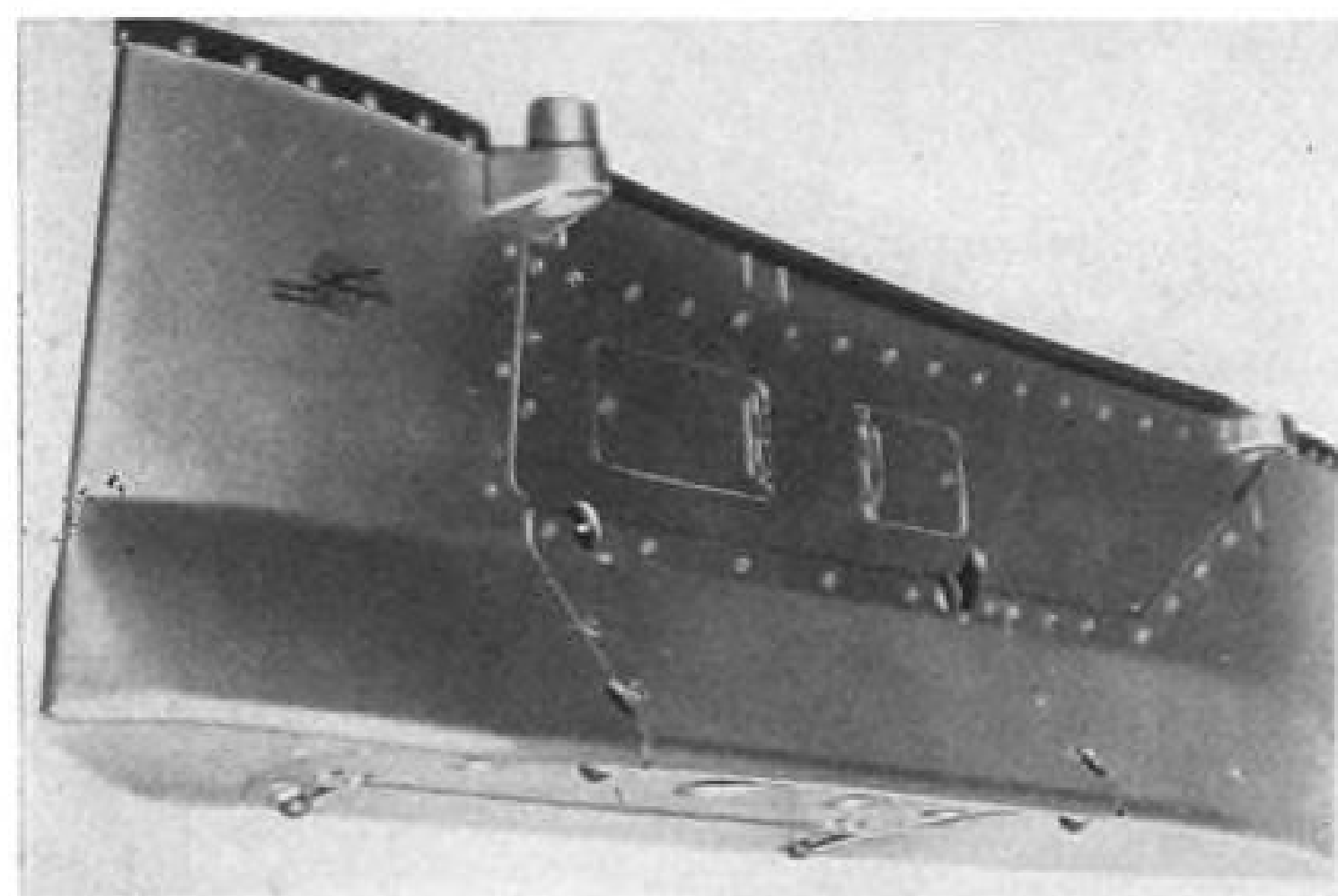
RHEEM Manufacturing Company...Government Products Division
Downey, Calif. • San Pablo, Calif. • Washington, D.C. • Philadelphia, Pa. • Burlington, N.J.



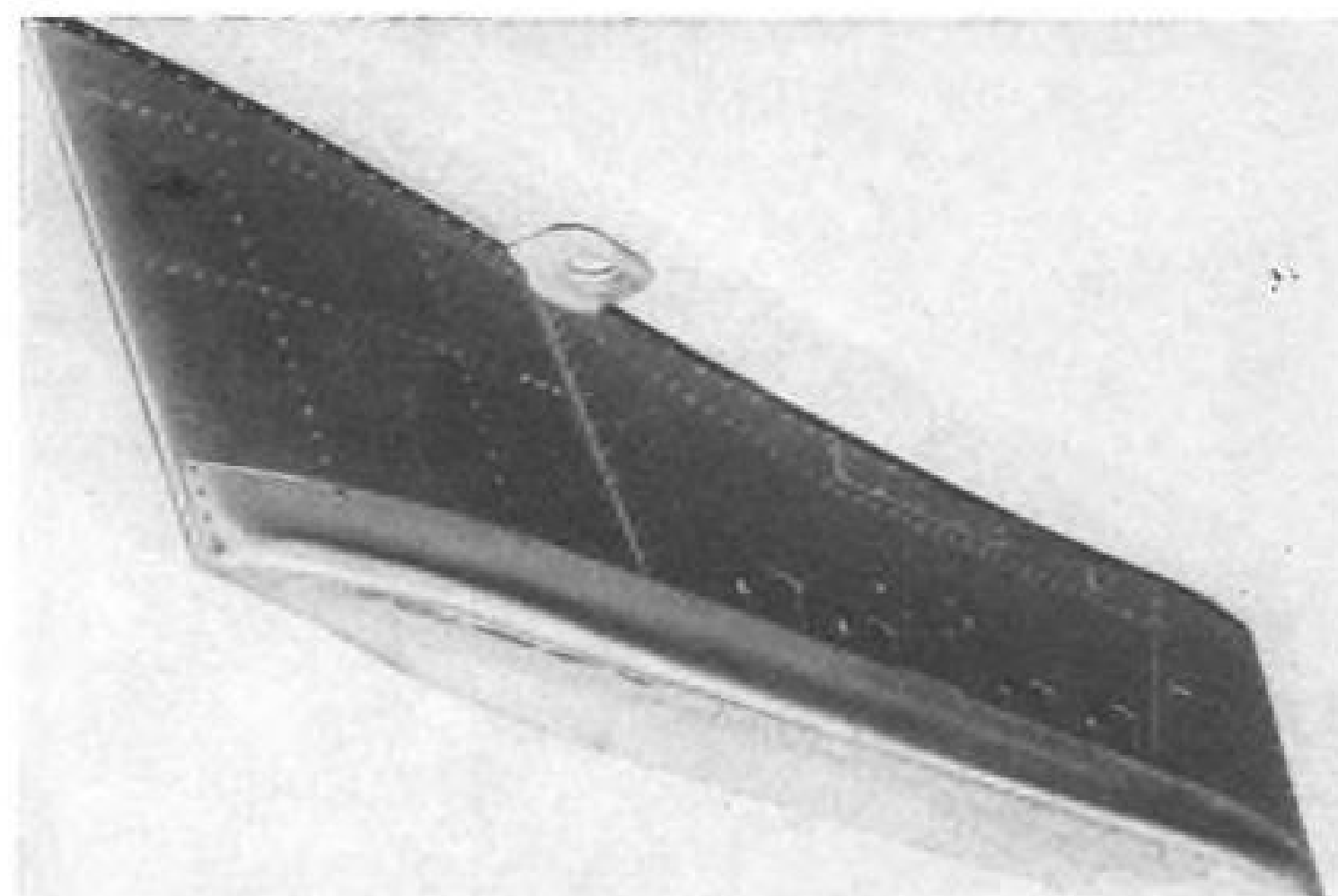
F-94C force-ejection mechanism, a production unit for the Lockheed Starfire, is examined by Victor F. Pastushin.



F-86F force-ejection pylon is seen installed on a Sabre to carry a 125-gal. WADC Type III jettisonable metal fuel tank.



JET BOMBER pylon for small and intermediate bomb or fuel stores is being flight tested. It contains electrical sequencing unit.



F-84 ejection pylon, with combination 14-in. and 30-in. lug spacing, can accommodate external tanks ranging from 125 to 450 gal.

glass fibers. Pastushin engineers report that in the matched-die technique a washing action can cause fiber displacement, resulting in non-uniformity—extremely difficult to evaluate with existing non-destructive inspection methods.

► **Vacuum and Heat**—An elastic bag—evacuated for application of atmospheric pressure—plus heat is used to cure the mold deposit in about 25 min. Because of the ample time allowed, complete wetting of the glass by the resin is obtained. This permits using a minimum of resin—the strength of the glass-plastic is in the glass, virtually none in the resin.

Because the sheet-metal mold is inexpensive, a multiple setup is feasible to attain production rates.

Pastushin's tank is a 200-gal. Type III unit—completely assembled at the factory. One configuration is a two-piece unit, while another is in three sections so that different center portions can be used to vary tank capacity. The internal structure—beam and two bulkheads—is metal at the present time, but probably will evolve as a plastic structure in future configurations of Pastushin tanks, company engineers say.

► **Scheme for Field**—The tooling de-

veloped for the production of tanks by Pastushin's rotary-vacuum method is seen capable of refinement for transfer to theater areas for field fabrication of the glass-plastic fuel containers. The tooling easily could be transportable by a single cargo plane, Pastushin engineers claim.

Output with a single production tooling unit, incorporating its own power, could be 50 tanks per day, they say.

The company also is working on a field bonding process, so that tank components could be shipped nested, then assembled in forward areas. Aim is to develop a simple, portable device (one for each shipping crate) for application of controlled heat in the field. Pastushin engineers say they know of no satisfactory cold-setting adhesive available for meeting stringent military requirements.

► **Tank Pylons**—Pastushin's plastic tank is qualified for use with the company's force-ejection system developed for F-86 and F-94 aircraft.

Pastushin now is working under an Air Force \$3-million contract, obtained about six months ago, for approximately 3,000 ejection pylons, it is reported. These will handle tanks (metal or plastic) up to 230-gal. capacity and, with

modifications, bombs up to 1,000 lb., AVIATION WEEK has learned from a reliable source.

► **Package, Expendable Types**—Company also is working under an R&D contract, obtained more than a year ago, to develop a universal ejector package for application as a unit to service planes. This contract now is about three-quarters complete—several ejector packages have been built, are now entering the flight test stage under WADC cognizance, it is reported.

Under development are designs for a relatively inexpensive expendable-type force-ejection pylon, to leave the plane aerodynamically clean after pylon release. Pastushin is working on this—as are about 15-20 other companies—under a military competition aimed at creating a standard expendable type. In addition to work in the competition, Pastushin is pushing other designs of expendable-type pylon configurations for aircraft.

Pastushin sees the force-ejection pylon as part and parcel of tomorrow's aircraft and is putting big effort on design of these units for supersonic planes—just dropping the stores involves too much hazard of damage through collision with the aircraft.



ELECTRONIC GUIDE

MEMORANDUM
Office of the President

1/4/55

JLH:

CANCEL THIS AD---

There is a big story here — and nothing in it actually classified — but what will be gained by publishing it?

It might give comfort to the communists to tell them anything at all about our missile work.

The equipment Raytheon is producing for the security and defense of the country is so ~~important~~ that we can't afford to take any risks.

It seems to me there is a message we should print, however—one in which every American can take pride and confidence: Raytheon's government contracts are being carried out by many of the nation's ablest scientists, engineers and workers. These fine people have a deep respect for the quality of the electronic equipment they make. They know its importance to the welfare and safety of a free people. What do you think?

*Jack -
This is a matter of policy -
- Please see me -*

CFA
C. F. Adams, Jr.

RAYTHEON MANUFACTURING COMPANY, WALTHAM 54, MASS.

PRODUCTION BRIEFING

► **Convair-Ft. Worth** figures it saved \$2,674,874 in 1954 using suggestions from employees. Firm accepted 411 ideas—the highest award paying an employee \$1,119.

► **Western Metal Specialty Co.**, Milwaukee, has purchased Crippen Machine & Tool Co., Jackson, Mich., maker of small fuel tanks.

► **Columbus Engineering & Manufacturing Co.**, Columbus, Ohio, airframe and engine components makers, has completed a facilities expansion program and realigned its sales offices: Columbus, 480 W. Broad St.; Dayton, 51 Waverly Ave.; Toledo, 5438 W. Central Ave., and Stratford, Conn., 64 Pauline St.

► **R. K. LeBlond Machine Tool Co.**, Cincinnati, has appointed Balbach Co., 1201 California St., Omaha, sales distributor for eastern Nebraska and western Iowa for its lathes and attachments and other machine tools.

► **Cook Electric Co.**, Chicago, has leased facilities at Dayton Municipal Airport, Vandalia, Ohio., including 42,000 sq. ft. of hangar space for in-

creased volume of aircraft instrumentation, modification and testing which was formerly handled at O'Hare Field, Chicago.

► **Keller Tool Co.** has been made a division of Gardner-Denver Co., Quincy, Ill., following consolidation of the two firms. E. V. Erickson, president of KTC has been elected an executive vice president of Gardner-Denver.

► **Universal stainless steels**, based on metallurgical control to allow one analysis to meet various specifications, have been developed jointly by Michigan Steel Casting Co. and WaiMet Engineering Co., Detroit, and are now being produced by the former firm.

► **Temco Aircraft Corp.** has renewed its lease with Chance Vought Aircraft, Inc., for five years on the Naval Industrial Reserve Aircraft Plant facilities occupied by the former company for nine and one-half years.

► **Aeroquip Corp.**, Jackson, Mich., through a newly formed Canadian subsidiary, has acquired Prencos Progress & Engineering Corp., Toronto, a former Aeroquip licensee. Increased Canadian use of Aeroquip aircraft flexible hoses and self-seal couplings prompted the move, company officials say.

► **Westinghouse Electric Corp.**'s two 83,000-hp. motors powering transonic and supersonic windtunnels at Arnold Engineering Development Center, Tullahoma, Tenn., have started running. Installation of a transonic compressor, built by the firm's Sunnyvale, Calif., plant, will be completed in mid-1955.

► **Quality Control Engineers, Inc.**, has been formed by R. A. Anderson and Si Greitzer, formerly of Hughes Aircraft Co., at 6399 Wilshire Blvd., Los Angeles.

► **Micro Switch** has opened a new assembly plant in Independence, Iowa, which initially will employ 50-100.

► **Cannon Electric Co.**, Los Angeles 31, plans to move into new 30,000-sq. ft. administration and engineering quarters across from its Humboldt St., plant.

► **Kropp Forge Co.**, Chicago, has completed a \$6-million expansion program to provide larger, more complex military plane parts. Two 50,000-lb. drop hammers, said to be the largest of their kind, are among the new equipment.

► **Humphrey, Inc.**, San Diego, Calif., has formed a new Investment Castings Division for the firm's gyros, potentiometers and accelerometers.

Navy Contracts

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

A. C. Spark Plug Div., General Motors Corp., Flint 2, Mich., spark plugs, \$447,866.
Aerotec Corp., Conly Ave. & Pemberwich Rd., Greenwich, Conn., pressure switches, \$104,372.

Airborne Accessories Corp., 1414 Chestnut Ave., Hillside 5, N. J., actuators, 165 ea., \$39,517.

Auburn Spark Plug Co. Inc., 89 York St., Auburn, N. Y., spring and eyelet assys., 742,700 ea., \$33,867.

B. K. Sweeney Mfg. Co., 1601 - 23rd St., Denver, sockets, 156 ea., \$28,935.

Bendix Products Div., Bendix Aviation Corp., 401 Bendix Drive, South Bend 20, Ind., brace assys., end rods and adjuster assys., \$28,564; maintenance parts for overhaul of TJC 1 control, \$36,695.

Douglas Aircraft Co., Inc., 827 Lapham St., El Segundo, Calif., maintenance parts for AD aircraft, \$688,352.

Goodyear Tire & Rubber Co., Inc., 1144 E. Market St., Akron 16, wheel and brake assys., \$228,750.

Lear, Inc., 110 Ionia Ave., N.W., Grand Rapids 2, Mich., various assys., for P5M-1, -2 aircraft, \$54,527.

Pattern Co. Inc., 142 Green St., Worcester, Mass., rafts, 2,616 ea., \$799,188.

Reynolds Metals Co., 2500 So. Third St., Louisville 1, aluminum alloy, \$64,286.

Henry Spen & Co., Inc., 1995 Pitkin Ave., Brooklyn 7, N. Y., trailers, 79 ea., \$139,298.

Sikorsky Aircraft Div., United Aircraft Corp., Bridgeport 1, Conn., technical publications \$88,245.

Thompson Products, Inc., 23555 Euclid Ave., Cleveland 17, pump assys., 118 ea., \$44,109.

United States Rubber Co., 1 Market St., Passaic, N. J., hydraulic hoses, \$29,965.

Atlas Paint and Varnish Co., 50 Buffington Ave., Irvington 11, N. J., enamel, 20,000 gal., \$39,800.

Bendix Products Div., Bendix Aviation Corp., South Bend 20, Ind., services and materials to overhaul valve assys., \$40,858; technical publications to cover Bendix equipment, \$25,565.

Eagle-Signal Corp., Moline, Ill., emergency ignition timers, 190 ea., \$32,284.

Swift Parachute Co., Inc., 1325 E. State

St., Trenton, N. J., parachutes, \$44,976.

Titeflex, Inc., 500 Freylinghuysen Ave., Newark 5, N. J., maintenance parts used on harness assy., \$34,363.

Bone Engineering Corp., Glendale 4, Calif., fuel flow testers, 103 ea., \$107,827.

Hiller Helicopter Corp., Palo Alto, Calif., helicopters, 72 ea., \$2,271,600.

Robertshaw-Fulton Controls Co., Greensburg, Pa., oxygen regulators, 2,490 ea., \$386,846.

Technical Services Corp., Philadelphia 7, administrative history of the Bureau of Aeronautics from 1 July 1929, to 30 June 1947, \$65,336.

Westinghouse Electric Corp., Baltimore, turret systems, 65 ea., \$18,691,124.

BuAer Contracts

The following contract awards of \$25,000 and more have been announced recently by the Bureau of Aeronautics, Department of the Navy, Washington 25, D. C.

COMPUTER-CONTROL CO., INC., Wellesly, Mass., preparation of problems for solution on the Raydac computer, \$327,696.

CURTIS-WRIGHT CORP., Propeller Div., Caldwell, N. J., propeller service tools and overhaul of certain propellers, \$398,462.

FAIRCHILD ENGINE and AIRPLANE CORP., Stratos Div., Bay Shore, L. I., N. Y., conduct a study of requirements for equipment for use in jet-powered, pressurized cabin aircraft, for supplying clean air, \$31,419.

MASSACHUSETTS INSTITUTE of TECHNOLOGY, Division of Industrial Cooperation, Cambridge 39, Mass., conduct studies to formulate equations of motion of a rotating elastic blade, \$32,900; conduct an investigation of chromium alloys, \$36,000.

BENDIX AVIATION CORP., Eclipse-Pioneer Div., Teterboro, N. J., diffuser-mechanism calibrators, 9 ea., \$26,982.

CAPEWELL MFG. CO., Hartford, 2, Conn., ejector snap assemblies, 5,551 ea., \$136,536.

LEAR, INC., Grand Rapids 2, Mich., amplifier & gyro assemblies, etc., 2,970 ea., \$1,856,111.

McCULLOCH MOTORS CORP., Los Angeles 45, pneumatic ejectors, 5,532 ea., \$3,071,103.

THOS. J. MORAN'S SONS, INC., New Orleans 12, services related to the development of Kalfax material, \$239,957.

man from the "flyingest" business talks about Airwork.



"Construction is probably the 'flyingest' business of all those using corporation aircraft. At Brewster, we average a take-off and a landing every hour.

"That kind of flying demands the utmost in engine performance and reliability. That's why I stick to Airwork overhauls for my engine and engine driven accessories."

George Bevins

Chief Pilot
G. M. Brewster & Son, Inc.

Airwork is 1 of the nation's 4 P&WA overhaul bases... and the one most corporation pilots prefer.

MILLVILLE, ARLINGTON,
ATLANTA, MIAMI,
NEWARK



Airwork
CORPORATION
Millville, New Jersey

SILENTBLOC breaks the Vibration Barrier

Vibration is one of the major remaining barriers to smooth and soundless flight. Silentbloc mounts overcome the problem by soaking up vibration and sound, absorbing shock and correcting misalignment.

Silentbloc's unique rubber-in-metal deflection principle is conquering vibration in dozens of different aircraft applications. It could be the answer to one of your problems.

For complete information on Silentbloc vibration control products write to The General Tire & Rubber Company, Industrial Products Division, Dpt. H-2, Wabash, Indiana.



"From Plans to Products in Plastics and Rubber"

These are General Tire Industrial Products now serving industry

Silentbloc vibration and shock mountings • Silentbloc bushings • Silentbloc bearings • Oil & hydraulic seals • Bonded to metal rubber parts • Hydraulic brake parts • Metal stampings • Extruded & molded rubber • Extruded plastic • Polyester glass laminates • Sponge rubber • Glass run channel • Vibrex® fasteners



AVIATION WEEK, February 28, 1955

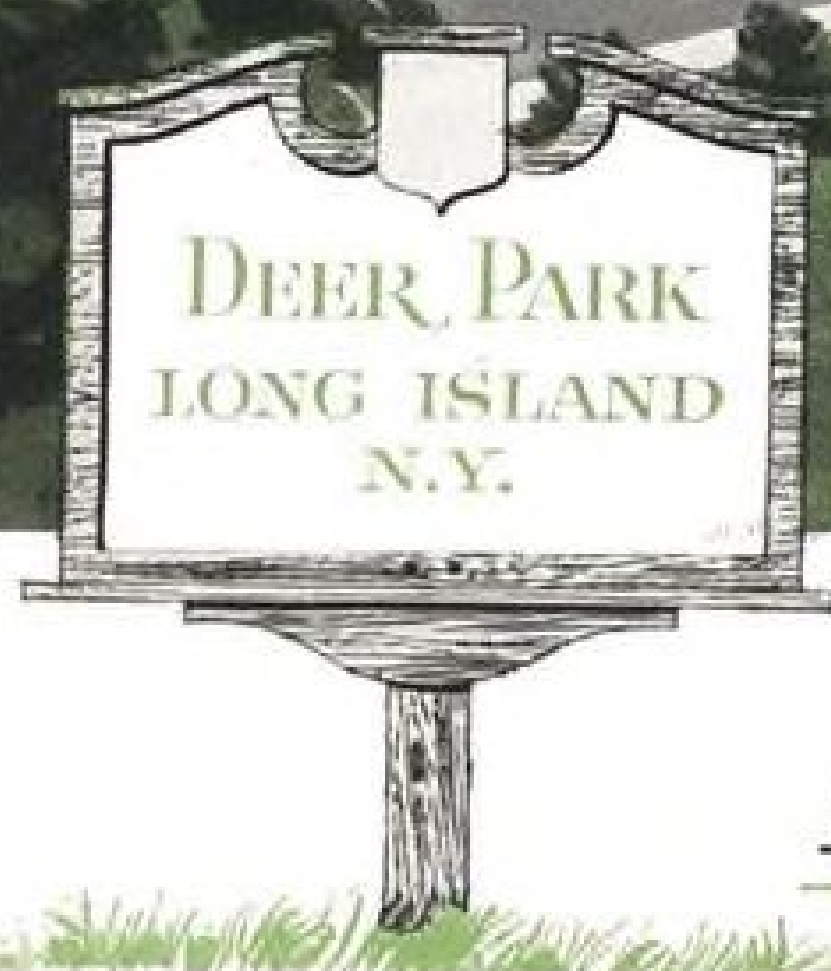
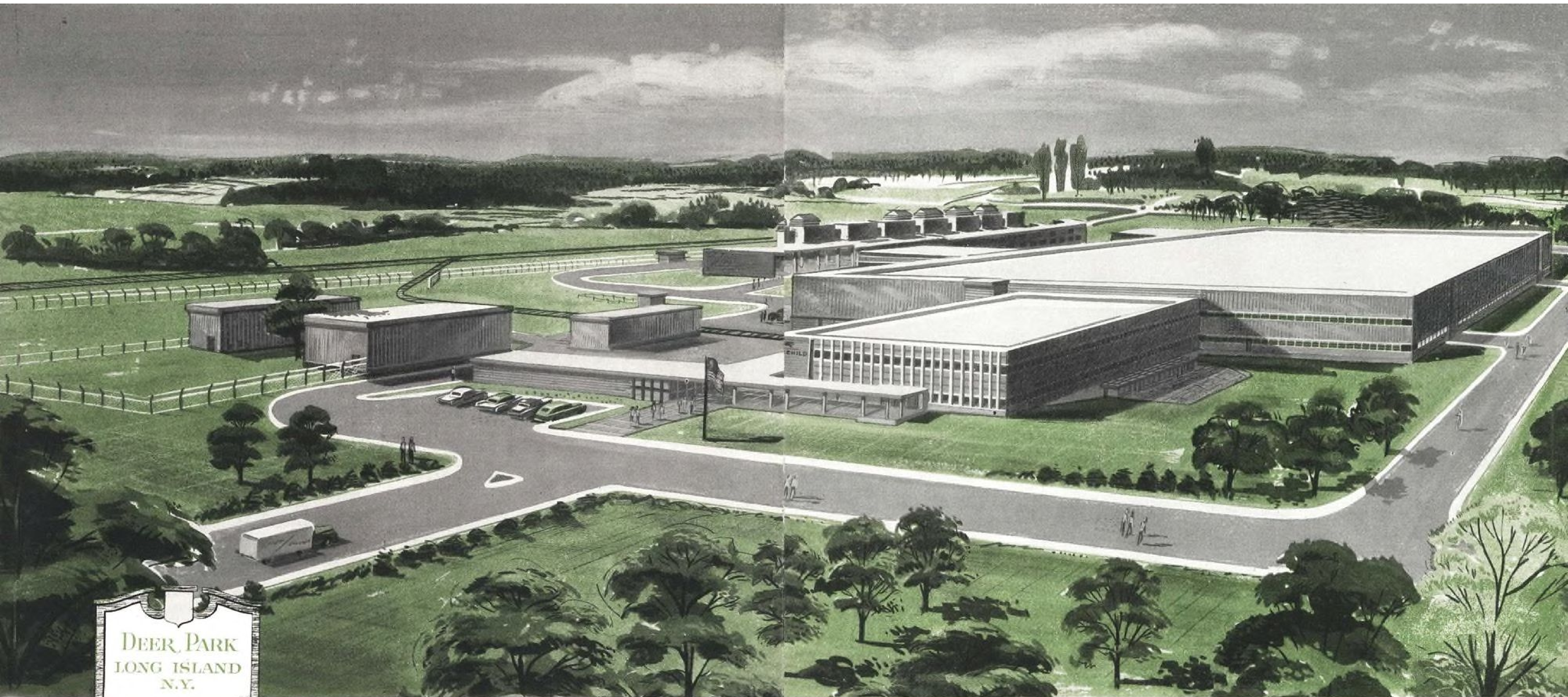


Beaver Takes Off From Dolly

Float-equipped de Havilland Canada Beaver takes off from runway via dolly. As craft rests on dolly, arm is depressed by float to

release dolly brake to give the small carrier mobility. As soon as the plane rises from the dolly, arm is released to brake dolly.

AVIATION WEEK, February 28, 1955



SIGNPOST FOR FAIRCHILD'S NEW POWER DEVELOPMENT CENTER

THE AUSTIN COMPANY • Designers and Builders

More and Better Power... On the Way!

Important new developments in *power* are programmed for this new Fairchild Engine Division plant and turbine test laboratory now under construction at Deer Park, Long Island. Scheduled for full-scale operations later this year, this new facility gives Fairchild Engine Division increased potential for advanced design,

development and production of power for tomorrow's weapons systems and for unique power applications in industry. In addition to mass-producing small turbojets for target drones, pilotless planes and guided missiles, and weapons systems for undersea craft, Deer Park will provide modern equipment for testing and

evaluating newer, more economical sources of power for the armed forces.

This new plant and turbine test laboratory are in keeping with Fairchild's policy of planning now for future needs of the military services and for specialized demands of industry.

"where the future is measured in light-years"



Including AL-FIN, the Fairchild patented process for the molecular bonding of aluminum and magnesium to steel, cast iron, nickel or titanium.

New Low-Cost ADF Aids Small Airports

By Philip Klass

A "poor man's" automatic direction finder costing only \$3,500, with performance comparable to the best military ADFs, according to the manufacturer, should make it possible for many small airports to procure this useful terminal aid.

Previous military and Civil Aeronautics Administration ADFs have cost several times this figure. The builder of the new equipment states that his price may drop even lower if quantity orders are received.

Developed by Olympic Radio & Television, Inc., the new model AS-111 direction finder instantly gives a control tower operator the bearing to any airplane equipped with VHF transmitter, with an overall error of less than five degrees, Olympic's tests indicate. The firm reports that its ADF gives useful bearing indications even under high noise level conditions where a plane's voice transmission is unintelligible (signal-to-noise ratio of -20db.)

► **Army Interested**—The Olympic equipment now is being evaluated by Army aviation. Recently it was demonstrated in Washington, D.C., to representatives of CAA, Air Navigation Development Board and Navy.

The company expects to be able to deliver the equipment to civil or military purchasers approximately 3-4 months after receipt of an order, according to David Gerstein, general manager of Olympic's Government Products Division.

► **Easy to Operate**—The new ADF consists of two units: a stationary antenna with four half-wave dipoles and a built-in goniometer, and a combination receiver-indicator which can be located up to several hundred feet away. The receiver-indicator, measuring only 11x6x21 in. mounts all power and tuning controls on its front panel, together with a 5-in., indirectly illuminated bearing indicator.

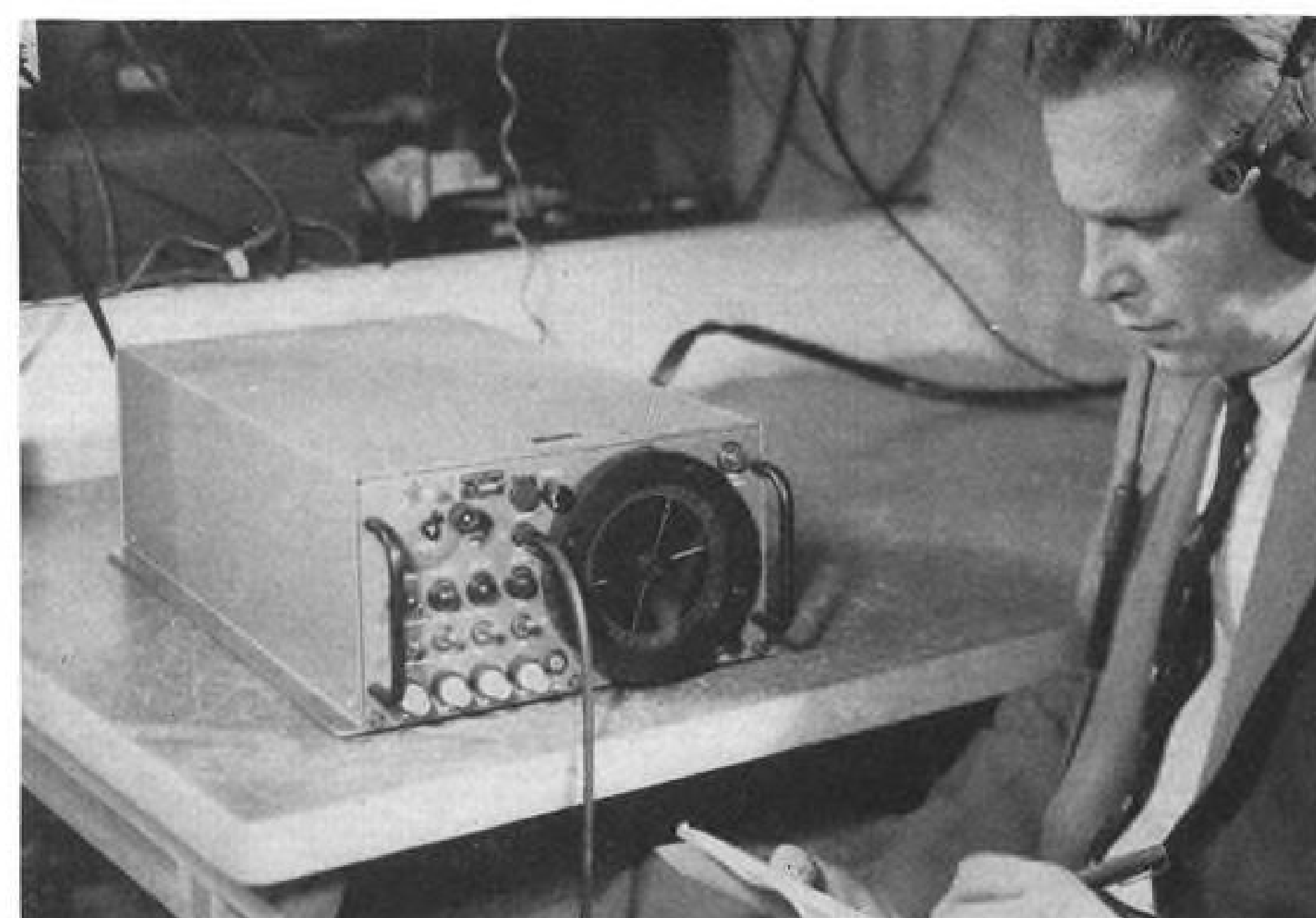
In normal operation at a small airport, the ADF receiver would be tuned to the tower's unicom frequency. (The receiver is continuously tunable between 118 and 148 mc.)

When a plane calls the tower, the bearing indicator will automatically and instantly display its bearing. A small neon bulb near the indicator will flash to alert the operator that it has DF-ed on a plane and that the signal level is sufficient for an accurate reading.

► **Speedy Response**—Olympic demon-



LOW-COST VHF direction finder for small airports consists of antenna (l.) and indicator (r.).



LARGE INDICATOR gives an immediate bearing to any VHF-equipped aircraft in the area.

New 3-Phase HIGH ALTITUDE INVERTERS

deliver full load
at 50,000 feet!



Truly effective, upper altitude performance

The new Jack & Heintz inverters, Models F138-1 and F148-1, deliver full-rated load up to 50,000 feet, half-rated load up to 65,000 at +20°C ambient! Performance is increased; size and weight reduced ... with diversity of outputs available as shown in the table below.

Unrestricted air flow solves heat problem

Self-ventilated and self-contained, these inverters utilize a large commutator with staggered brushes. Air flows freely over commutator and through the unit. Fans are mounted on each end of the rotor to cool the a-c and d-c sections separately. Partial bleeding of this air cools the control box.

Installation and maintenance advantages

A single, compact, plug-in control unit combines both frequency and voltage controls. New two-stud d-c terminal block for d-c input connection is provided ... plus an AN connector for a-c power output. This connector and voltage adjustments are mounted on d-c end of control box for easy installation and maintenance.

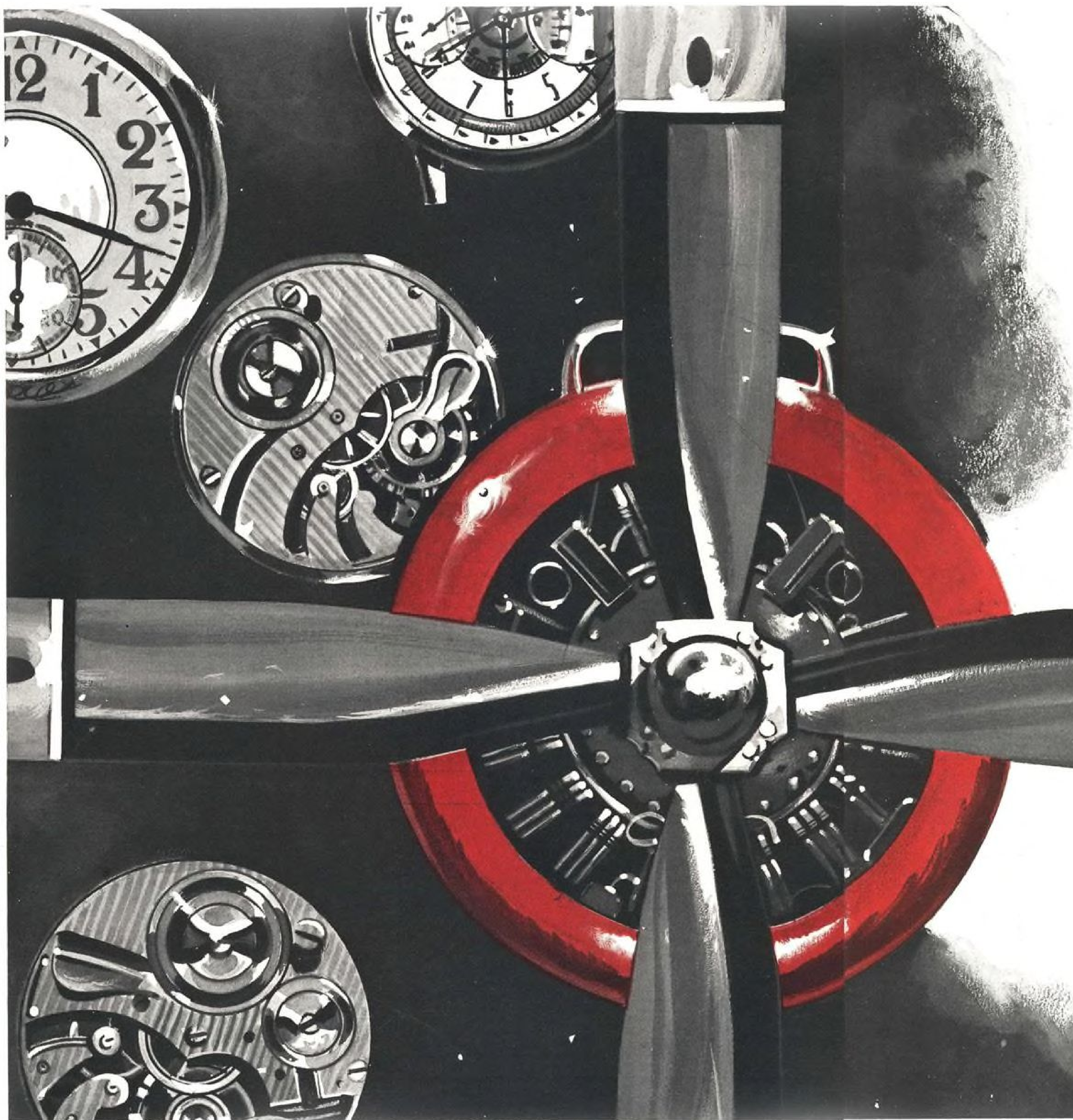
Jack & Heintz builds special high altitude inverters or other electrical equipment to meet your specific needs. Write Jack & Heintz, Inc., 17635 Broadway, Cleveland 1, Ohio. Export Department: 13 East 40th Street, New York 16, N. Y.

OPERATING CHARACTERISTICS	F138-1		F148-1	
	Three Phase	Single Phase	Three Phase	Single Phase
Output Rating				
Full Load va, Sea Level to 50,000 Ft	1500	1250	2500	2250
Full, 50,000 Ft to 65,000 Ft	750	750	1250	1250
A-c Voltage—Volts	115/200	115	115/200	115
Voltage Range—All Environments	110-120/190.5-208		110-120/190.5-208	
Frequency Range—All Environments (cps)	390 to 410		390 to 410	
Power Factor	90% Lag to 95% Lead		90% Lag to 95% Lead	
Input Voltage—d-c (volts)	26.0 to 29.0		26.0 to 29.0	
Ambient Temp Limits at Sea Level—F. L.	-55° C to +85° C		-55° C to +85° C	
Ambient Temp Limits at 50,000 Ft—F. L.	+20° C Max		+20° C Max	
Drawing Specifications	54A3B806		54A3B807	
Design Specifications	AN-I-10b		AN-I-10b	
Weight—Lb	43		60	

© 1955, Jack & Heintz, Inc.

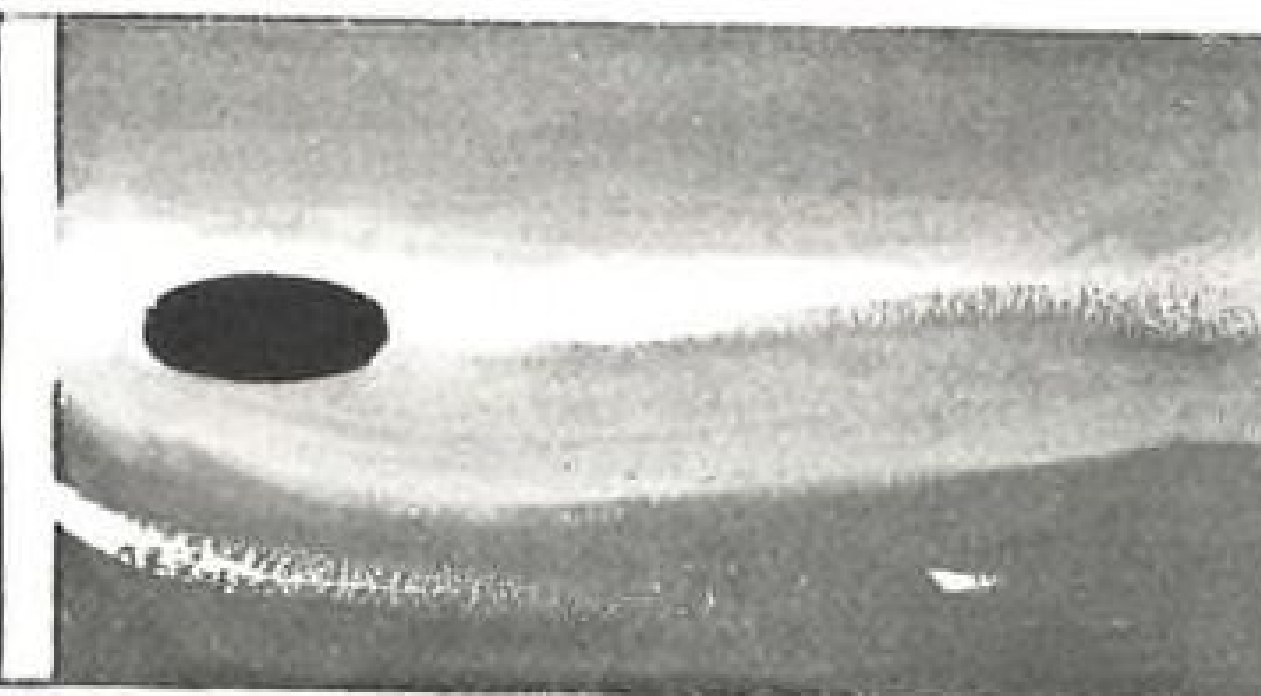
Military specification numbers as used herein are for purposes of product identification only and do not necessarily imply specification conformity.

JACK & HEINTZ *Rotomotive* AIRCRAFT EQUIPMENT



How to open a Watchmaker's Eyes . . .

Many people regard a 21-jewel watch as the ultimate in precision. Yet, a modern airplane engine is built to a standard of precision far beyond that of the finest watch. For the engine, with moving parts machined to the Nth degree, must operate at speeds in the thousands of revolutions per minute, at temperatures that would melt many metals. And they must do it hour after hour under full load.



Such engines demand the finest motor oils for lubrication. Sinclair is proud that it supplies 45% of all the motor oil used by major scheduled airlines in the United States. That is proof of the high quality of Sinclair lubricants. You can depend on them.

SINCLAIR AIRCRAFT OILS

Sinclair Refining Company, Aviation Sales • 600 Fifth Avenue, New York 20, N. Y.

strated to AVIATION WEEK the speedy response of its bearing indicator, whose pointer can flick from one position to another on the dial in less than $1\frac{1}{2}$ seconds, without overshooting. This is made possible by a highspeed servo motor which drives the pointer. The motor also makes it possible to drive repeated synchros in the event that remote ADF indicators are desired.

A front-panel jack is provided for an external headset or speaker. Another jack, for an external meter, makes it possible to show whether the plane is flying toward or away from the ADF antenna. The meter, when used, connects into the automatic volume control circuit and indicates whether the plane's signal level is increasing or decreasing.

► **ADF Inspiration**—Olympic was inspired to develop its own ADF as a result of its program to produce direction finders for the USAF (to AF specs). Finding ways to cut costs is old stuff to Olympic; the company makes the only TV set retailing for less than \$100.

Olympic's engineers hit upon ways of cutting the size, weight, and cost of a VHF direction finder without cutting its accuracy. The new AS-111 which resulted is a proprietary Olympic development, according to Ben Parzen, the company's chief engineer.

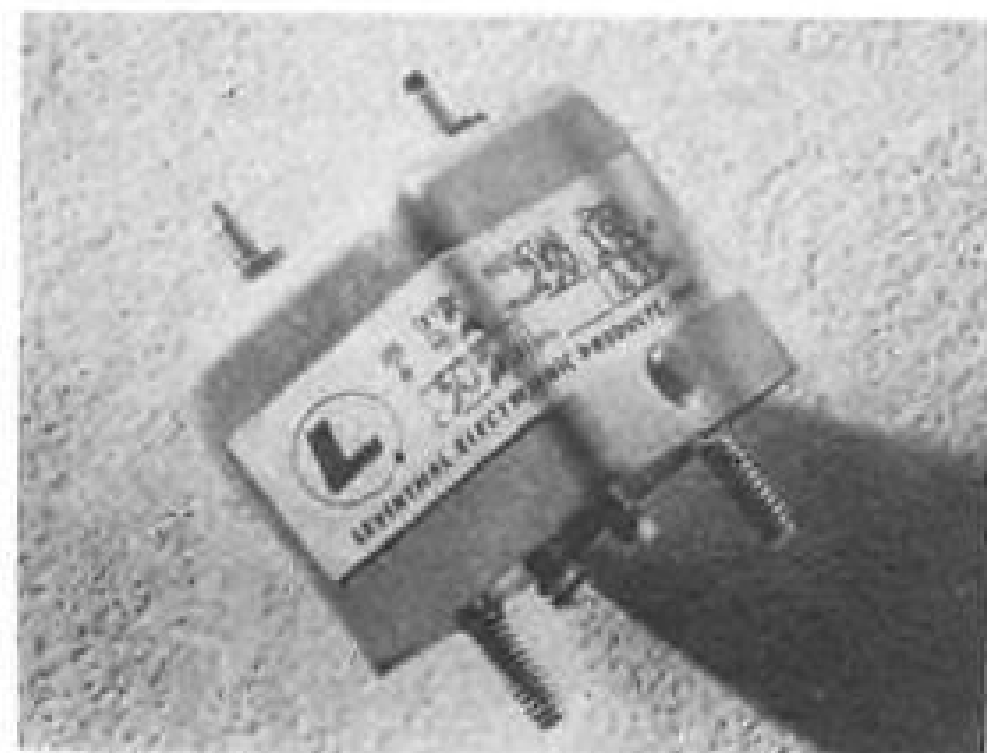
Despite its low cost, the new ADF uses JAN parts throughout and is built to military standards, Parzen says.

► **Low Power Consumption**—The new AS-111 operates from 105-125 v. a.c. power, 50 or 60 cycles. It consumes a maximum of 240 watts, including power required to operate a small "hazard light" atop the 12-ft. antenna mast.

Olympic's address is 34-01 38th Ave., Long Island City, N. Y.

New Components On the Small Side

A miniature intermediate-frequency transformer, ruggedized for missile and aircraft use and reportedly capable of operating over the temperature range of -50°C to 100°C , is one of several new miniature components which may enable avionics designers to cut equipment size and weight.

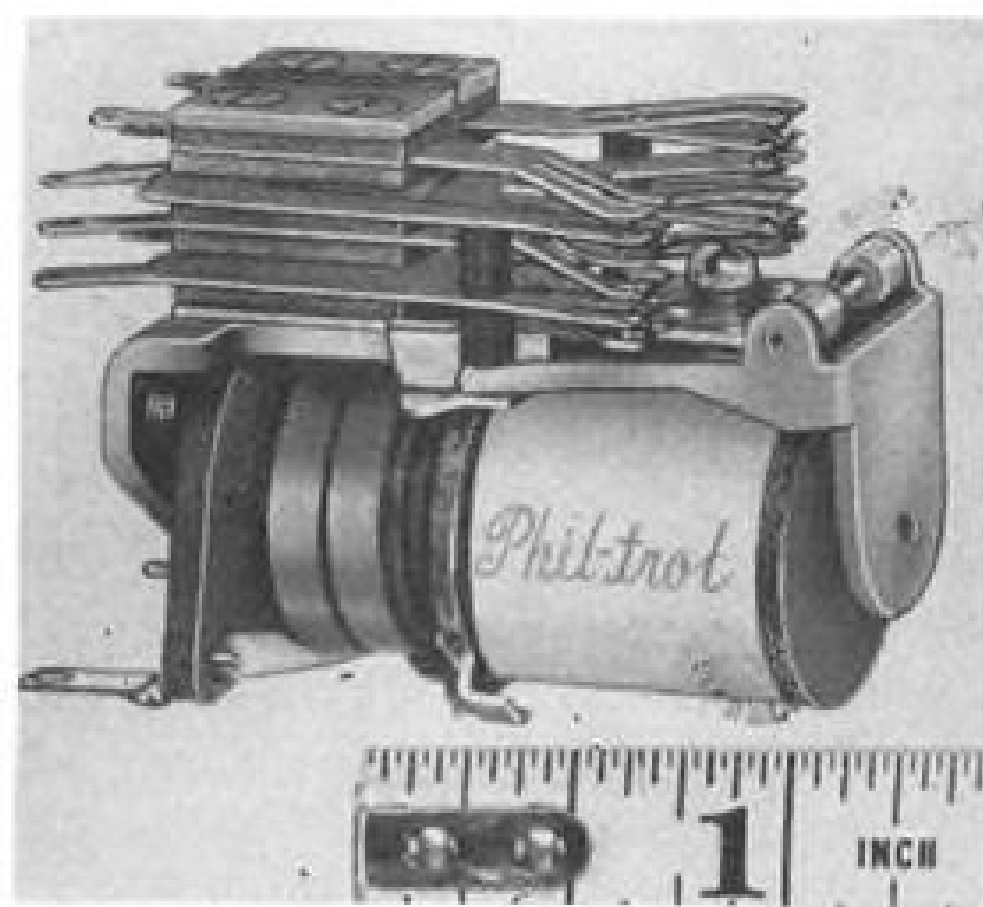


TINY IF transformer operates up to 100°C .

The new IF transformers, available for operation at 262, 455 or 1,525 kc., are housed in $1\frac{1}{2}$ -in. cubical cans. Powdered carbonyl-iron cup cores are embedded in epoxy resin to withstand large amplitude vibration. Temperature coefficient of inductance reportedly is less than 50 ppm./deg. C. Transformer Q exceeds 180, and for the 455-kc. unit, it exceeds 200. Manufacturer: Levinthal Electronic Products, Inc., 2727 Fair Oaks Ave., Redwood City, Calif.

Other recently announced miniaturized components include:

• **A.C. relay**, Type 8AC, has self-contained half-wave rectifier, one section of which shunts the coil to prevent a.c. vibration. In 4PDT configuration, relay can operate at temperatures of 85°C ;



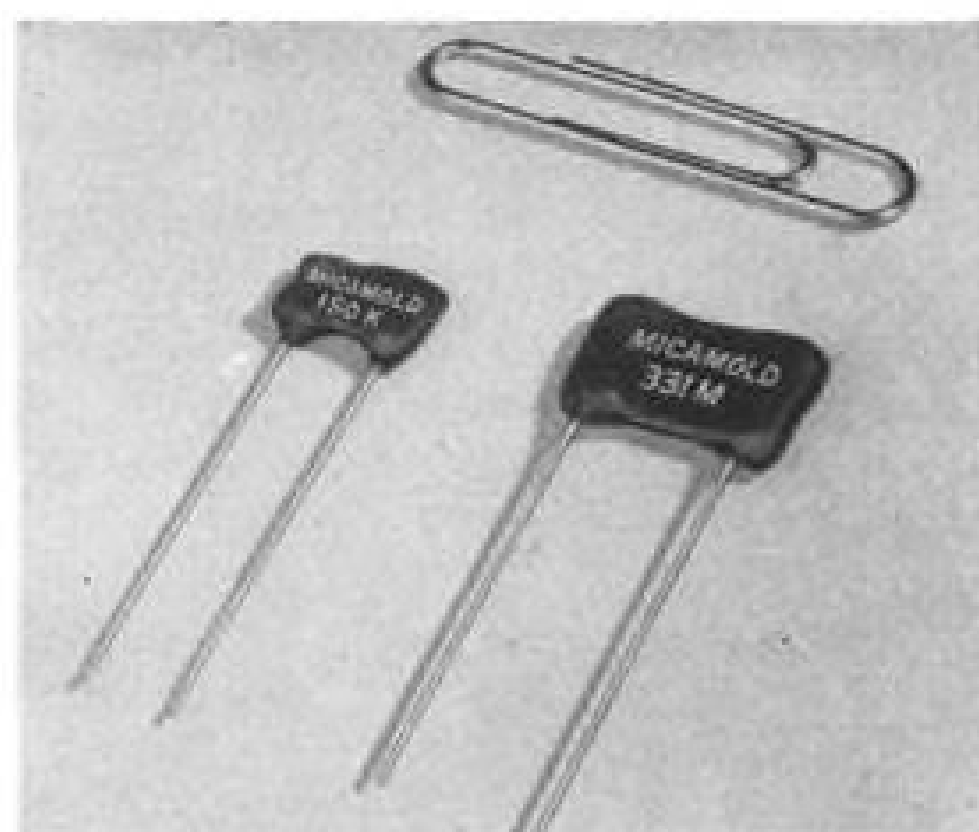
AC RELAY has built-in half-wave rectifiers.

in 2PDT style, up to 55°C . Coil is rated 115 v., 60 to 400 cycles, or higher if fewer contacts are required. Relay is available in hermetically sealed enclosure. Phillips Control Corp., Joliet, Ill.

• **Vacuum relay**, high-voltage type, for pulse network, antenna transfer, and missile applications, measures only 2 in. dia. x 3 in., including its 12- or 24-v. d.c. actuating solenoid located in the base. Type R5-E is rated for 10 kv., 10 amp. Break time reportedly is 10 microseconds and make time is about 25 microseconds. Catalog literature is available. Jennings Radio Manuf. Corp., P.O. Box 1278, San Jose 8, Calif.

• **High-temperature networks**, resistance or resistance-capacitance types, are available with resistance values to within $\pm 0.02\%$ and temperature coefficients matched to within 3 ppm. deg. C., according to manufacturer. Networks can be operated between -65°C and 125°C with no wattage derating. Daven Co., Dept. RE, 191 Central Ave., Newark 4, N. J.

• **Mica capacitors**, new line of hermetically sealed and encapsulated units, are smaller than molded types and generally cost less, according to manufacturer. New "Micaps" Style MQ has



NEW MICA capacitors are small, low cost.

capacitance range of 5 to 330 mmfd., is rated 500 v. d.c., measures $7\frac{1}{2} \times 4 \times \frac{1}{2}$ in. Style MO covers range of 220 to 1,000 mmfd., rated at 500 v. d.c., measures $4\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{2}$ in. Bulletin 110 gives engineering data. Micamold Radio Corp., 1087 Flushing Ave., Brooklyn 37, N. Y.

New Power Supplies For Air, Ground Use

A 30-watt encapsulated high-voltage power supply for aircraft use, capable of delivering 7.5 ma. at 5,100 v. d.c., is one of several recently announced power supplies. The others are designed to be used in laboratories or instrumentation.

The new encapsulated high-voltage supplier, designed to MIL-E-5400, also produces 1.5 amp. of 6.3-v. a.c. power, and is designed to operate between -62°C and 85°C . Unit measures $4 \times 4 \times 6$ in., weighs 6 $\frac{1}{2}$ lb. Manufacturer: Telectro Industries Corp., 35-18 37th St., Long Island City 1, N. Y.

Other new regulated d.c. power supplies include:

• **4-30 v. d.c., 5-30 amp.**, with no more than 1% voltage variation from no load to full load, or for line variation of 100 to 125 v. a.c. Ripple is quoted at 1% rms. Input is single phase, 60 cycle. Bulletin T-5300 describes it in detail. Manufacturer: Inet, Div. of Leach Corp., 4441 Santa Fe Ave., Los Angeles 54, Calif.

• **200-235 v. d.c., 300 ma.**, with stability quoted at 0.1% for line or load variations, ripple at less than 1 mv., and transient response at under 150 microseconds. Manufacturer: Power Designs Inc., 119-22 Atlantic Ave., Richmond Hill 19, N. Y.

• **6 v. d.c., 5 amp.**, magnetic-amplifier regulated to maintain voltage within 1% for line variations of 95 to 130 v. a.c., as well as load changes between 10% and 100% full load. Response time is quoted at 0.2 sec., and ripple at 1%. Input is single-phase 60-cycle. Manufacturer: Perkin Engineering Corp., 345 Kansas St., El Segundo, Calif.



After two years in 55 Convair 340's...

United Air Lines pleased with performance of Skydrol in AiResearch Supercharger

Here's a statement from the airline which has had more experience with the AiResearch supercharger in Convair 340's than any other operator.

United enjoys the high capacity and weight savings of the AiResearch supercharger with all the assurance that fire-resistant Skydrol brings.

"We have been using Skydrol in AiResearch superchargers on 55 of our Convair 340's. After checking results of over 2 years of hard commercial service, we are well satisfied with the performance of both Skydrol and supercharger!"

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In Convair systems, too, United Air Lines uses Skydrol exclusively. Because hydraulic systems reach into all parts of the plane, carrying fluid under pressures of 3000 psi or more, use of fire-resistant Skydrol eliminates a real hazard. Its excellent lubricity also reduces wear on moving components.

Converting to Skydrol costs less than you think. Your present overhaul practice calls for periodic replacement of many components of the hydraulic system. Replacing them with units suitable for Skydrol costs little more.

In all it costs less than \$2000 to convert a Convair at overhaul. Ask us for details and engineering help.

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We are now manufacturing an absolutely shadowless edge-lighting fixture, used in edge-lighted panels, to illuminate the faces of back-mounted instruments. These fixtures conform to MS-25010 and MIL 7806. Part numbers 1900 with solder terminal and 1950 with screw terminal.

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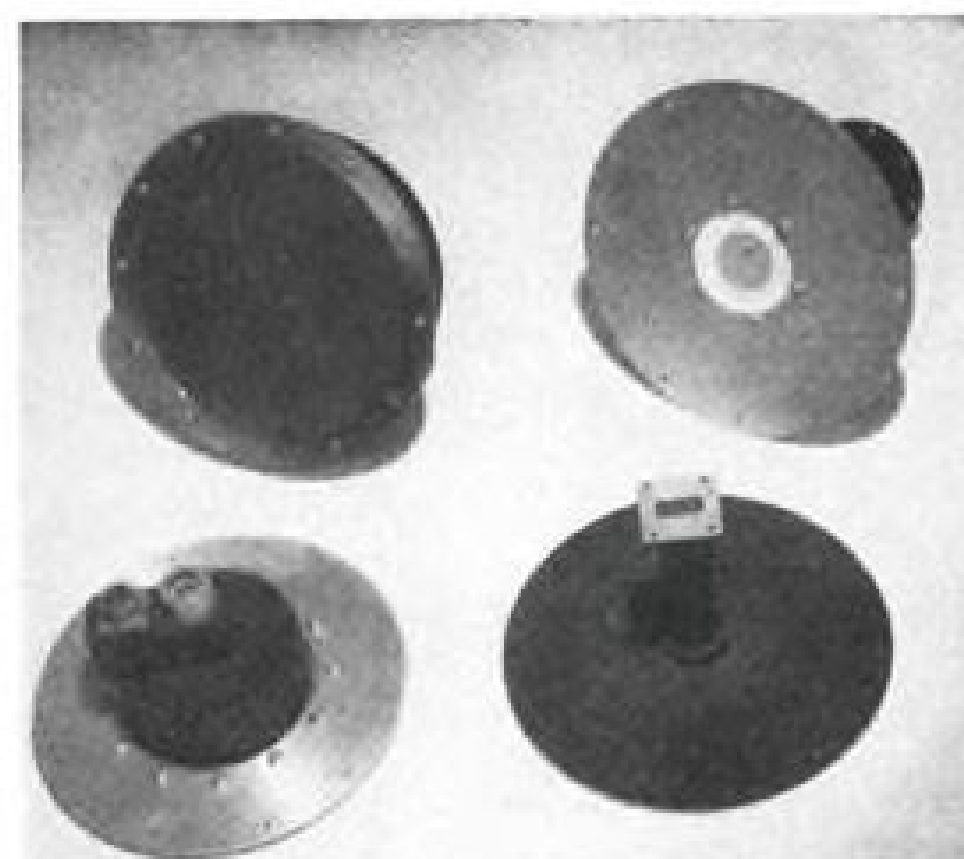
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RADAR ANTENNAS for flush mounting.

Flush Antennas Cover 380-10,800-mc. Range

A new line of eight flush-mounted, elliptically polarized microwave antennas, covering the frequency range of 380 to 10,800 mc. is one of several recently announced devices of interest to microwave and radar designers.

Six variations of one type antenna (photo, left), covering the band of 380 to 5,000 mc., are helical radiators for flush cavity mounting and have coaxial inputs. Two variations of the other type antenna (right), cover the 4,750 to 10,800 mc. band. They have waveguide inputs transitioned into round flush-mounted horns containing phase shifters for producing elliptical polarization. General specs include: less than 2:1 VSWR, less than 2:1 ellipticity ratio, and 45-deg. beam width at half-power points.

Manufacturer: Dalmo Victor Co., 1409 El Camino Real, San Carlos, Calif.

Other new microwave components include:

- Traveling-wave tube amplifier, X-band (7 to 14 kmc.), provides 5 mw. output, 30 db. gain, has maximum VSWR of 2:1, weighs 1 lb. Unit requires a 400 gauss field and 1,200-v. regulated power supply.

Manufacturer: Huggins Laboratories, Inc., 711 Hamilton Ave., Menlo Park, Calif.

- K-band RF heads, covering the range of 12.4 to 400 kmc., include RF tuning assembly and a K-band mixer and are designed for use with microwave spectrum analyzers. Bulletin K-Band gives technical details.

Manufacturer: Vectron, Inc., 395 Main St., Waltham 54, Mass.

- X-band VSWR measuring system, Model 110B, is improved version of earlier model containing added attenuation and VSWR scales, reading from 1.02 to 1.20 and 1.1 to 2.50. System includes a tunable oscillator covering 8.5 to 9.6 kmc., an accurate wavemeter to supplement direct-reading dial of the oscillator, a bi-directional coupler with

bolometer detectors, and a direct-reading VSWR indicator.

Manufacturer: Color Television Inc., 913 E. San Carlos Ave., San Carlos, Calif.

Avionics Companies Report Expansions

Aircraft Radio Corp., Boonton, N. J., has broadened its line of airborne communication and navigation equipment with the acquisition of Orion Industries, Inc., manufacturer of low-cost flight directors for business aircraft.

Sales responsibility of Orion products will be transferred to ARC headquarters in Boonton, but the devices will continue to be manufactured at the present Richmond, Va., location.

Other new moves, expansions, and acquisitions in the avionics industry include:

- Avion Instrument Corp., a division of ACF Industries, Inc., will move from Paramus, N. J., to join ACF's Engineering and Research division at Riverdale, Md., near Washington. The move, to be made in next 12-18 months, when new building is completed, will provide better coordination of Avion and Erco activities. ACF purchased Engineering & Research Corp., several months ago (AVIATION WEEK Nov. 22, 1954, p. 7).

- Minnesota Electronics, subsidiary of Librascope, Inc., Glendale, Calif., is constructing a new plant at Santa Ana, Calif., that is slated for completion this spring.

- Gyromechanisms, Inc., is expanding its facilities 20% through the acquisition of another building opposite its present Halesite, L. I., plant. New facility will house design, engineering, and part of administrative staff.

- Elgin National Watch Co. has purchased American Microphone Co., Pasadena, Calif., maker of microphones and communications accessories. The move, part of Elgin's diversification program, follows on the heels of the company's purchase of Neomatic, Inc. (AVIATION WEEK Nov. 22, 1954, p. 58).

- Decca Navigator Canada, Ltd., Toronto, subsidiary of Decca Co. of England, has been formed for the development of the Decca Navigator and Flight Log nav-aids.



- Single-Axis Autopilot for DC-7s—One major airline, not now using autopilots, is investigating possibility of buying a single-axis autopilot for its new DC-7s to maintain plane more closely at assigned altitude. United Air Lines and American Airlines have found that use

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Computers and Controls

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of Sperry autopilot in their DC-7s cuts flight time by tighter control of altitude and heading.

► **Belgium Buys VORs**—Wilcox Electric reports the sale of two 50-watt omnirange stations (TVORs) to Belgium, making a total of three which that country has purchased from Wilcox.

► **Electrodata Machines Cataloged**—A new 74-page booklet entitled "A Catalog of Devices Useful in Automatic Data Reduction," has been prepared by Armour Research Foundation under USAF sponsorship. Booklet, which lists products of 50 different firms, will be revised periodically to include new devices. It will be distributed through the Air Force.

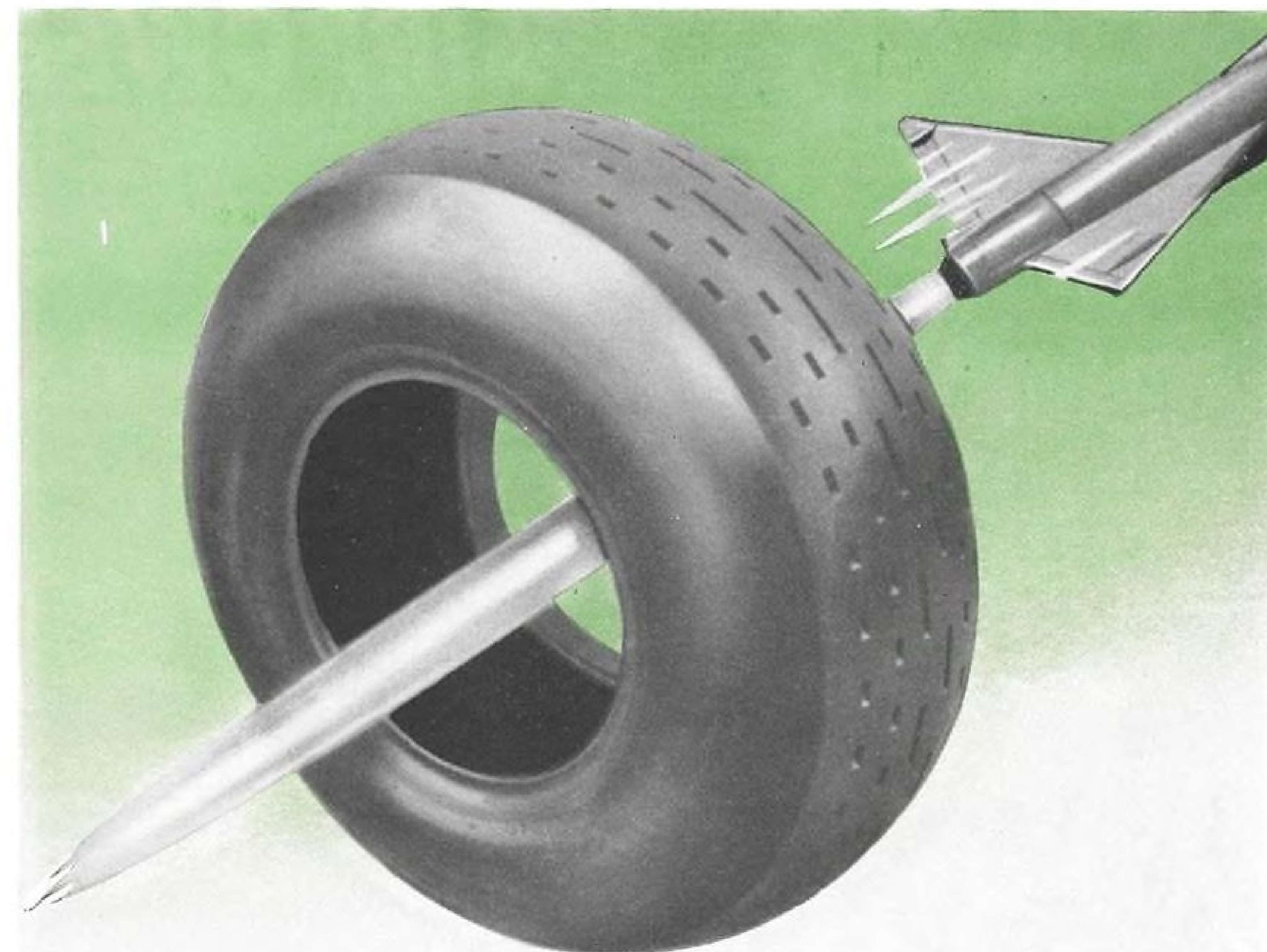
► **New High-Temp Wire**—Newly developed magnet wire insulated with thin polyester film, enabling it to withstand hot-spot temperatures up to 150C, is being produced by General Electric's wire and cable department. New Alkanex wire is available in round sizes No. 13 AWG through No. 26 AWG, with single or heavy-wall film thicknesses.

► **Panagra Starts Radar Installations**—Panagra has taken delivery on the first three of the Bendix Radio RDR-1 X-band storm warning radars slated for fleetwide installation on the carrier's DC-7Bs. One set will replace an APS-42A military radar which Panagra has been flying aboard a DC-6B since last April. —PK

Avionics Bulletins

Recently announced bulletins and booklets of interest to persons in the avionics field include the following:

- **Precision snap-action switches**, made by Micro Switch, are described in two new publications: Catalog No. 62 (28 pp.) describes standard line of switches; Catalog No. 75 (12 pp.) describes subminiature units. Company address: Freeport, Ill.
- **Cathode-ray oscilloscopes**, (precision type 530 series) are described in 14-page bulletin available from Tektronix, Inc., P. O. Box 831, Portland 7, Ore.
- **Instrument development facilities** of Avien, Inc., are described in 16-page brochure entitled "Thrust." Company address: 58-15 Northern Blvd., Woodside 77, N. Y.
- **Potentiometer linearities** are discussed, and four different types defined to aid in the selection of pots, in new bulletin called "Linearities Defined and Compared." Form No. 753813. Clarostat Mfg. Co., Inc., Dover, N. H.
- **Power supplies**, wide variety of types will be described in Perkin Power Supply Bulletin. First issue includes description of new tubeless airborne radar power unit. Subscription is free. Write on letterhead to Perkin Engineering Corp., 345 Kansas St., El Segundo, Calif.
- **Measuring and testing instruments**, wide variety of types, are described in 8-page catalog. Write to Instrument Div., Federal Telephone and Radio Co., 100 Kingsland Road, Clifton, N. J.



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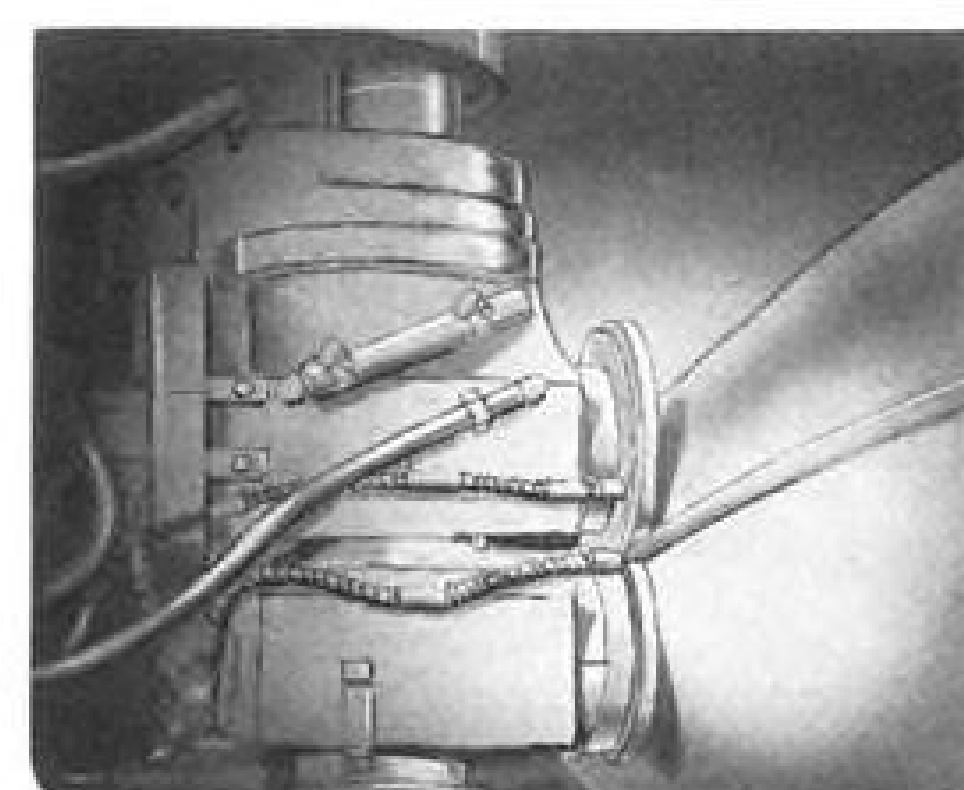
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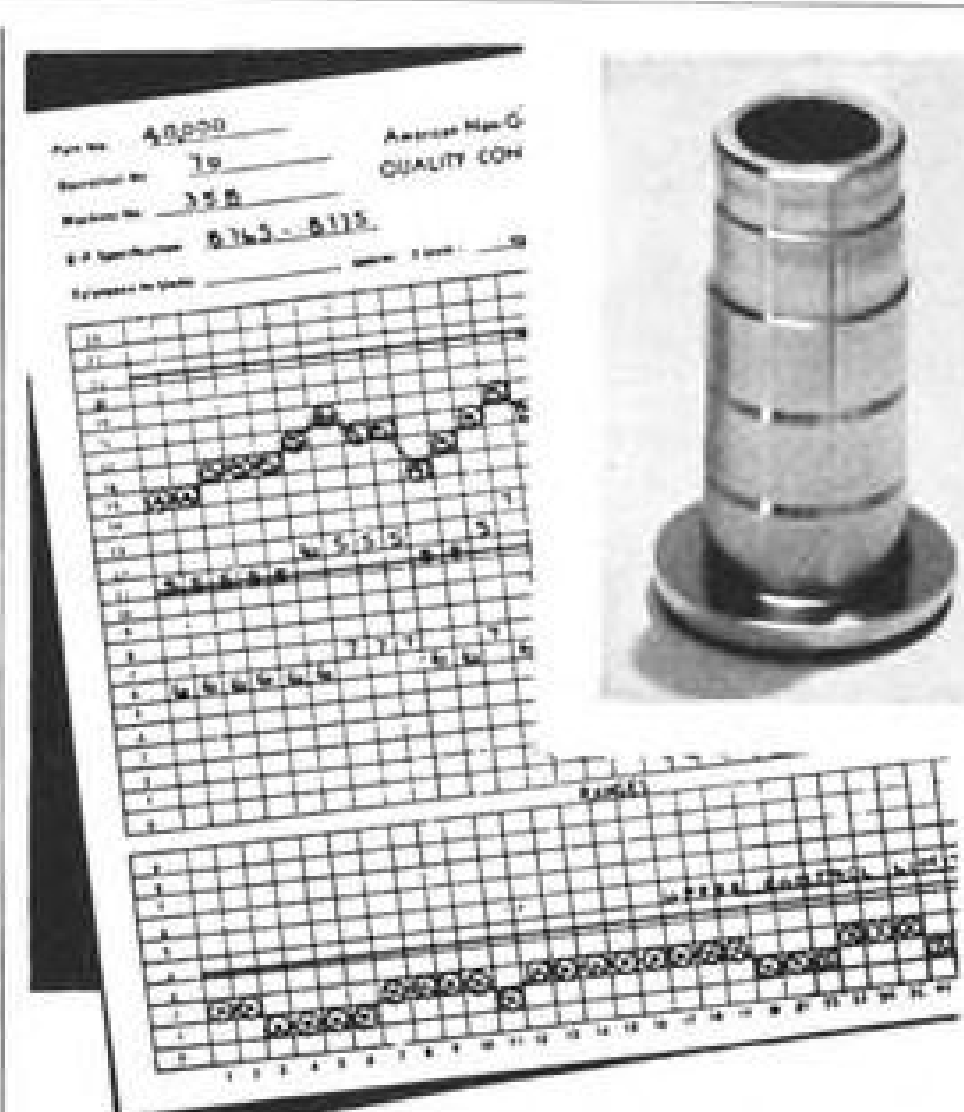


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22nd Annual Aviation Week

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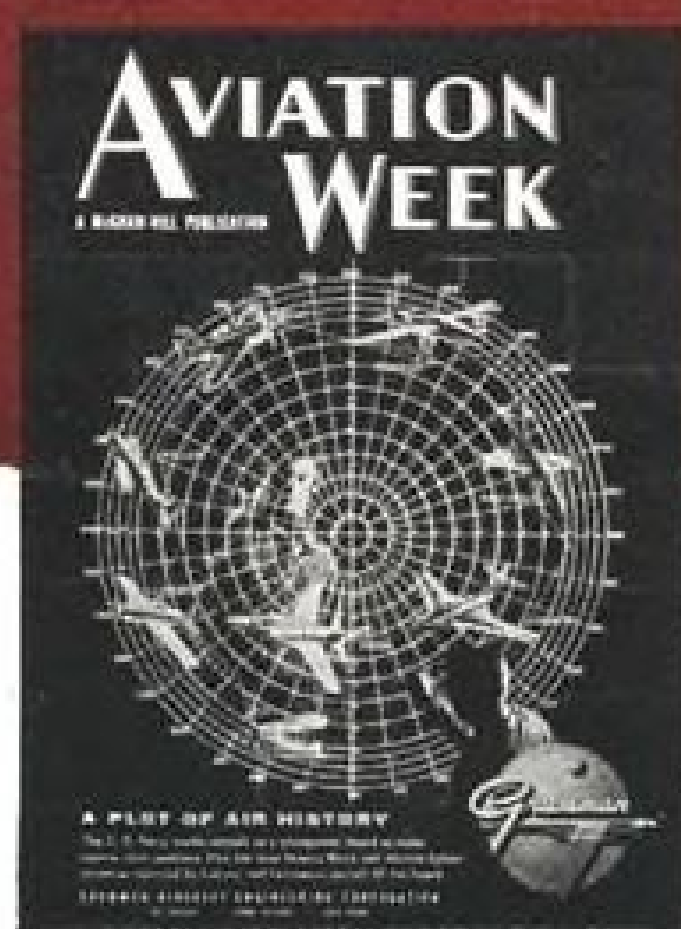
AVIATION WEEK'S 22nd ANNUAL "INVENTORY OF AIRPOWER" EDITION—"Airpower in the Age of Peril"—covering every phase of U.S. civil and military aviation, and providing the latest information on foreign airpower, will be published March 14, 1955. Featuring the complete story of the transition from the Korean crisis buildup to the solid industrial and airpower base necessary to meet the requirements of U.S. Policy over the long pull, this important issue will hold significant and lasting interest throughout the aviation world.

Aviation management men, engineers, military and government officials will read, refer to and depend upon "Airpower in the Age of Peril." Only in this edition will be found full information on fiscal 1956 federal aviation budgets, new procurement and financing regulations . . . ground rules that will guide Air Force and Navy policy in doing business with the aviation industry over the next two years, as well as latest reports from AVIATION WEEK correspondents in every part of the world on significant developments abroad.

Reference tables especially designed for "Airpower in the Age of Peril" will give new, revised specifications on U.S. and foreign aircraft, missiles, and engines. Special reports will cover the expansion of the guided missiles industry, the conversion of do-

mestic and international airlines from piston to gas turbine powered equipment (including full statistical coverage of all U.S. and foreign airline operations), the expanding role of equipment and component manufacturers in the weapons system development and production cycle, and avionics in military and civil aviation. This storehouse of vitally needed aviation information will be used constantly wherever aviation business is transacted.

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EQUIPMENT

New Valve Cuts Replacement Time 99%

• Douglas C-133 turboprop transport will use 22 of the plug-in units that take only four steps to remove.

An unorthodox fuel shutoff valve that can slice replacement time as much as 99% is being put into production by Wm. R. Whittaker Co., Ltd., Los Angeles, Calif.

"Plug-in" design permits the entire valve unit, including actuating motor and reduction gear train, to be installed or removed as a single package. The new equipment was especially designed for the upcoming Douglas C-133 mammoth turboprop-powered transport for U.S. Air Force. The Whittaker valve was developed in close cooperation with the airplane builder's engineer, D. W. McLennan, Whittaker executive vice president points out.

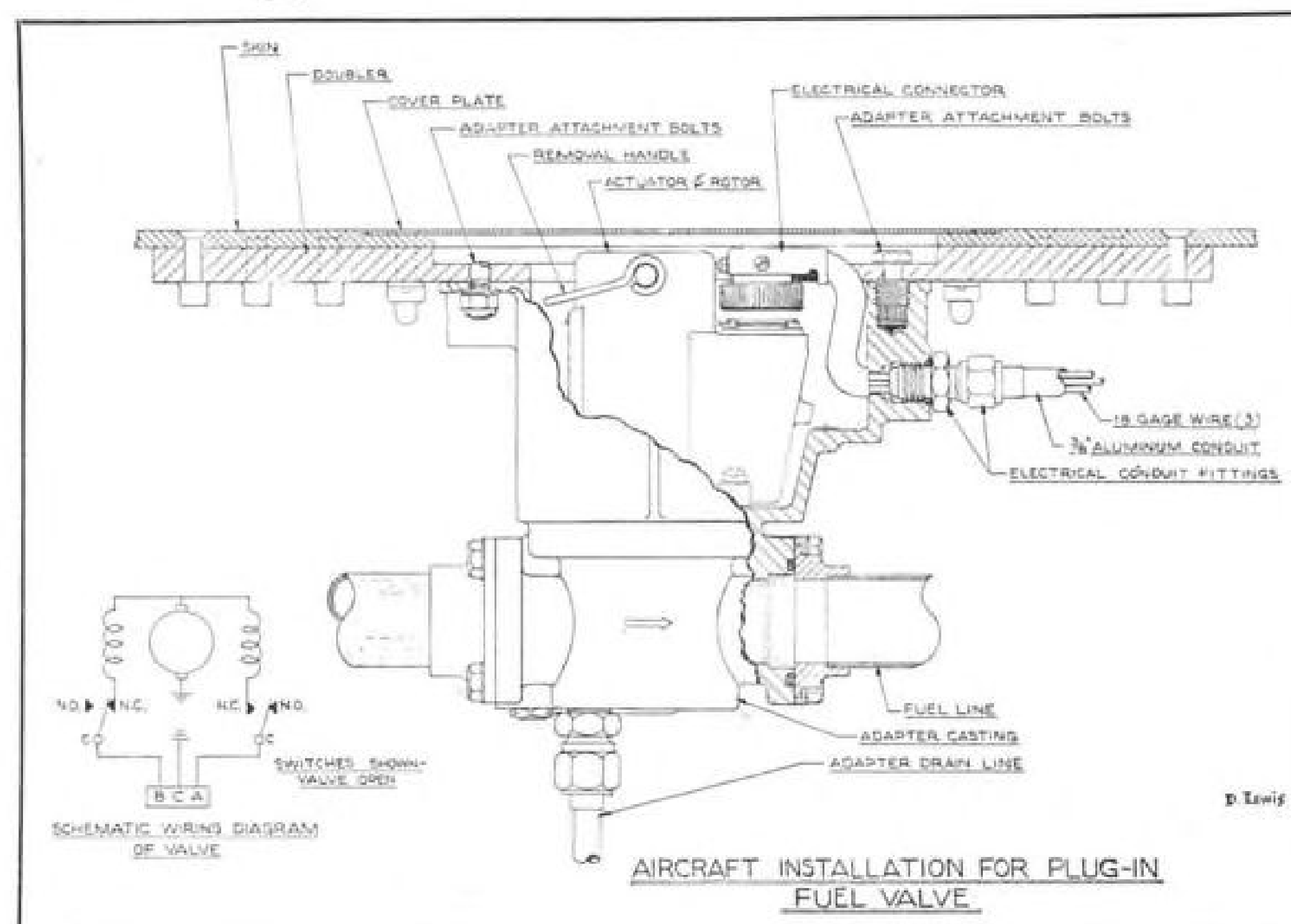
► **Quick & Easy**—This is how quickly and easily any of the 22 valves used on each C-133 can be removed: Take off a cover plate; remove four screws; disconnect one electrical plug; remove valve actuator assembly from upper surface of the wing.

Usual procedure (with variations according to the aircraft) in removing conventional fuel shutoff valves involves all or most of these time-consuming, laborious steps: Aircraft has to be isolated. Fuel tank, or tanks of the affected system has to be drained and inerted while emergency fire equipment stands by.

In order to get at conventional type of valve, portions of aircraft structure, such as leading edges, sometimes have to be removed, further complicating and prolonging the job.

None of this is necessary with the plug-in type of valve. Fuel systems, and even the fuel lines in which the valves are installed, may contain any quantity of fuel and the valves replaced without consideration of the plane's fuel situation.

► **Growing Trend**—Philip Terry, Whittaker field engineer who has liaison responsibility for the entire project between the company and Douglas, told AVIATION WEEK his company is so enthusiastic about the plug-in concept that it has on drawing boards a refined design for a fuel shutoff valve which can be installed in the bottom of a wing tank and removed with the loss of only a "cup full of fuel." In another application, the company's engineers are



PLUG-IN VALVE is sketched in a typical installed position in the new Douglas C-133.

developing a booster pump which will work on the plug-in principle.

Referring to the C-133 valve, company officials add: "The overall performance of this . . . valve was so satisfactory that the basic design has subsequently been used in several other new valves. . . ."

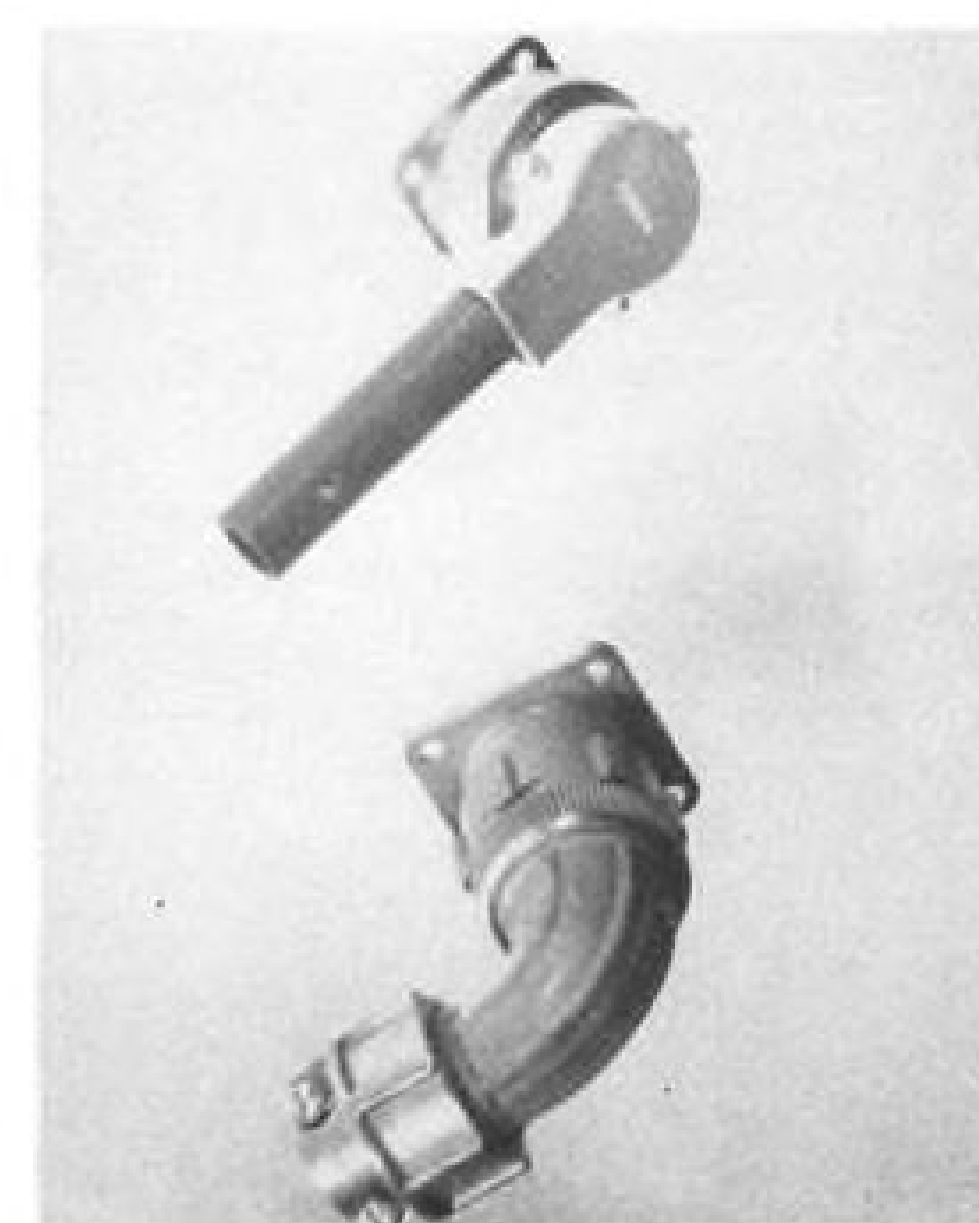
► **How It Started**—Genesis of the plug-in shutoff valve was during the conception of the C-133's fuel system. Clifford Starr, Douglas' chief power-plant engineer, considered submerging

all fuel manifold lines and valves in the plane's fuel tanks so that any leakage would be directly into the tank.

However, certain fuel system components (such as the shutoff valves) were to be electrically driven. This precluded installation of the units within the tank because, as Whittaker puts it: "Electrical actuators capable of operating within a fuel tank, though theoretically feasible, could not conscientiously be considered in view of the inherent risk involved in placing d.c.



NEW-TYPE CONNECTOR (arrow, top) is shown on adaptor casting of plug-in valve.



COMPARISON of new connector (top) for plug-in valve with standard type.



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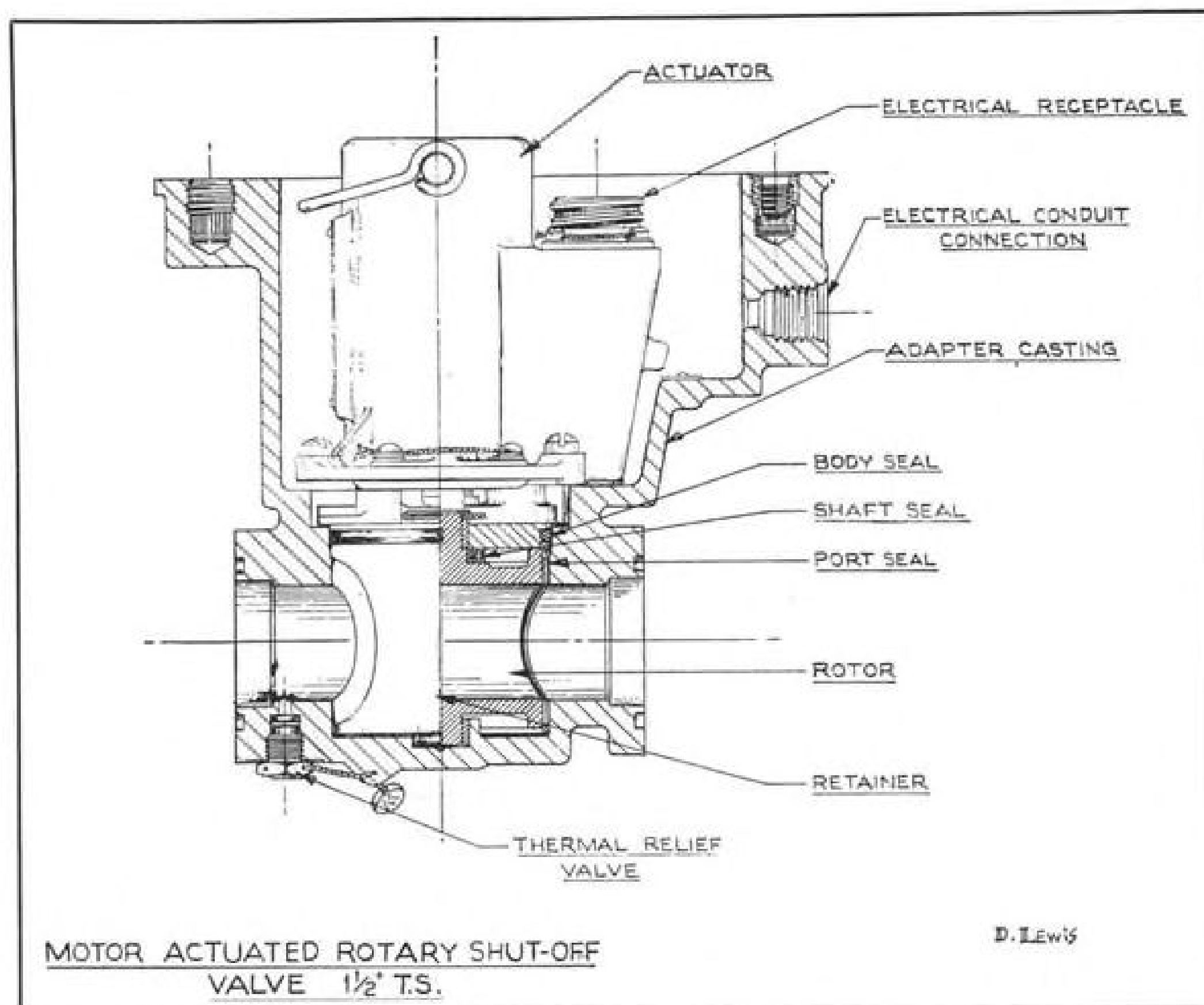
Capital's preference for the PB-10A Automatic Pilot with Flight Path Control was determined by an absolute necessity for the finest in automatic flight safety, performance and dependability under all weather conditions—along the radio skyways of the nation's omni-range network and down the guiding beams of airport landing approach systems.

Here, in Capital's selection of an auto pilot that would fit into its "new concept in flight", is further convincing evidence that Eclipse-Pioneer *knows* auto pilots . . . and how to build them to meet maximum flight standards.

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CUTAWAY of prototype valve has different seal configuration than production model.

electric motors and switches within a fuel tank."

However, the idea of running the fuel lines inside the fuel tanks was practical, so Starr's preliminary layouts located the fuel manifold lines in the upper portions of the tanks. Next logical step was to develop an adapter which would accommodate a conventional fuel shutoff valve and to which the submerged fuel lines would be connected. The design was such that the valve could be installed externally yet that portion which mates with the fuel lines is submerged in the tank with the lines. Thus the valve can be removed and replaced without having to drain the affected system.

Although the plug-in-type valve outweighs its conventional counterpart by about 3:1, (4 1/2 lb. to 1 1/2 lb.), the 100-to-one maintenance time saving (which, for a plane the size of the C-133, is of major importance), more than offsets the weight penalty.

► **Reason for Plug-in Type**—Whittaker engineers say that, "Working with Douglas' preliminary sketch, our engineers determined that a conventional slide- or gate-type valve was less adaptable to the unique Douglas design than a rotary-type which would occupy less space and would seal more efficiently to the adapter."

Initial valve design used a rotary type valve installed by the plug-in principle. It was operated by a standard 18-30 v. d.c. system, using an electrical actuator and a post type connection

for the sealed electrical conduit. Provisions were made for a drain line from the upper section of the adapter (which is sealed from the tank) to be vented to atmosphere at the lower wing surface.

► **Breadboard & Changes**—"Breadboard" model tests of the shutoff valve resulted in these changes being incorporated:

- **More accurate valve actuating mechanism** was incorporated which, through an overriding clutch, positioned the valve accurately regardless of the voltage supplied to the actuator.

- **Spring loaded, line thermal relief valve** was installed integrally with the adapter. The unit, set to open at 75 psi., allows fuel to be released from the fuel line into the tank. Valve reset pressure is 60 psi.

- **Single seal, of simple configuration**, replaced both the static seal (between valve body and adapter) and the dynamic seal (between valve plug and valve body). The "improved seal passed every test," the company notes.

A new type of electrical connector designed by Cannon Electric Co., was substituted for the terminal post-type originally proposed. The new connector has several advantages: It is considerably smaller, lighter and less complex than the terminal post type.

Whittaker engineers cite these additional features of the unit: "The new connector is completely impervious to fuel and is less prone to damage from temperature extremes and general wear

than standard connectors. Also, the unit is designed to prevent arcing when it is being connected or disconnected from the receptacle."

► **No Leakage**—Whittaker personnel say that tests of the valve mechanism were very satisfactory. No leakage was encountered during a series of tests and the Teflon seals exhibited excellent wearing characteristics throughout more than 10,000 cycles.

Seals used with the valve are: Upstream Teflon port seals, curved to mate with the cylindrical plug, are held stationary against the adapter. Shaft is sealed by an upstream Teflon cartridge static seal between seal retainer and valve body.

The company claims that "the complete absence of rubber from this portion of the design further simplifies maintenance and eliminates inherent drawbacks always present when rubber is used in fuel systems."

The valve's sealing mechanism will function with fuel flowing in either direction. It will withstand shutoff pressures of 125 psig. With fuel temperatures ranging from minus 65F to plus 135F and ambient temperatures of minus 65F to plus 160F.

► **Actuator**—The actuating mechanism incorporates a compact, conventional, split-field, series-wound motor. Between motor and valve shaft is a planetary gear train which provides a 320:1 reduction between armature and output shaft. An over-riding clutch controls valve plug travel, disengaging the actuator from the valve rotor when the rotor reaches the desired position.

As company spokesmen put it: "The motor and gear train are de-energized by conventional limit switches after a slight overtravel following disengagement of the clutch. This allows both motor and gear train to decelerate without creating impact stresses which would be induced . . . by sudden stoppage."

► **Other Details**—The valve's position can be checked visually by noting the position of a gear segment through two apertures, which are marked "open" and "closed."

Adapter castings differ only in location of attachment bolts, whose position is dictated by location of wing stringers. The castings are installed in an early wing assembly position. Valve and actuator assemblies are installed later with other equipment items.

Whittaker engineers predict that the plug-in principle may be applied to many aircraft components other than shut-off valves, with correspondingly important maintenance time savings. Among components they listed are: fuel pumps, selector, check and restrictor valves, flow-meters, pressure sensing units, etc.



Receiver 51X-1

Transmitter 17L-4

Antenna 37R-1

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Collins 51X-1 and 17L-4 combination provides the maximum in system performance and serviceability. Autopositioner* control permits fast, positive selection of any channel in the VHF range (118 to 136 mc). Frequency selectors and shockmounts are available for various circuit and mounting arrangements. The units were designed toward ARINC 520A Characteristic.

Collins 51X-1 incorporates the latest design principles to achieve the utmost in selectivity, sensitivity and cross-modulation characteristics. The 51X-1 is composed of plug-in units which can be easily removed and replaced with spare subassemblies. Other advantages of this feature include easier, faster repair and simplified spare parts control.

*Autopositioner — patented

For complete descriptive literature, write

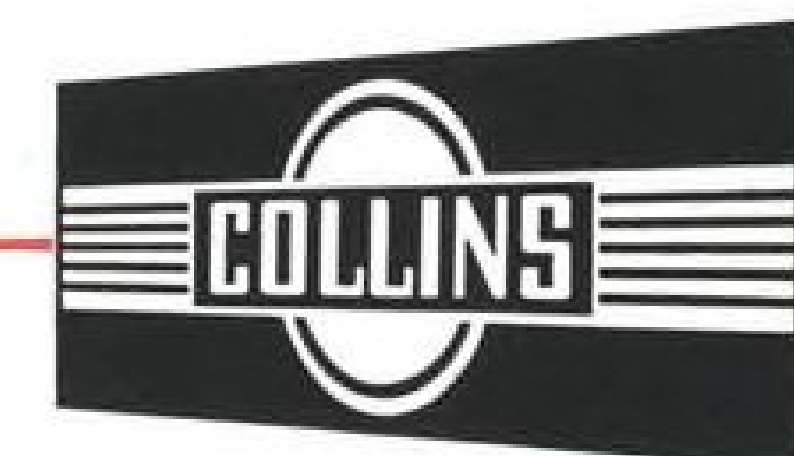
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Collins 17L-4 Transmitter produces 25 watts output on radiotelephone in an exceptionally light weight package. Vital components and moving parts can be checked by lifting off the easily removable side covers. Fast servicing is assured because principal assemblies are completely separate, interchangeable units. With power supply, the entire transmitter occupies only a 1/2 ATR case.

Engineered expressly for two-way communications, *Collins 37R-1* is a high-efficiency, low drag VHF antenna which can be mounted on the top or bottom of the aircraft. With only the RF connector protruding from the base, installation and maintenance are simplified, especially on pressurized aircraft. Current production incorporates new Lock Foam filler which excludes moisture.



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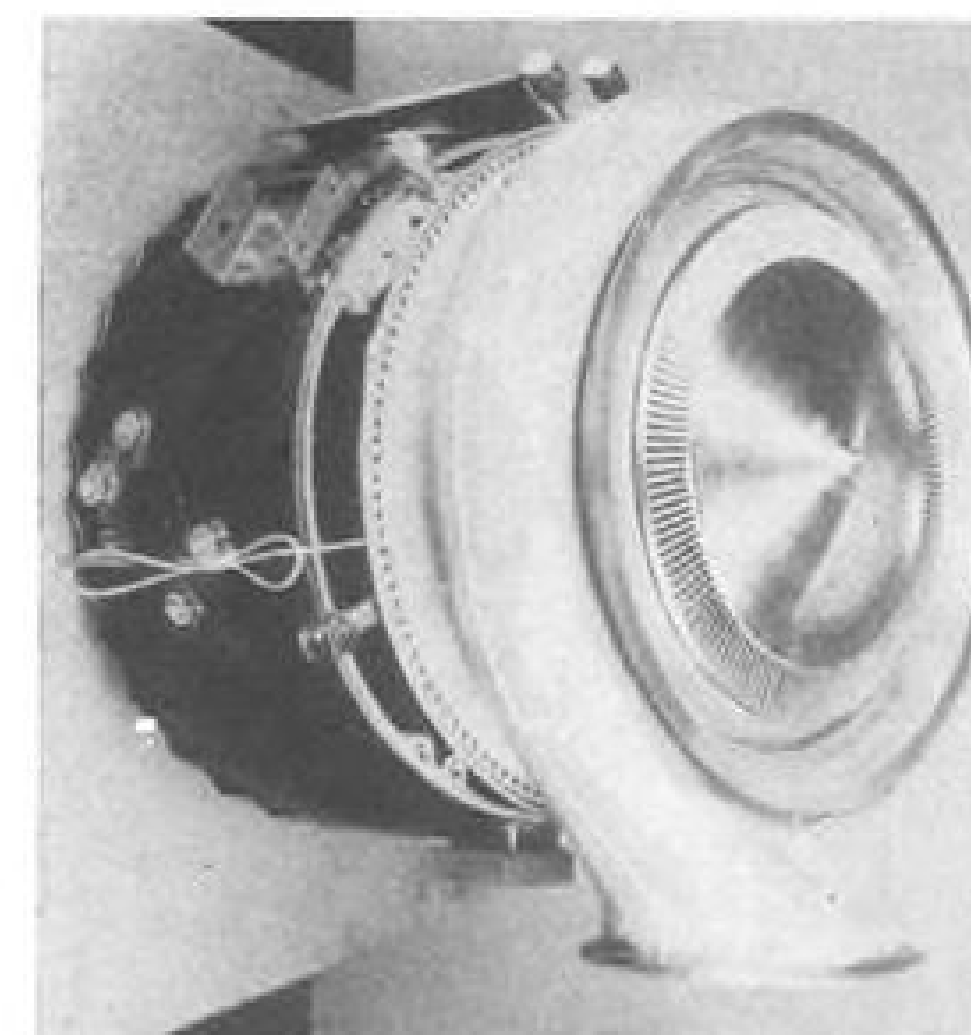


Interior view of Sound Chamber. Hoffman Laboratories has one of the West's largest and best equipped Environmental Test Laboratories.

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CH-10 TURBOSUPERCHARGER

GE Takes Wraps Off New Jet Accessories

The Aircraft Gas Turbine Division of General Electric recently unveiled these turbine-driven accessory equipments for aircraft:

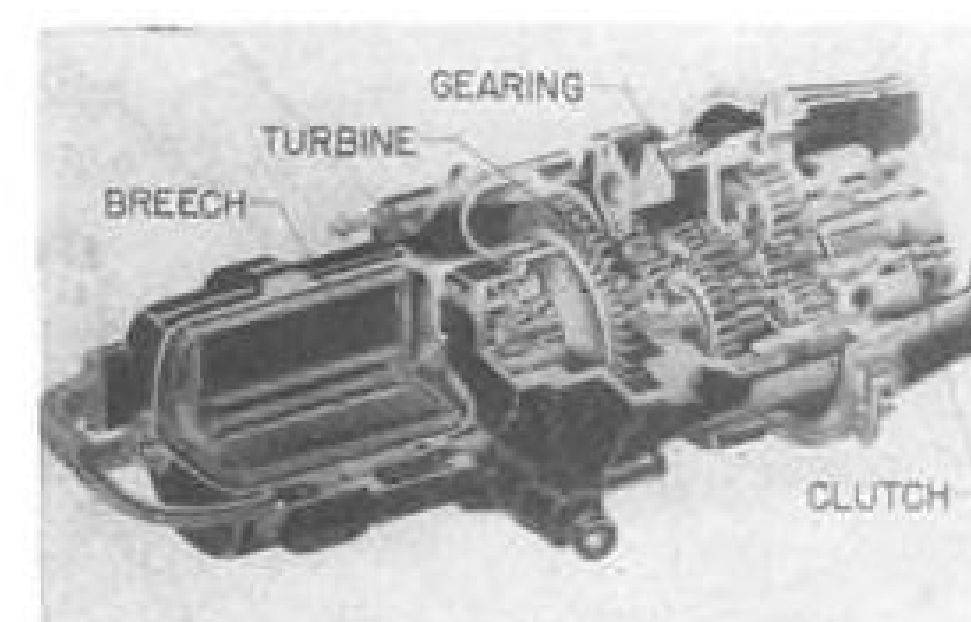
- Turbo alternator drive. (Model 7T-AD-10B), size: 43-in. long, 17-in. wide, 23-in. high; weight: 208 lb.; output: 53.3 kw.; turbine speed: 20,286 rpm.; output shaft speed: 6,000 rpm.

- Turbo hydraulic pump. (Model 7T-AP-10B). Size: 35-in. long, 14-in. wide, 13-in. high; weight: 95 lb. (dry); output: 8.25 gpm. @ 2,650 psig; turbine speed: 37,500 rpm.; pump speed: 3,700 rpm.

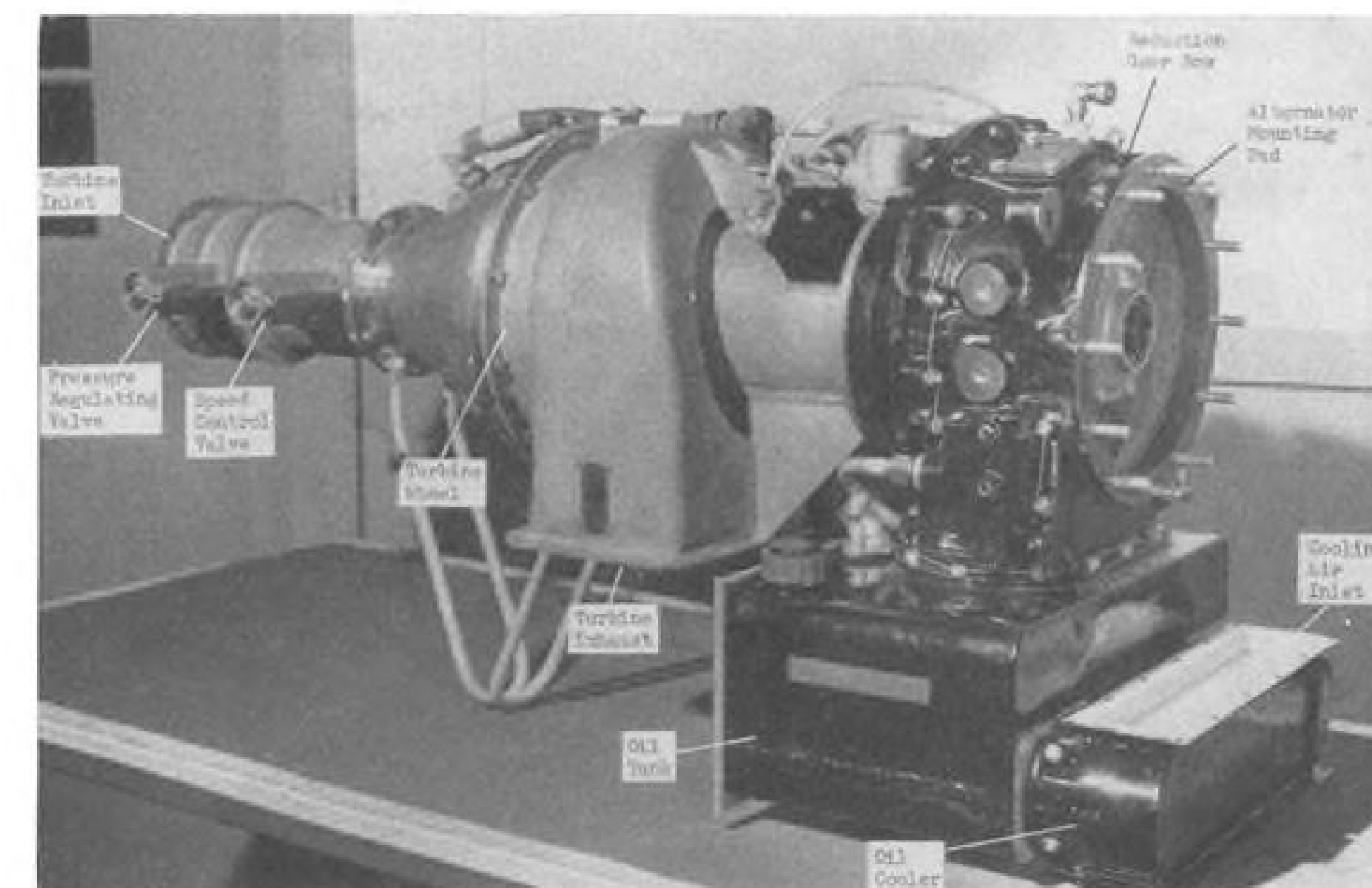
- Turbo starter—cartridge type. (Model 7T-AS-12). Size: 20-in. long, approx. diameter: 9½ in.; weight: 59 lb.; output: brings Wright J65 to idle in less than 20 seconds; turbine speed: 45,000 rpm.; application: Martin B-57.

- Turbo fuel pump. (Model 7T-AP-11). Size: 20-in. long, 7½-in. wide, 14-in. high; weight: 30 lb.; output: 86 gpm., @ 550 psi; turbine speed (first stage): 25,000 rpm.; turbine speed (second stage): 8,000 rpm.; application: North American F-86D.

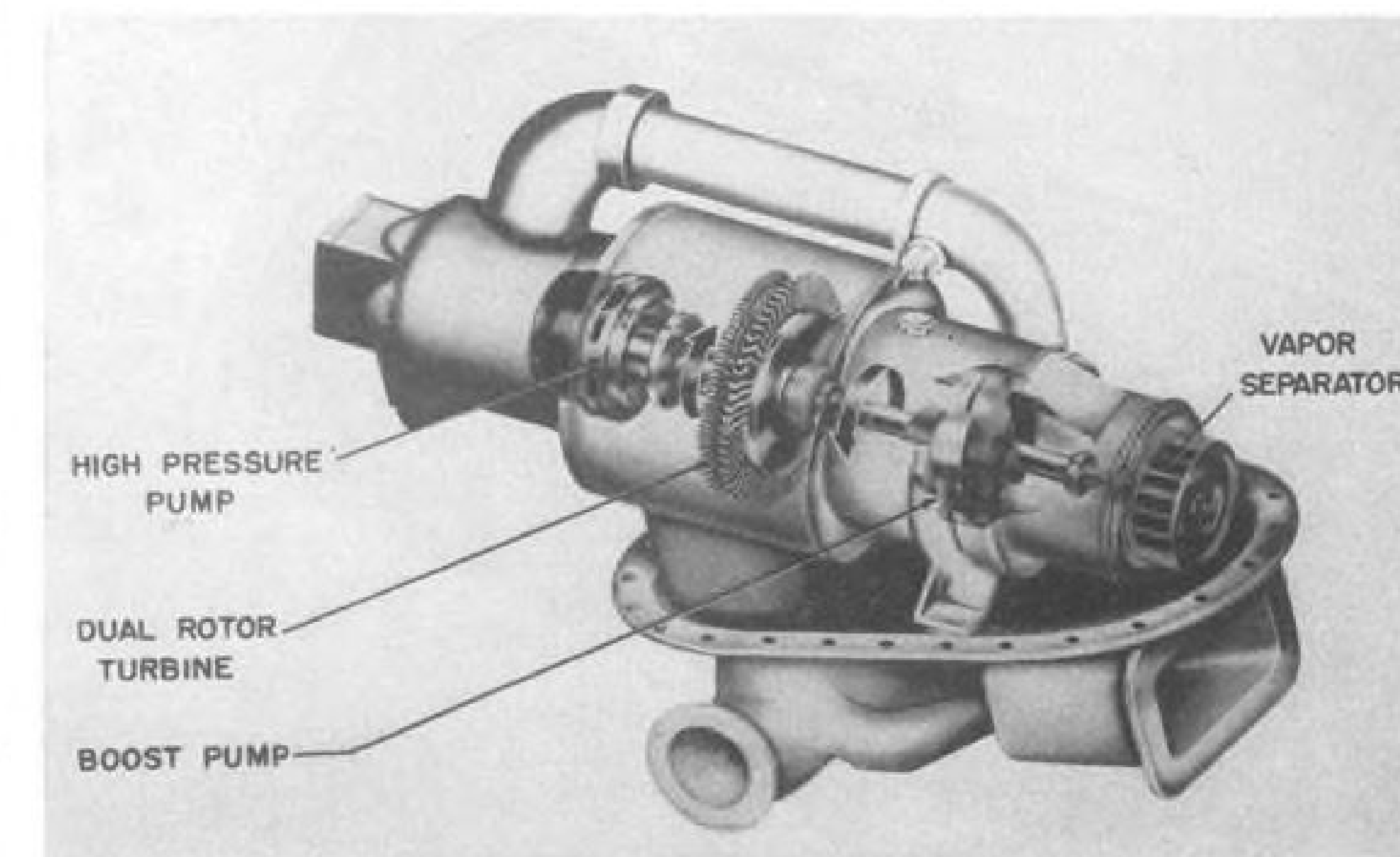
- Turbosupercharger. (Model CH-10). Size: 26-in. long, 29-in. clearance diameter; weight: 250 lb.; output: rated flow at altitude: 220 lb./min.; discharge pressure 27.8 in. Hg.; application: Boeing Super Stratocruiser.



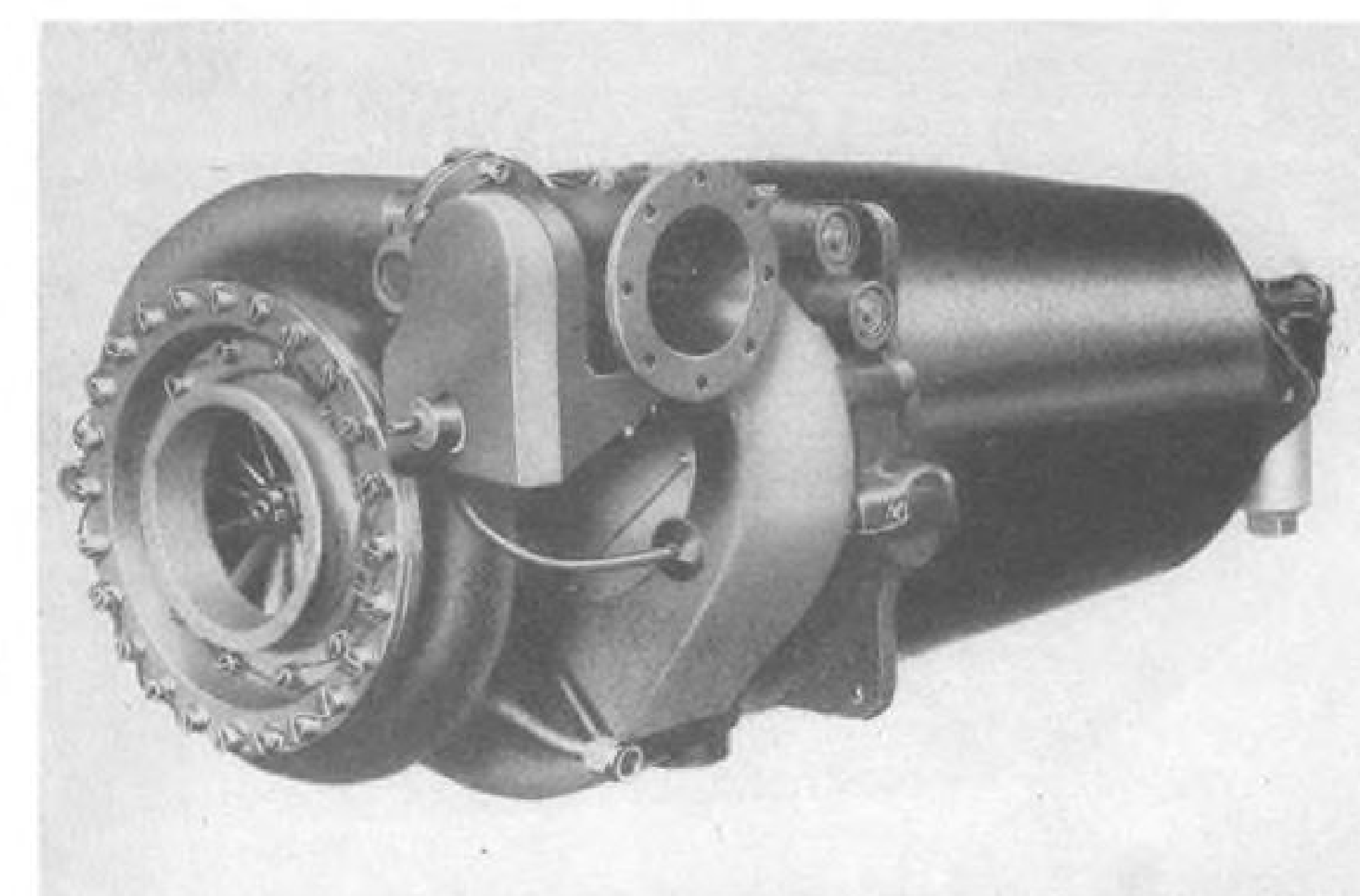
7T-AS-12 TURBO STARTER



7T-AD-10B TURBO ALTERNATOR DRIVE



7T-AP-11 TURBO FUEL PUMP



7T-AP-10B TURBO HYDRAULIC PUMP

Challenging opportunities for outstanding engineers. Write Director of Engineering, Hoffman Laboratories, Inc. 3761 S. Hill Street, Los Angeles 7, California.

NEW FJ-4 FURY FEATURES

"pump that couldn't be built"



The U.S. Navy's newest jet fighter, the North American Aviation FJ-4 Fury, uses a revolutionary new Pesco pump in a line-mounted fuel transfer application. This—the pump that couldn't be built—is the first centrifugal impeller type pump ever perfected for such use.

The extremely thin wings of the FJ-4 prevented use of submerged fuel pumps in the wing tanks, so Pesco engineered the so-called "impossible" pump. A radically new Pesco-designed impeller permits the pump to overcome long inlet line losses and deliver a full flow of JP-4 fuel up to 45,000 feet altitude. The pump is instantly self-priming should it become unprimed during maneuvers.

Designed for a 1200 hour overhaul cycle, this motor-driven pump is powered by a Pesco-built DC Electric Motor. Precise and powerful, it weighs only 7.4 pounds and its 11" x 5" x 5" envelope fits into a close-tolerance fuselage location.

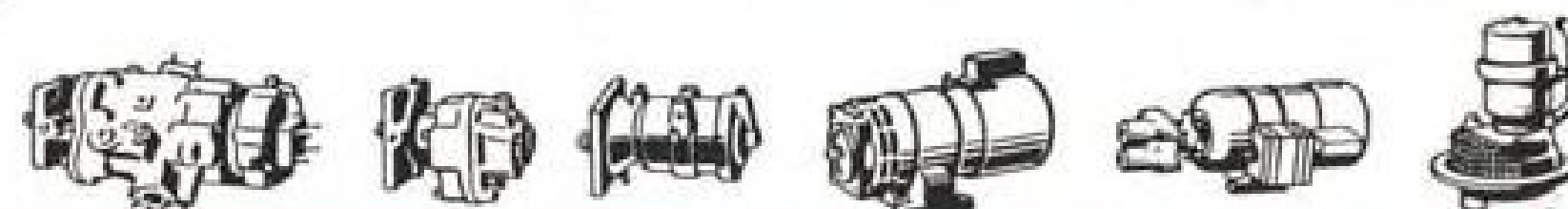
Three submerged fuel pumps in the fuselage tank are other Pesco components of the fuel system which supplies the Wright J-65-W4 power plant.

The "pump that couldn't be built" typifies Pesco's continued success in solving difficult aircraft pumping problems. If you have such a problem, take advantage of the development facilities, engineering experience and greatly increased manufacturing capacity of Pesco. Call or write: PESCO, 24700 North Miles Road, Bedford, Ohio.

Intended for combat at near sonic speeds, North American Aviation's FJ-4 Fury jet fighter is characterized by thin wings. The carrier-based craft, first flown on October 28, 1954, relies on a new-type Pesco fuel transfer pump and three Pesco submerged fuel pumps.

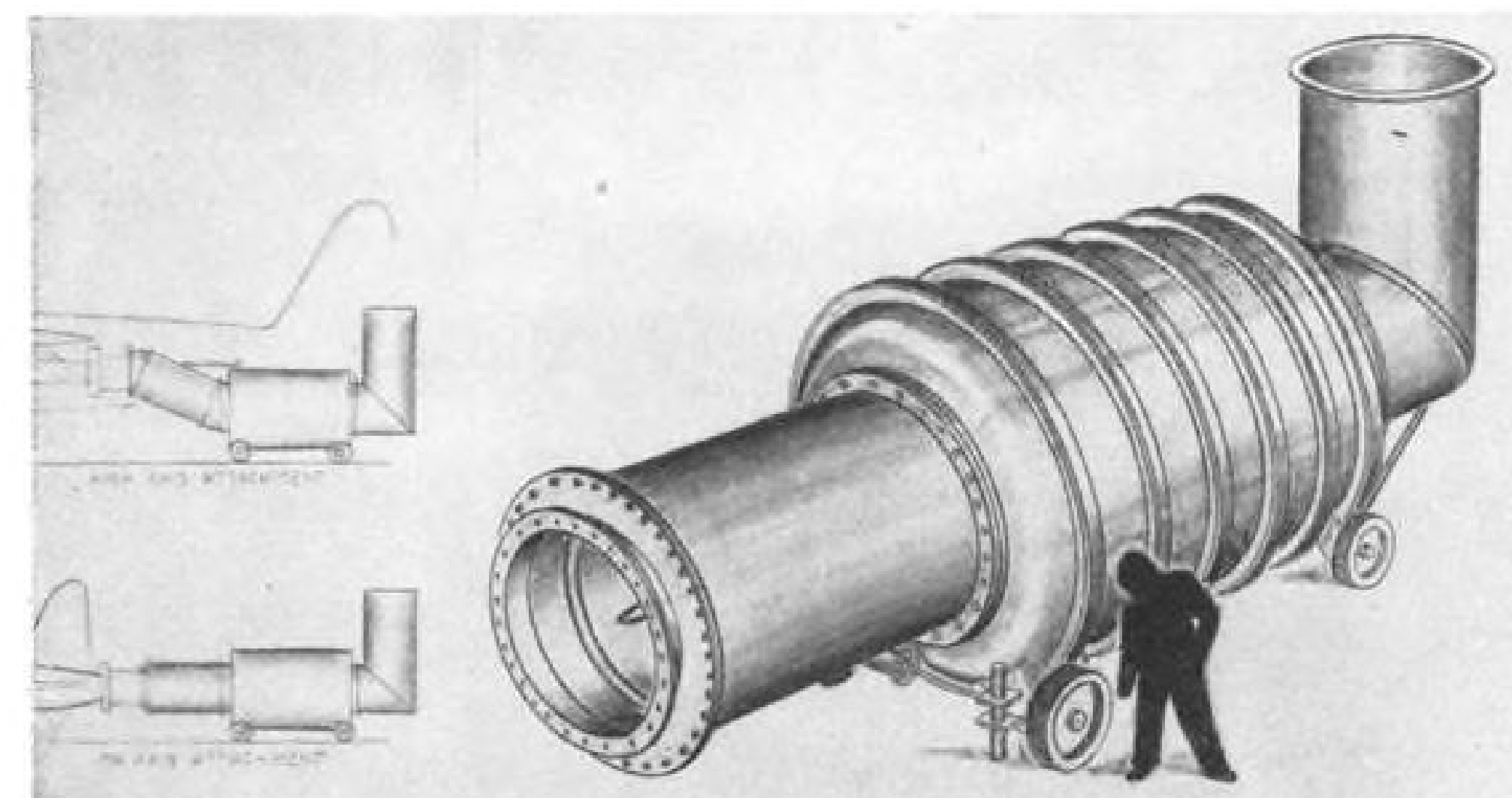


Model 122913-010 Fuel Transfer Pump was specially developed by Pesco for FJ-4. Able to pump boiling fuel, run "dry" for 15 hours and reprime itself, this pump performs a function previously considered impossible for a line-mounted aircraft fuel pump.



BORG-WARNER CORPORATION
24700 NORTH MILES ROAD • BEDFORD, OHIO

NEW AVIATION PRODUCTS



PORTABLE MUFFLER is adjustable to tailpipe height. This one is for P&W J57 afterburner.

Portable Unit Mufflers Test Noise

A series of low-cost, simplified jet engine ground run-up silencers which reduce the noise level of powerplants fitted with afterburners to that produced by highpower piston engines is available in both fixed and portable installations. The Dura-Stack units are also applicable to muffling rocket-motor trials, says the manufacturer, who has told AVIATION WEEK that Air Force and Navy have asked for specific proposals covering both conditions.

Design simplification has been aimed at bringing down costs: The portable muffler is in the \$15,000 price range; a basic cell for fixed installations runs approximately \$10,000.

Some of this simplification has been achieved by using a system of steel filters and resonators in place of the conventional fibrous sound absorbing ma-

terials. In addition the muffler is so designed that several of them may be connected, making it possible to lower noises as local conditions require.

The units have a pierced "spike" protruding into the jet stream, which dispenses water radially to cut gas temperatures. A holed pipe around the inside diameter of the muffler does a similar job.

In combination, these water sprays are said to reduce jet gas temperatures from about 3,000F to some 600F.

In places where water is at a premium, the firm, a specialist in refractory materials, is prepared to furnish linings of this material for its jet noise mufflers. Immediate deliveries can be made, the manufacturer states.

Industrial Acoustics, Co., Inc., 341 Jackson Ave., New York 54, N. Y.

Electrical Gage Makes Oxygen Check Simpler

A new lightweight electrical gage for measuring liquid oxygen in converters used in high-altitude flight is now in production. It is designed to replace bulkier mechanical gages. Working models have been submitted for evaluation to a number of airframe builders and to the Air Force's Aero Medical Laboratory.

Weight is saved in the new gage design by eliminating the need for an amplifying system ordinarily used to boost voltage to operate the indicator with conventional sensitive gages.

The product was developed by Armour Research Foundation of Illinois Institute of Technology, Chicago, and is being produced by Aro Equipment

Corp., Bryan, Ohio, which sponsored the foundation's project.

Armour says the gage is the first of its kind capable of withstanding high pressures present in oxygen converters, while at the same time detecting very slight changes in pressure. The device can take differential pressure of 20 lb./sq. in. despite a full scale range as low as 0.15 lb./sq. in. in a five-liter converter tank. Experimental gages have been developed for a range of tanks from five to 20 liters.

The new setup has a selector switch enabling the pilot to check his oxygen using only one dial—whereas the mechanical gage uses a separate dial for each converter, Armour says. In addition, space is saved through use of wires, replacing long tubes fitted to the mechanical type.

Continuous Strip Camera For Supersonic Recon

Embodying a small, fast-acting electric clutch for shutter actuation, a new continuous-strip military reconnaissance camera has been developed by Hycon Mfg. Co., Pasadena, Calif., for photography even at supersonic speeds, it is stated.

The new clutch, designed and built by Warner Electric Brake & Clutch Co., is part of the drive mechanism that transports the film. The drive consists of an index motor, a Warner stationary field clutch, a gear train, indexing mechanism and an over-riding clutch.

Power from the index motor is given to one side of the clutch. When the clutch is energized from the index relay, it transmits the drive from the index motor pinion to the second index stage, driving the idler gear, which operates the third index stage.

The electric clutch features compactness, elimination of adjustments, precision control and operation in temperature extremes.

Warner Electric Brake & Clutch Co., Beloit, Wis.

Dustless Blast Cleaner Cuts Time in Half

A new spherical mineral shot dustless blast cleaner affords time savings of up to 50% and uses lower impact velocity and lower blasting pressures, according to the manufacturer.

The mineral shot can be reclaimed for re-use, and since it's said to be moisture-resistant and chemically inert, it can be left in blast cleaning equipment without danger of corrosion or clogging lines and mix chambers. A non-conductor, the product will not affect electrical equipment, it is noted.

Two types are available, Type S for heavy cleaning and Type F for fine finish on precision parts. It is shipped in bulk or 100-lb. bags.

Baldwin-Hill Co., Trenton, N. J.

Fuel Flowmeter Test Stand Measures 12,000 Lb./Hr.

A new fuel flowmeter test stand for calibrating equipment in the range of 100 to 12,000 lb./hr., and capable of providing readings that are accurate to 0.3%, has been completed for the Air Force.

Type E-3 test stand will work with fuel flow transmitters containing control differential synchros, control transformer synchros, torque transmitter synchros and linear synchros—all in the 26-v. 400-cycle-class; and with Magnesyn-type 110-v. 400-cycle and USAF Type H-1A in addition to float-type flowmeters.

Indicators are of servomechanism



Biggest Aviation News for January!

GUIDED MISSILE PROGRAM

REACHES 'PAY-OFF'

MISSILE PROGRAM STORY — January's biggest aviation news — was an exclusive report by military expert Claude Witze, of AVIATION WEEK's Washington Bureau.

THREE MONTH BOX SCORE FOR TOP AVIATION NEWS

November — "DC-7C Challenges Turbine Transports" — by Senior Engineering Editor David A. Anderton.

December — "Wright Pushes 'Supercharged' Turboprop" — by Senior Engineering Editor Irving Stone.

January — "Guided Missile Program Reaches Payoff" — by Military Editor Claude Witze.

AVIATION WEEK'S top news articles are the product of the largest staff of expert Aviation Editors serving any publication. That is why Aviation Management and Engineering people prefer* AVIATION WEEK by a wide margin over any other aeronautical magazine. This exclusive report by Claude Witze, Military Editor at AVIATION WEEK'S Washington Bureau, serves as another illustration of AVIATION WEEK'S on-the-spot coverage of important aviation developments.

In this fast-moving aviation business, engineers and management men want to know about significant developments while they are news, not months later. They need this information to make daily decisions affecting the defense of the nation and the well-being and progress of the country's largest single business — Aviation. These men have learned long ago that it is only through the perceptive reporting and fast publishing schedule of AVIATION WEEK that these important requirements can be met.



CLAUDE WITZE resigned as Director of Public Relations at Piasecki Helicopter Corp., Morton, Pa., in May, 1954, to join AVIATION WEEK as Military Editor in the Washington office. A newspaperman for 17 years before he entered the public relations field in 1950 Mr. Witze was Aviation Editor of the Providence (R. I.) Journal and at that time served as a New England correspondent for AVIATION WEEK. He also worked as a reporter and editorial writer for the Troy (N. Y.) Record, the Hornell (N. Y.) Evening Tribune and the Gloversville (N. Y.) Leader-Republic. While at Piasecki, Mr. Witze served as a member of the public relations advisory committee of Aircraft Industries Assn. He is a member of American Helicopter Society, Aero Club of Washington, Aero Club of New England and Aviation Writers Association.

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AVIATION

WEEK

Pittsburgh 22, Pa., 738-9 Oliver Bldg. Philadelphia 3, Pa., 17th and Sansom Streets. San Francisco 4, Calif., 68 Post Street. St. Louis 8, Mo., Continental Bldg.



type for high accuracy in readings.

The only external connection required to operate the test stand is a 220-v. 60-cycle 3-phase source of power. Non-sparking castor provides portability. The manufacturer can supply these precalibrated master transmitters.

Bone Engineering Corp., 701 W. Broadway, Glendale 4, Calif.



SILICONE FLUID is heart of new relay.

New Time Delay Relay Features Speedy Contacts

Considerable increase in magneto-motive force and special spring loading of the armature of a new silicone-controlled time delay relay achieves high-speed contact action while providing substantial pressure in reducing contact resistance, the maker says.

Designated Type A Silic-O-Netic relay, the device is available with standard one-quarter to 120-sec. timings. Basis of the time delay is a silicone fluid.

Coil ratings range from 24-v. to 240-v. a.c.; 6 to 125-v. d.c.

Heinemann Electric Co., 278 Plum St., Trenton 2, N. J.

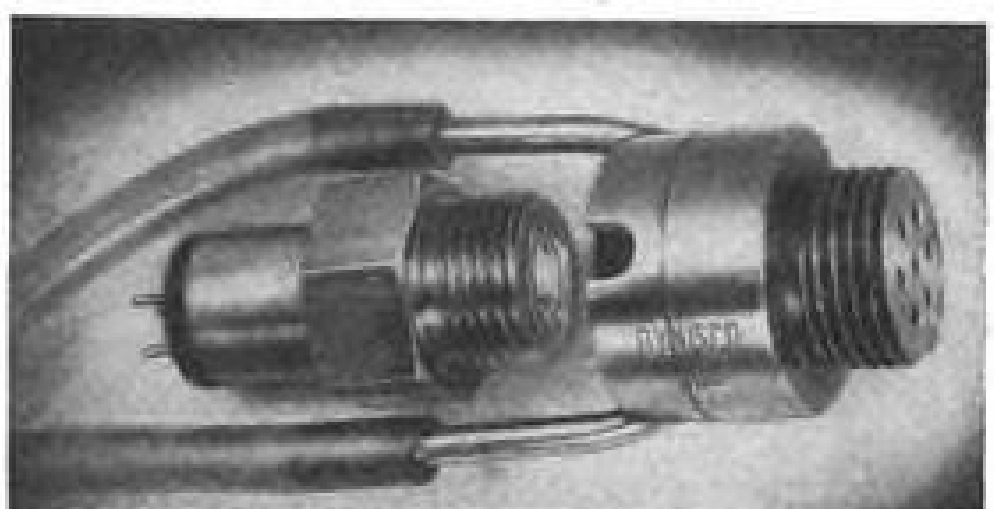
Adaptor Cools Fluid or Gas Used in Pressure Measuring

For measuring pressures at temperatures as high as 4,000F, a water-cooled adaptor for standard pressure pickups, featuring compact size and flush mounting, is available to widen research and control applications.

The adaptor has a cooling water jacket that encloses the tubes and lowers temperature before the hot fluid or gas contacts the pressure pickup.

Adaptors can receive either threaded or flanged Dynamic Instrument Co. pickups, have sensitive diaphragms $\frac{1}{8}$ -in. to $1\frac{1}{2}$ -in. diameter, with no modification of the pickup being necessary. Adaptor has a $\frac{3}{4}$ -in.-16 threaded mount and adaptor and pickups have stainless steel cases to resist corrosion.

Dynamic Instrument Co., Inc., 28 Carleton St., Cambridge, Mass.



PICKUPS can now go to 4,000F.

ALSO ON THE MARKET

Type Certificates for Lear ADF-14C and ADF-R14C automatic direction finders have been granted by Civil Aeronautics Administration, qualifying use of the devices in passenger and cargo planes.—Lear, Inc., LearCal Division, 3171 S. Bundy, Santa Monica, Calif.

Quick-action fastener using live-rubber locking mechanism combines functions of closing and isolation-vibration, the maker says. Developed by Vibrex Fastener Corp. Mt. Kisco, N. Y.—Manufacturer and market agent is General

Tire & Rubber Co., Industrial Products Division, Wabash, Ind.

Electric wire conduit for lightweight applications comprises watertight synthetic cover for use in water or oil environments.—Universal Metal Hose Co., 2133 S. Kedzie Ave., Chicago 23.

Tension-type locknuts allow quick change of the setting of an adjustment screw to any desired position, the maker points out. Barbs at the base of the nut hold it securely. Backoff torque of the tension nut is twice installation torque.—Palnut Co., 61 Cordier St., Irvington 11, N. Y.

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Fuel Flow from 3 P.P.H. to 30,000 P.P.H. Housings up to 2,000 pounds operating pressure. Complete range of filtration from $\frac{1}{2}$ micron to 200-mesh screen (74 microns).



Air Instrument air and breather filter application to 10 c.f.m. Filtration for air-driven instruments and venting of hydraulic systems. (AN6240-1, AN5822-1, AN-6237-1, etc.)

*1 MICRON = .000039"



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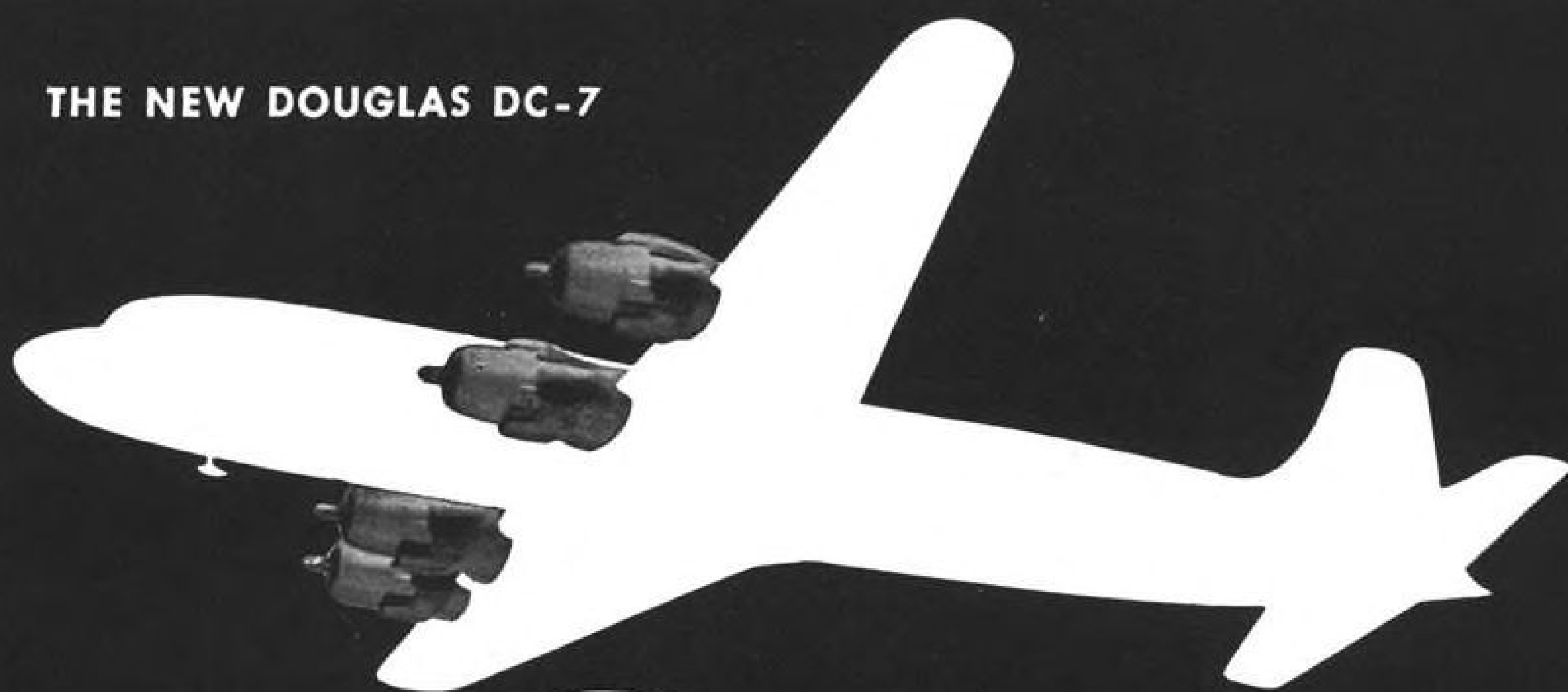
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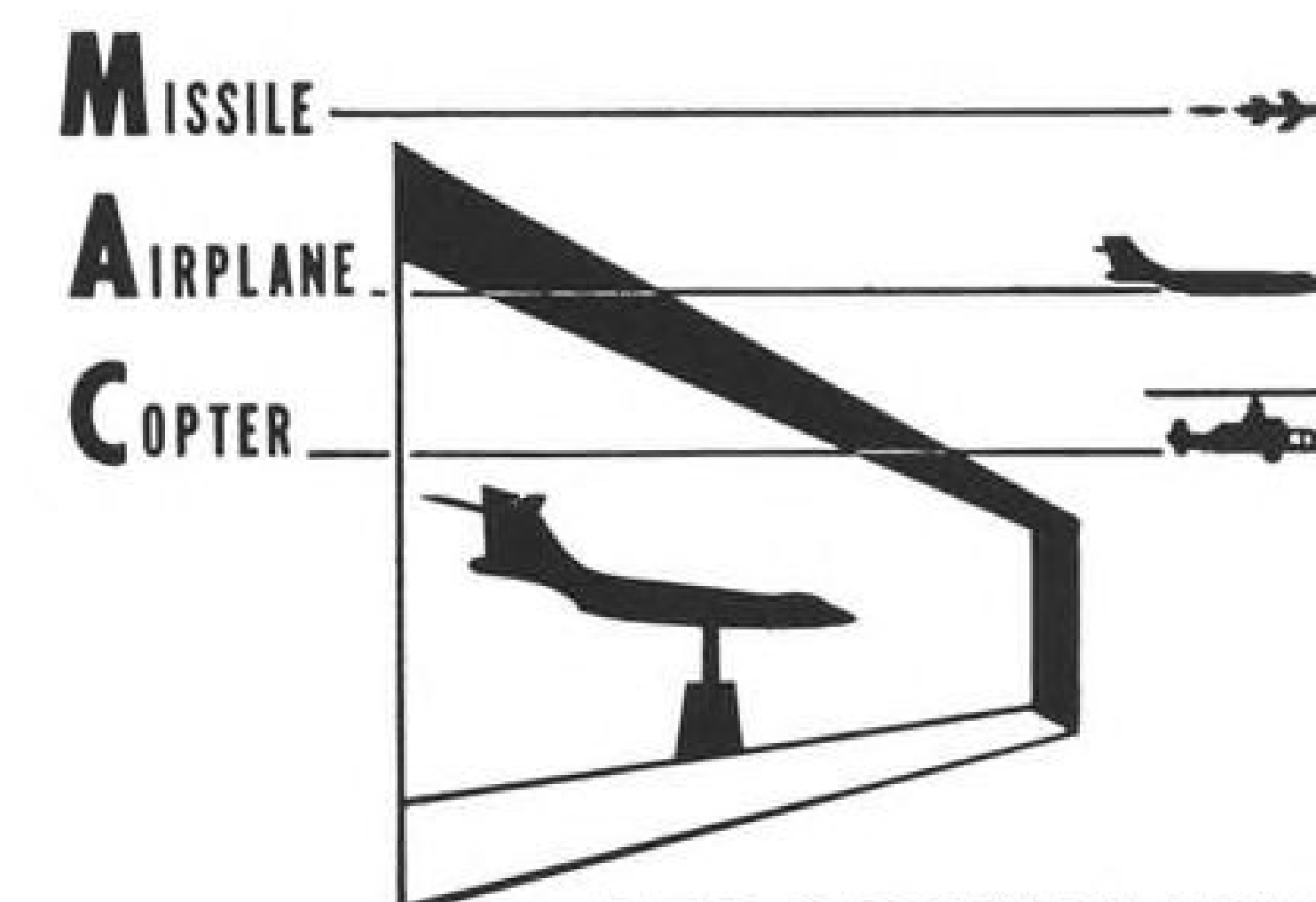
AIRCRAFT CORPORATION

CHULA VISTA AND RIVERSIDE CALIFORNIA

AVIATION CALENDAR

- Mar. 8-10—Air Line Pilots Assn., third annual safety forum, Shoreland Hotel, Chicago.
- Mar. 11—Institute of the Aeronautical Sciences, National Flight Propulsion Meeting (restricted), Hotel Carter, Cleveland.
- Mar. 14-16—Society of Automotive Engineers, production meeting and forum Netherlands Plaza, Cincinnati.
- Mar. 14-18—American Society of Tool Engineers, first Western Industrial Exposition, Shrine Auditorium and Convention Hall, Los Angeles.
- Mar. 20-23—Aero Medical Assn., 26th annual meeting, Hotel Statler, Washington, D. C.
- Mar. 21-24—Institute of Radio Engineers, national conference, Waldorf-Astoria Hotel, Kingsbridge Armory, New York.
- Mar. 28-Apr. 1—American Society for Metals, ninth Western Metal Exposition and Congress, Pan Pacific Auditorium and Ambassador Hotel, Los Angeles.
- Mar. 31-Apr. 1—Symposium on Boundary Layer effects in Aerodynamics, Britain's National Physical Laboratory, Teddington, England.
- Apr. 5-7—Radio Technical Commission for Aeronautics, spring assembly and joint meeting with the Institute of Radio Engineers, Los Angeles.
- Apr. 6-10—World Plastics Fair & Trade Exposition, National Guard Armory, Los Angeles.
- Apr. 13-15—American Society of Lubrication Engineers, 10th annual meeting, Hotel Sherman, Chicago.
- Apr. 14-15—American Ordnance Assn., symposium of Proving Ground Instrumentation Committee, Patrick AFB, Fla.
- Apr. 16-20—American Association of Airport Executives, 1955 annual convention and business meeting, El Conquistador Hotel, Tucson, Ariz.
- Apr. 18-21—Society of Automotive Engineers, Golden Anniversary Aeronautic Meeting, Aeronautic Production Forum and Aircraft Engineering Display, Hotel Statler and McAlpin Hotel, New York.
- Apr. 18-21—American Society of Mechanical Engineers, Diamond Jubilee spring meeting, including four aviation sessions, Lord Baltimore Hotel, Baltimore.
- Apr. 20-22—American Rocket Society, spring meeting, Baltimore.
- Apr. 27-29—Society for Experimental Stress Analysis, spring meeting, Hotel Statler, Los Angeles.
- Apr. 27-30—American Helicopter Society, 11th annual forum, Hotel Mayflower, Washington, D. C.
- Apr. 29—Eastern regional meeting of Institute of Navigation, Friendship Airport, Baltimore, Md.
- Apr. 29-30—New England radio-electronics meeting, sponsored by Boston and Connecticut Valley sections of IRE, Sheraton Plaza Hotel, Boston.
- May 2-5—Society of Aeronautical Weight Engineers, national conference, Hilton Hotel, Ft. Worth.
- May 4-6—Fourth International Aviation Trade Show, 69th Regiment Armory, New York.

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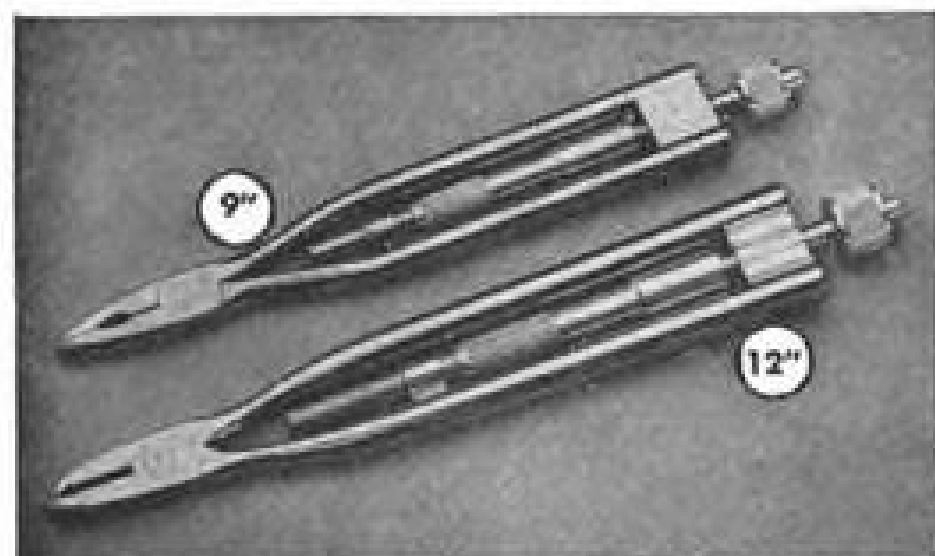
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News Sidelights

Legislation permitting a crop duster to take a lien on a farmer's harvest to insure payment for services was endorsed by California's Gov. Goodwin Knight at the Agricultural Aircraft Assn.'s recent convention.

Savings of \$103,000 are possible in constructing an 8,000-ft.-long, 200-ft.-wide runway if the concrete is the normal 36 in. thick in the center 60 ft. but only 30-in. thick in the remaining width, report two University of California engineers. The technicians measured landings with electrical traffic detector tapes and found distances of impact from runway centerlines did not vary significantly either day or night, IFR or VFR.

Piper Apache twin-engine light transport will be flown across the South Atlantic in mid-March by Piper Aircraft Corp. president William T. Piper's sons. Vice president-development Howard Piper and executive vice president William T. Piper, Jr., will ferry the plane to a Johannesburg, South Africa, customer.

Special short course in winter flying problems has been developed by Taloa Academy of Aeronautics, Oakland, Calif., for business plane and private pilots. To keep costs down, the instrument instruction is taken in the pilot's own plane at a price of \$100 for primary instrument and \$30 for cross-country.

Lear's twin-engine Learstar business plane has been certificated by Civil Aeronautics Administration in the 4b transport category. Learstar is a considerably modified version of the Lockheed 18 Lodestar. Two prototype Learstars have been completed and 10 more are being produced for corporations, including Chance Vought, Inc., Dallas.

Highest mark ever recorded in the radio navigation section of Civil Aeronautics Administration's instrument rating exam has been turned in by 71-yr.-old Marcellus M. Murdock, publisher of the Wichita (Kan.) Eagle. Murdock became interested in aviation through his friendships with the late Walter Beech and late Clyde Cessna.

Ohio farmer was awarded \$9,000 by a federal jury as compensation for giving the Air Force an easement for a sloping air lane over his farm to provide clearance for takeoffs by jets from nearby Youngstown Municipal Airport. In return, the farmer must keep the area clear of obstructions for 25 years.

Aircraft with Russian markings may be spotted over the U. S., but they actually will be USAF fighters painted dark blue with red star insignia to resemble MiG-15s. Planes are being used to film the "McConnell Story," a motion picture on the life of Korean jet ace Capt. Joseph McConnell, killed in the crash of an F-86H at Edwards AFB. Picture will star Alan Ladd.



BOW-DOOR OPEN AND RAMP EXTENDED, a Convair R3Y-2 Tradewind turboprop powered transport taxis toward a beach near San Diego, Calif., in a practice landing maneuver. An anchor to keep the flying boat from broaching in the surf dangles from the Tradewind's aft fuselage. Reversible-pitch props will be used to back the plane off the beach later. Its four 5,500-hp. Allison turboprops give the R3Y-2 a top speed exceeding 400 mph. Range of the 80-ton craft exceeds 2,000 miles.

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New uses for this versatile unit are being constantly uncovered because it provides such a wide range of modification possibilities. For example, it can be magnetically or spring restrained . . . the reluctance-type pick-off is readily adaptable to your needs and it can be made to operate on single phase or three phase current. Many other modifications are possible to meet your special needs.

If you've been looking for a "special" rate gyro, this may be the end of your search. A telegram or phone call will put us in touch with you immediately . . . or write for Bulletin 101W.

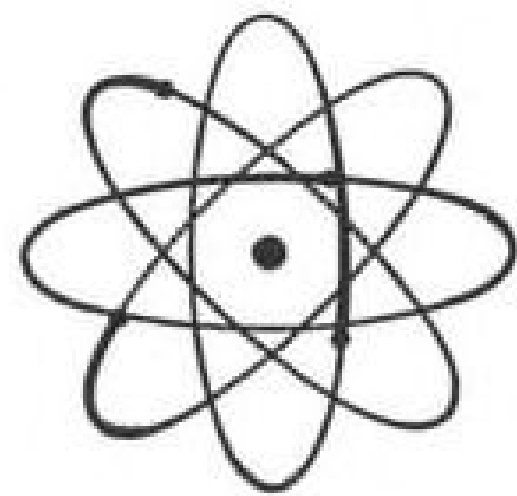
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METALLURGISTS

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Openings also exist for Chemical Engineers, Chemists and Radio Chemists.

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Mr. C. F. Stewart, Atomic Power Division,
Westinghouse Electric Corporation
P.O. Box 1468A, Pittsburgh 30, Pa.

WHO'S WHERE

(Continued from p. 11)

W. B. Agler has moved up in Kawneer Co. to general manager of the Aircraft Products Division, Niles, Mich.

Rear Adm. Henry G. Williams is new military relations director for the Aircraft Products Division of Manning, Maxwell & Moore, Inc., Danbury, Conn.

Roy W. Minson has been named assistant secretary and Chester Lage assistant treasurer of Transocean Air Lines.

Joseph B. Black has been promoted to division manager of contracts administration for Hiller Helicopters, Palo Alto, Calif.

W. J. Pattison is new director of military relations and foreign operations for the Garrett Corp., Los Angeles. Richard Palmer succeeds Pattison as manager of contract and administration department of Garrett's AirResearch Manufacturing Division.

W. L. Gorton, Jr., has been promoted to assistant chief engineer at Pratt & Whitney Aircraft, East Hartford, Conn.

Kenneth L. Marshall is new director of public relations for Bristol Aeroplane Co. of Canada Ltd., Montreal.

Doug Givens has been named Washington representative for de Havilland Aircraft of Canada Ltd., Toronto.

Otto K. Weltin has been appointed assistant director of Cook Research Laboratories, Skokie, Ill., a division of Cook Electric Co. Charles E. Durkee is new technical chief of the lab's radar and communications section.

Martin V. Kiebert, Jr., has become assistant to the chief engineer of Convair, San Diego division of General Dynamics Corp.

Frederick P. Jensen has moved up in Pan American World Airways to passenger traffic manager of the Latin American Division.

Robert F. Griffin has been promoted from general superintendent of Bingham-Herbrand Corp.'s Aviation Division to chief engineer of the Herbrand Division, Fremont, Ohio.

M. E. A. L. de Jong, U.S. director of traffic and sales for KLM Royal Dutch Airlines, has become advisor to the international air carrier's management on worldwide traffic and sales.

A. Robert Teasdale, Jr., has joined Temco Aircraft Corp.'s Engineering Division, Dallas, as chief of electrical design.

J. M. Vinicombe, Jr., has been appointed industrial relations director for Borg-Warner Corp.'s Pesco Products Division, Bedford, Ohio.

Melvin P. Espy is new assistant engineering director of Northrop Aircraft's Anaheim (Calif.) Division.

John W. Kelly has been promoted to chief engineer of Cook Research Laboratories' radar and communications section, Skokie, Ill.

Mrs. Charlotte S. De Armond, formerly with Pacific Airmotive Corp., has been named public relations director of Hoffman Electronics Corp., Los Angeles.

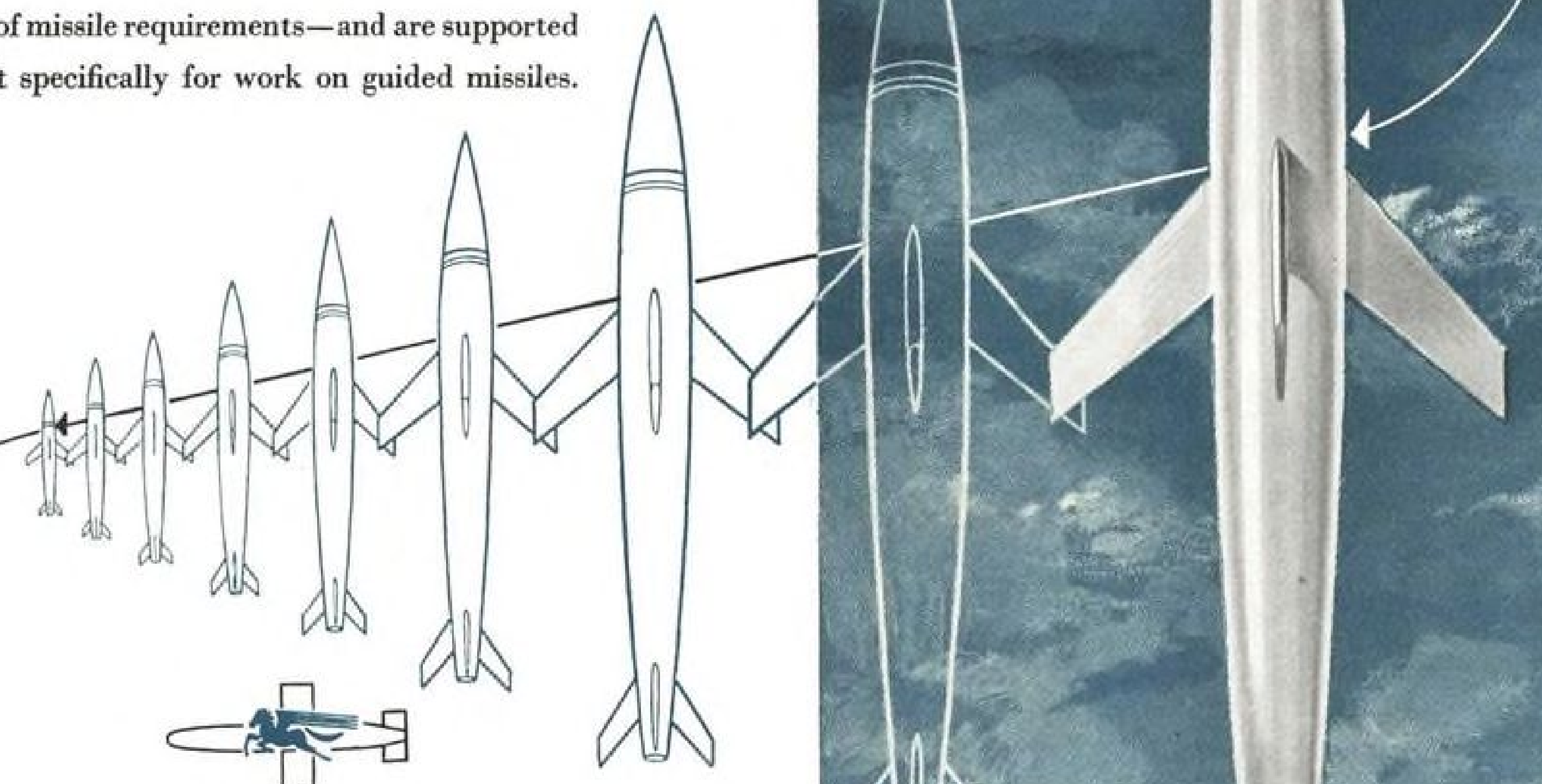
Paul A. Deegan, director of public relations for Avco Manufacturing Co.'s Lycoming Division, Stratford, Conn., has taken on additional duties as advertising director of the parent company's defense and industrial sales.

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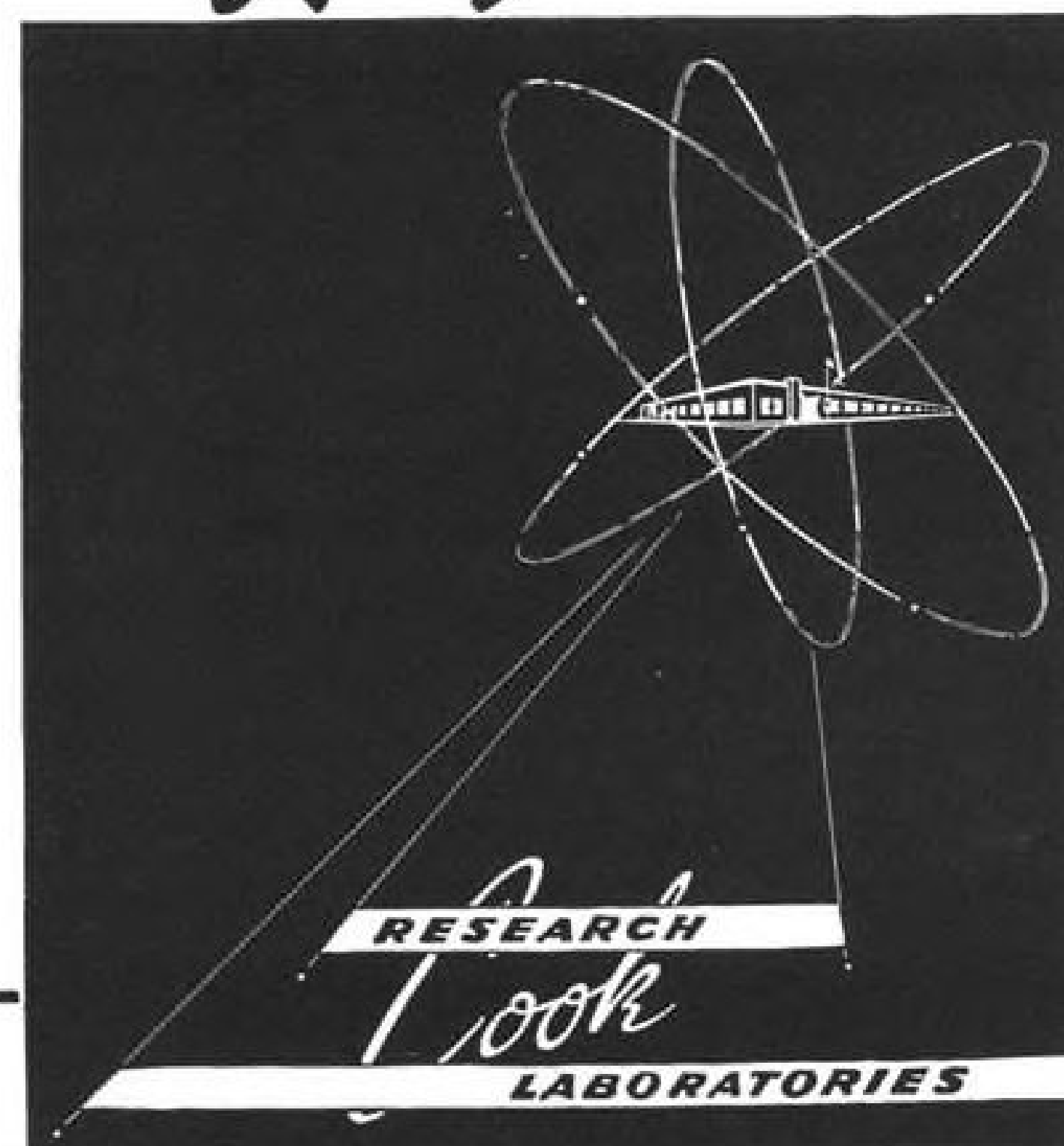


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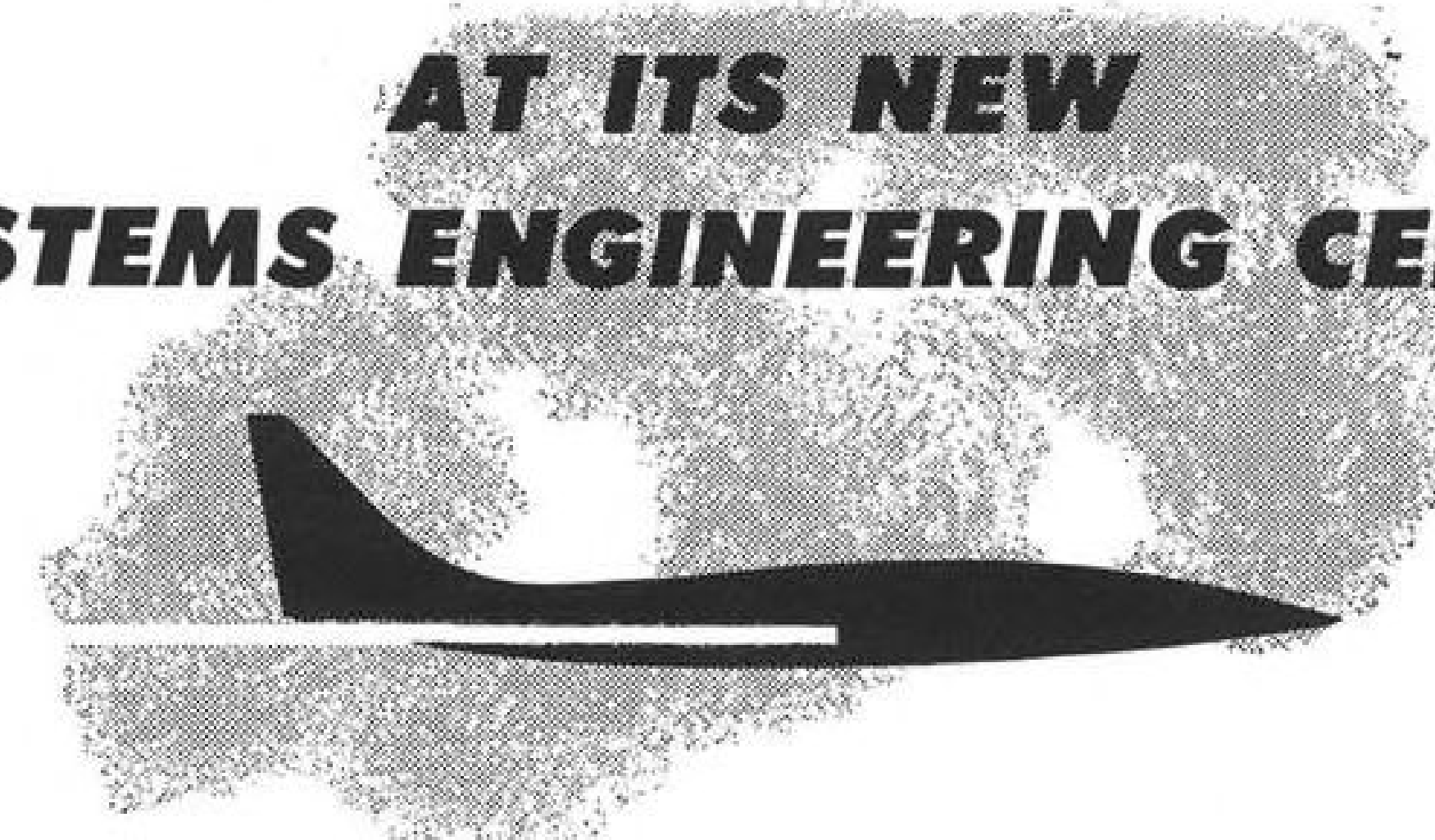
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Experience with oscillograph and electronic flight installations preferred. Ground experience accepted. Openings for a senior and junior position are available in a growing department.

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To conduct pattern studies, design prototype antennas and supervise flight tests of new antenna installations. College graduate in Physics, Math or E.E.

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Senior Research Engineer—Servomechanisms

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See page 69 in this issue for other positions.

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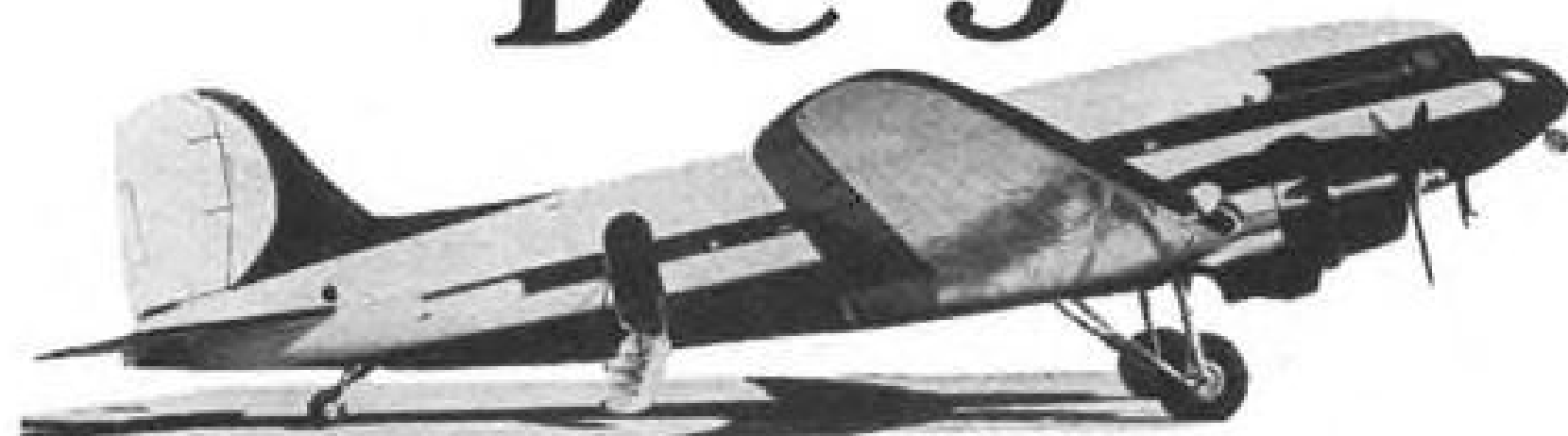
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AIR TRANSPORT



HOW TAXIWAYS WILL FEED into new passenger terminal area is shown in artist's conception. Vehicular traffic passes under taxiways.

Idlewild to Get New Concept in Terminals

- Project will cover 655 acres, cost \$60 million.
- Ten buildings will handle 140 planes at one time.

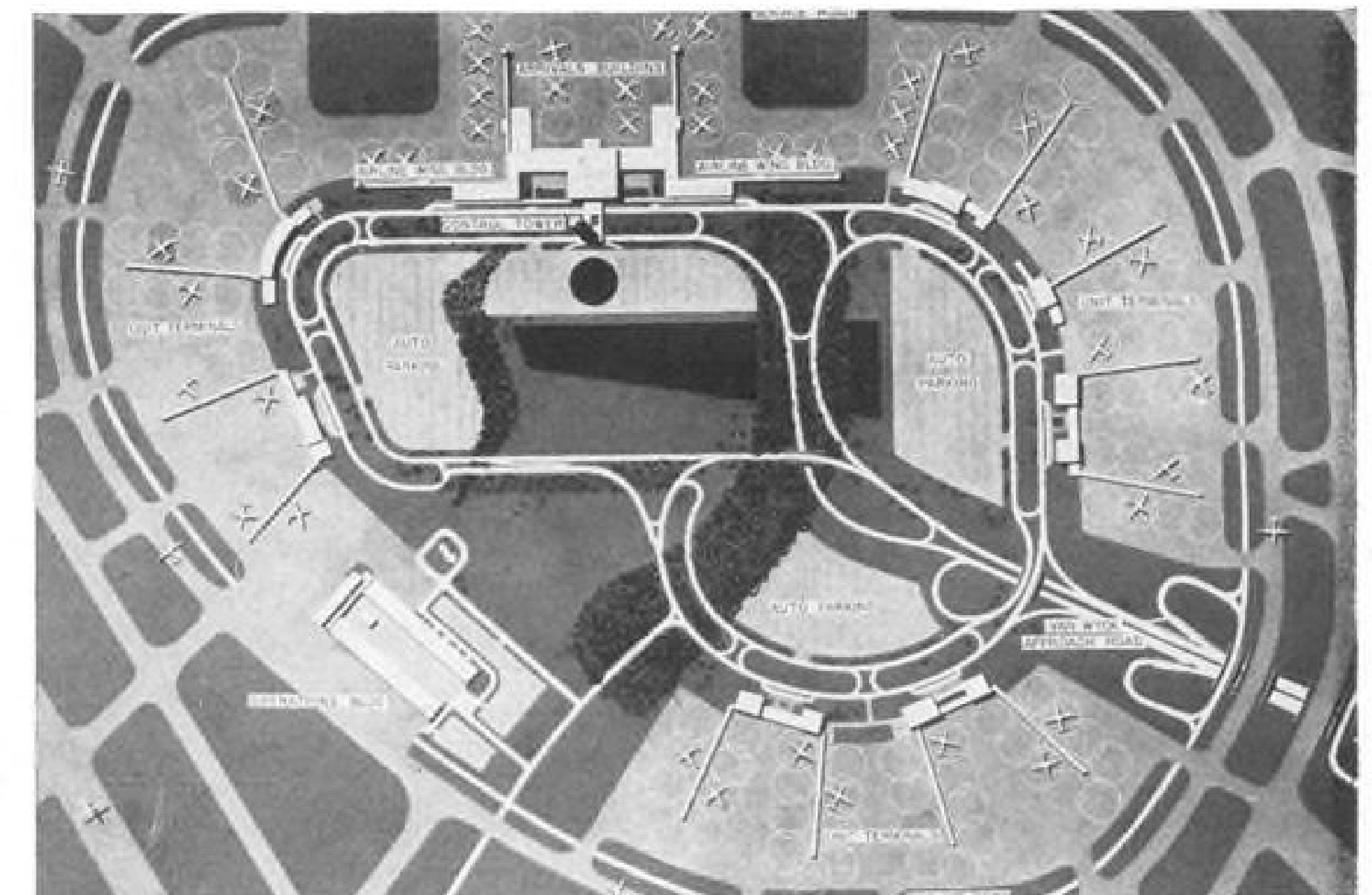
The world's largest air terminal, a \$60-million project capable of handling 140 aircraft at one time, will be started this fall on New York's Idlewild International Airport.

"Terminal City" will be formed by 10 buildings constructed on a 655-acre oval. Largest of the terminals will be an 11-block-long International Arrival Building, with two adjacent airline wing facilities. The seven other buildings will be individual airline terminals.

Port of New York Authority, operator of the 5,000-acre airport, announced last week that the terminal is expected to handle more than 8.5-million passengers by 1965, more than tripling Idlewild's total for 1954.

Construction on the 2,200-ft.-long International Arrival Building and the two adjacent Airline Wing Buildings will begin this fall and be completed by early 1957.

The seven airline unit terminals will be started as soon as design plans are



UNIT TERMINALS have individual gate "fingers," each able to take seven to nine planes.

prepared and contracts let. They will be occupied by American Airlines, Eastern Air Lines, Pan American World Airways, Trans World Airlines, National Airlines and Northwest Orient Airlines.

► New Concept—The 10-building lay-

out involves a new concept in permanent air terminals, designed to the 140-plane requirement. A single structure able to accommodate this number of aircraft simultaneously would be nearly two miles long, making it virtually inoperable by any normal stand-

ard of public airport terminal requirements.

Big advantage of the multi-terminal system is elimination of distance bottlenecks. Passengers originating or terminating their flights at Idlewild (about 85% of all those using the airport) can go directly to or from individual airline terminals with a minimum of walking. Mail, cargo, baggage, commissary supplies, etc., also will move only short distances.

Passengers who transfer from one flight to another on the same airline (10%) will remain in one building. Others who transfer from one airline to another (5%) will be supplied with frequent ground transportation. This may resemble the automotive passenger trains used at the New York World's Fair.

► **International Arrival Building**—The three-story International Arrival Building, plus the adjacent two Airline Wing Buildings, will be erected first at a cost of \$15 million. The buildings will form "the most modern, efficient and largest air passenger terminal in the world," according to Port of New York Authority officials.

The structure will accommodate up to 32 plane positions and will handle all incoming international passengers. The buildings, with a floor area of 227,500 sq. ft., will house all federal inspection services such as health, immigration and customs.

One feature of the International Building layout: Complete separation of incoming and outgoing international passengers. Incoming passengers will be accommodated on the ground floor, where they will go through customs and related functions. Outgoing passengers and airport visitors will use the second floor.

Other facilities included in the building will be a 3,300-ft.-long, partly enclosed observation deck overlooking the active airport and airline and consumer activities. A large restaurant and cocktail lounge will be accommodated in the third floor penthouse.

East and west Airline Wing Buildings will house airline ticket counters, lobbies and offices of these 12 foreign-flag airlines: Aerolineas Argentinas, Air France, British Overseas Airways Corp., Iberia-Lineas Espanolas, Israel National Airlines, KLM Royal Dutch Airlines, Linee Aeree Italiane, Linea Aeropostal Venezolana, Loftleider Icelandic Airlines, Sabena Belgian Air Lines, Scandinavian Airlines System and Swissair.

Access from Airline Wing Buildings to aircraft positions will be through two 500-ft., two-story arcades.

The existing 11-story Control Tower will be enclosed and connected to the International Arrival Building by an elevated promenade.



CONTROL TOWER dominates landscape.

► **Individual Terminals**—The seven individual unit terminals will be laid out in eight-plane position increments, each able to accommodate four aircraft on either side. Buildings incorporate one or two eight-plane fingers.

Provisions will be made for helicopters to land and take off near the outer ends of terminal building fingers.

► **Terminal Facilities**—Other facilities that will go into the complete terminal include:

- Two peripheral taxiways to the passenger area. Each taxiway will be more than seven and a half miles long and 100 ft. wide, equal to the width of an eight-lane highway. Ten miles of two-lane roads will link all of the terminal's buildings and facilities.
- Three large parking lots, with a combined area of 50 acres, will handle up to 6,000 automobiles.
- A central plaza that will include a wooded park and a large reflecting lagoon.
- A 240-room hotel will be erected near the perimeter of the airport to make it accessible to the terminal, yet

removed from Idlewild International far enough to reduce noise.

► **Runways, Hangars**—In addition to the terminals, the Port of New York Authority announced plans to construct two parallel 8,400-ft. instrument runways on a 4-22 heading plus two other parallel runways nearly 10,000-ft. long on a 13-31 heading. Separation of the runways is sufficient to allow simultaneous takeoffs and landings.

Even under IFR conditions, Idlewild will be able to handle from 80 to 100 aircraft an hour, PNYA officials estimated.

Construction is under way on two new cargo buildings costing \$2.5 million and three new taxiways adding up to \$1.7 million.

This June a structure near the Federal Building will be open to house air traffic control center facilities for the Eastern United States and North Atlantic areas.

Also under construction are two \$5-million facilities, one each for United and Eastern, plus a \$1.5-million combined hangar-and-communications center for the Civil Aeronautics Administration.

American, Pan American and TWA plan to build hangars at Idlewild this year.

► **Flight Distribution**—Here is how the Port Authority will distribute flights among the three New York Metropolitan airports:

- Idlewild International will handle 100% of all international flights, 50% of all longhaul operations and 25% of the shorthaul. It will get 50% of all New York City area traffic.
- Newark will have 50% of the longhaul flights and 25% of the shorthaul operations.
- LaGuardia will handle 50% of the shorthaul operations.

► **Terminal Design**—The functional and physical planning of a terminal area and individual terminal structures was done by the Port of New York Authority's aviation planning division, headed by Thomas M. Sullivan.

The Port Authority is retaining Wallace K. Harrison as design consultant and co-ordinator of exterior architecture of the various buildings, roadways, layout, landscaping, etc. Harrison's more famous projects include Rockefeller Center and the United Nations buildings.

Skidmore, Owings & Merrill, famed for New York's Lever House, will work in co-operation with the Port Authority staff to design the Port Authority buildings.

All phases of the International Airport terminal project are under the supervision of Fred M. Glass, director of aviation for the New York Port Authority.

CAB Revises Survival Proposals

New amendments to Civil Air Regulations spell out airline procedures and equipment for emergencies.

Amendments to the Civil Air Regulations covering emergency and evacuation equipment and procedures have been proposed for air carriers in domestic, international and irregular operations by Civil Aeronautics Board.

The proposals are a revision of a set issued last August which ran into stiff opposition from the Air Transport Assn. Civil Aeronautics Administration and the Air Line Pilots Assn. were in general agreement, but all three asked for various changes.

► **New Over-Water Requirements**—The amendments would specify procedures and equipment to be maintained by carriers for use in emergency situations. Affected parties are invited to comment by Mar. 18.

Under the proposed rules airlines would have to carry certain equipment for over-water operation, including life vests and life rafts sufficient to accommodate all occupants of the airplane, a portable emergency radio signaling device and suitable pyrotechnic signaling devices. All this gear would have to be easily and quickly accessible in an emergency.

Other proposed requirements:

- A survival kit appropriate for the route flown would have to be attached to each life raft.
- All doors and emergency exits more than six feet from the ground, except for emergency exits over the wing, would be required to have a chute or other device for rapid evacuation ready for use.
- All emergency exits, with their means of access and means of opening would be conspicuously marked and recognizable from a distance equal to the width of the cabin. Location of the emergency exit operating handle and opening instructions would have to be marked and readable from a distance of thirty inches.
- For night operations, lights with independent power would have to be installed to illuminate all emergency exit markings.
- Air carriers would be required to assign all necessary emergency functions to members of the crew for performance in circumstances requiring emergency evacuation.
- Emergency equipment inspection would be required, along with periodic testing of life rafts and life vests.

In extended over-water operations, passengers would be orally briefed on location of life rafts and location and method of operation of life vests and emergency exits. The briefing, which

would be described in the air carrier manual, would include a demonstration of the operation of the life vest.

► **Over-Water Definition**—When a flight proceeded over water immediately after takeoff, briefing on life vests and emergency exits would be done before takeoff and the remainder as soon as possible. Otherwise, briefing could be done in the air, but would have to be accomplished before flying over water.

Extended over-water operations would consist of a flight over water conducted more than fifty miles from the nearest shoreline.

Rules for irregular and international carriers would be changed to require first aid kits and other emergency equipment appropriate to the territory over which a flight is made.

Domestic carrier rules would be changed to require marking of exterior areas of the fuselage to indicate mechanisms of access and areas suitable for cutting to effect escape of occupants in the event of an accident.

Lufthansa Schedules Domestic Test Runs

Still hoping for the lifting of final political bans so that it can inaugurate service in April as planned, the German airline Lufthansa will start a series of test flights over its proposed European routes within the next several weeks.



CAA Officials Get Turboprop C-130 Briefing

Comprehensive briefing on Lockheed C-130A, the Hercules turboprop-powered transport, was given to 12 Civil Aeronautics Administration officials recently during two-day visit to firm's Marietta, Ga., plant. Getting briefed on the C-130A's Allison T56

Since the carrier will not receive its Lockheed Super Constellations until late spring, initial planned service will be with its four Convair 340s over European routes. The test runs will be made over the following:

- Hamburg-Dusseldorf-London and also Munich-Frankfurt-London, both daily flights.
- Hamburg-Frankfurt-Paris flights thrice weekly.
- Hamburg - Cologne-Frankfurt-Madrid, twice weekly.

Present plans call for inauguration of trans-Atlantic service sometime this summer. In addition to the four Super Connies on order for this service, Lufthansa has taken an option on four more.

ATA, Copter Builders Study Civil Problems

Substantial progress toward helicopter and heliport criteria, major stumbling block to wider commercial use of rotary-wing aircraft, is expected to result from a two-day meeting held recently by the rotorcraft committee of the Air Transport Assn. with helicopter manufacturers and the New York Port Authority.

Chairman Charles Froesch of Eastern Air Lines said that the ATA committee will use results of the meeting to compile a report for its directors and the International Air Transport Assn.

Indications are that the report will suggest an agreement is possible among ATA, the manufacturers and the Port Authority on heliport dimensions, take-off procedures, glide angles and other technical questions not previously resolved.

engine are (left to right): Paul H. Bremer, Lockheed structural engineer; George W. Haldeman, CAA; Al D. Brown, C-130 project engineer; H. D. Hoekstra, CAA, and Gordon P. Thorn, Lockheed research engineer. C-130A is being built for USAF.

Comparisons

Here is how the proposed \$60-million Idlewild terminal project compares with other New York airport facilities:

The entire cost of LaGuardia Field was \$39 million, plus \$7 million in subsequent improvements, for a total of \$46 million.

The 655-acre passenger terminal area is 105 acres larger than all of LaGuardia (and three-fourths the size of New York's Central Park).

The estimated total of 8.5 million passengers to be handled annually compares with 5 million handled at LaGuardia in 1954.

The 140 plane positions compares with 18 at LaGuardia, 29 at Idlewild as it exists today and 16 at Newark.

IATA Drafts Airline Helicopter Proposals

Commercial helicopter operators would be given wide latitude to exercise discretion over pilot competence and marginal weather flying under recommendations drafted by the helicopter working group of the International Air Transport Assn.

First formal statement of international airlines on the operation and design of helicopters, formulated last November at a meeting in Montreal, favors:

- Giving the pilot responsibility to slow down in poor visibility without an established scale of visibility versus speed. This would not apply in traffic where helicopters and fixed-wing aircraft are mixed, requiring maintenance of usual VFR standards.
- Giving similar responsibility, for turning back or diverting, to the pilot on a VFR flight that runs into below-minimum weather.
- Giving to the airline responsibility to determine the amount of training required to check out a fixed-wing pilot for helicopter operations, just as they convert pilots to new equipment at present.

In a special list of recommendations drawn up for helicopter manufacturers and other "outside interests," the IATA group calls for improved instrumentation. The report says two pilots are necessary to operate multi-engine helicopters on IFR at low forward speeds. ▶ **Instrument Needs**—"Notwithstanding this fact," IATA says, "there is a requirement for the development of an instrument that will combine attitude measurement with rate measurement and present the information in one instrument instead of two."

Other instrument requirements are for more accurate altimeters and air-speed indicators.

The report declares that it will be impossible to expand heliports or raze obstacles to accommodate low performance helicopters. For this reason, the IATA members say, performance characteristics of the aircraft must be determined by the heliports, not vice-versa. In this, IATA differs with the heliport committee of the Aircraft Industries Assn. (AVIATION WEEK Nov. 29, 1954, p. 13).

- Other recommendations by IATA:
- Obstacle clearance requirements should be no more stringent than those for fixed-wing planes and probably less.
 - Specific requirements for fuel and oil reserves would be unrealistic; amount carried should be decided by the operator for each flight according to circumstances.
 - There should be no rule requiring two pilots.

- Noise problem should be attacked by keeping copters away from residential areas, muffling engines, deflecting noise away from perimeter of heliports.
- Blades and rotor heads need protection against ice.

Board Fails to Solve Braniff Route Dispute

Latest Civil Aeronautics Board decision on Braniff Airways' Route 106, center of a trunkline-local service dispute, has left the problem unresolved.

The CAB has ordered Braniff to continue serving Route 106 as it has in the past, since United Air Lines and Ozark Air Lines have balked at taking on the new service assigned them by the Board.

▶ **Controversy Develops**—Last December, a CAB decision split Route 106 among Braniff, United and Ozark (AVIATION WEEK Jan. 3, p. 18). Up to that time it had been operated as a local service route, but the Board decided that questions of subsidy and service to the communities involved would be best answered by changing 106 to a trunkline route, assigning certain points to UAL and Ozark. The date set for the change was Feb. 20, 1955.

The decision caused considerable controversy both in and out of the CAB. Member Josh Lee felt the route should go to Ozark to strengthen the feeder line structure (AVIATION WEEK Jan. 17, p. 100). He said the Board, through its decision, was moving toward abolishment of the local service system.

United, Ozark and North Central Airlines asked the CAB to reconsider its action. Each of them felt that the whole route should have been incorporated into its system, rather than

distributed among three carriers. In addition, certain legal questions were raised concerning the Board's authority in the case.

▶ **Denial Reasoning**—The Board has denied these petitions and, at the last minute, ordered Braniff to continue its service to all points it served before the route was split. This step was necessary to avoid leaving Dubuque, Fort Dodge, Clinton, Ia., and Rockford, Ill., without service when it became apparent that United and Ozark would not be ready to step in when Braniff suspended at those points.

Braniff's new authorization is extended to July 1, 1956, or until United and Ozark inaugurate service, whichever occurs first.

In denying the petitions for reconsideration, the CAB majority said that it was convinced that "the air service needs of the communities here involved will be better met and at less cost to the government by placing these communities on the route systems of Braniff, United and Ozark as we proposed, rather than by their retention on Route No. 106 as an entity to be served by a single carrier."

"It is not without significance that none of the civic intervenors in this proceeding, some of whom expressed themselves vigorously with respect to the service deficiencies under the present mode of operation of Route No. 106, have petitioned for reconsideration of our decision."

▶ **Lee's Dissent**—The CAB has also directed both Ozark and United to show cause why they should not be ordered to inaugurate service to the points specified for them.

Once more, Josh Lee dissented from the majority action in the matter. He repeated his former opinion that Route 106 is a feeder route and should be retained as such, and said that the Board

has passed up an opportunity to correct its past decision, one which Lee feels will be impossible to implement.

"For a period of nine years," Lee said, "confusion and uncertainty have existed with respect to air transportation over this route. All of this could be ended quickly by merely granting Ozark's petition for reconsideration and awarding the route to Ozark—a decision which is required by the facts of record in this case. But instead, the majority by its action is creating additional difficulties with respect to this route which may take years to untangle."

AA Traffic Increases Despite Pilot Strike

American Airlines increased revenues and traffic in 1954, despite losses suffered during last summer's 24-day pilot strike.

Total revenue was \$214,766,204 last year, compared with \$208,305,856 for 1953. Net earnings of \$11,431,287 were down from the \$13,413,051 netted by American in 1953, but the credit of a tax adjustment made for the years 1949-52 brought the total to \$14,474,707. Total per share of common stock was \$1.97 after preferred stock dividends. The 1953 total was \$1.85 per common share.

▶ **DC-4s Sold**—American flew 3,445,686,192 revenue passenger miles in 1954, compared with 3,306,417,003 in 1953.

Two factors which contributed to earnings were the sale of five DC-4s, which resulted in a net profit of \$1,142,000, and an extension of the useful life estimate of DC-6Bs, from five to seven years, which added \$904,000 to 1954 net earnings.

American figures that the suspension of service during the August strike cost the company a \$2,790,000 loss for that month.

The board of directors has authorized a dividend of 20 cents a common share to be paid Mar. 21 to holders of record Mar. 4.

SHORTLINES

▶ **Northwest Orient Airlines** reports January passenger traffic up 18.4% over January 1954.

▶ **United Air Lines** is installing electric ticket machines in main ticket offices in New York, Denver, Seattle, Los Angeles and San Francisco. The "ticket-eters" stamp out all details on blank tickets and cut handling required by sales agents. They already are in use

in Chicago and Cleveland . . . UAL reports a 26% increase in vacation traffic to California and Hawaii during 1954.

▶ **Swissair** reports it flew 10.8 million route miles in 1954, compared with 7.9 million the previous year. Total passengers carried increased 28%, cargo 22% and mail 19%. Revenues approximated \$28 million, against \$22 million in 1953.

▶ **North Central Airlines** had its best January on record last month. The airline carried 23,008 revenue passengers, an increase of 51% over January 1954. Revenue passenger miles totaled 3,705,520, with a load factor of 42%.

▶ **Pan American World Airways** has sold its interest in Middle East Airlines to Saeb Sala, president of the Arab line.

▶ **United Air Lines** has signed an interline agreement with Iranian Airways that adds 15 cities in the Middle East to UAL's system. Connections can be made through KLM Royal Dutch Airlines, Air France, Scandinavian Airlines System or Lincee Aeree Italiane, all of which operate to Teheran.

▶ **International Air Transport Assn.** says scheduled airlines serving Europe will

increase passenger seats by 14% this summer to accommodate expected increases in tourist and business traffic. Summer operations begin Apr. 17.

CAB ORDERS

(Feb. 10 to Feb. 16)

GRANTED:

Nebraska Department of Aeronautics leave to intervene in a case involving service by Western Air Lines to Richfield and St. George, Utah, and Chadron, Neb.

Capital Airlines a temporary exemption to allow free transportation for five representatives of Vickers-Armstrongs Ltd. and six representatives of Rolls-Royce Ltd. for purposes of technical observation on Capital's new Vickers Viscounts.

APPROVED:

Agreements between Capital Airlines, North Central Airlines and various other carriers relating to intercompany arrangements.

DENIED:

El Al Israel Airlines application for a permit to allow use of Philadelphia as a terminal on a flight to Israel.

DISMISSED:

Investigation and suspension of certain Delta-C&S Air Lines fares, since the fares have been canceled.



New Puerto Rico Terminal Nears Use

Puerto Rico's new \$15-million international airport, to be inaugurated May 20-22 will be only 15 minutes from San Juan (background) by the connecting expressway under construction. Field will have 8,000-ft.

runways. Terminal facilities are designed to handle 50,000 airline passengers a month, compared with the present air terminal's capacity of some 40,000 under pressure. New field will have a 30-room hotel.

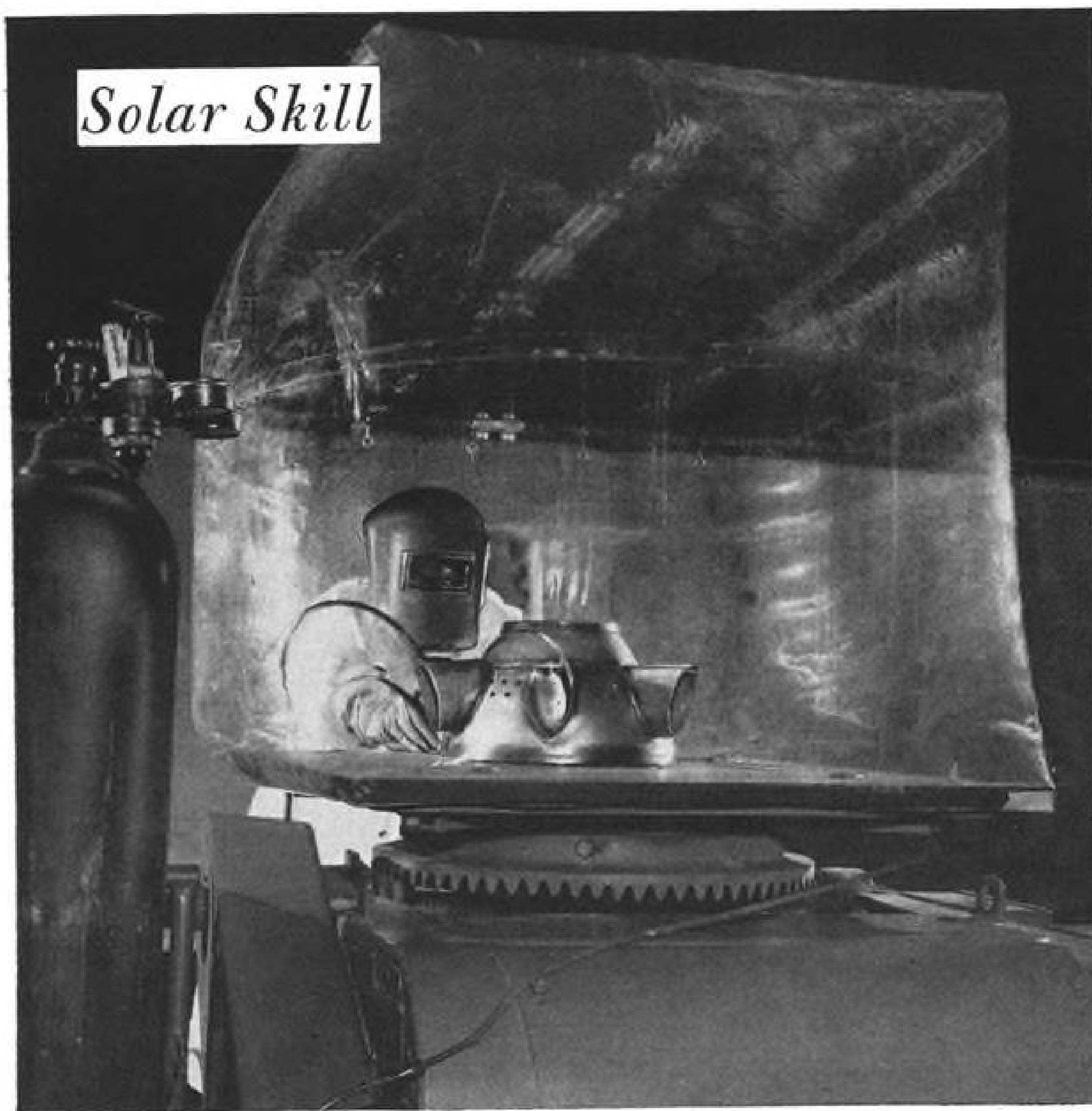


Local Service Executives Tour Europe

This group of U.S. local service airlines officials is pictured at Brussels during a recent tour of Europe as guests of Sabena Belgian World Airlines. From left to right: Sidney F. McCullough, Ozark Air Lines' general sales manager; Harold Goodson, Southern Airways' district sales manager; L. J. Eichner, vice president-traffic and sales, Trans-Texas Airways; R. D. Hager, Piedmont Airlines' vice president; David L. Miller, vice president-traffic and sales,

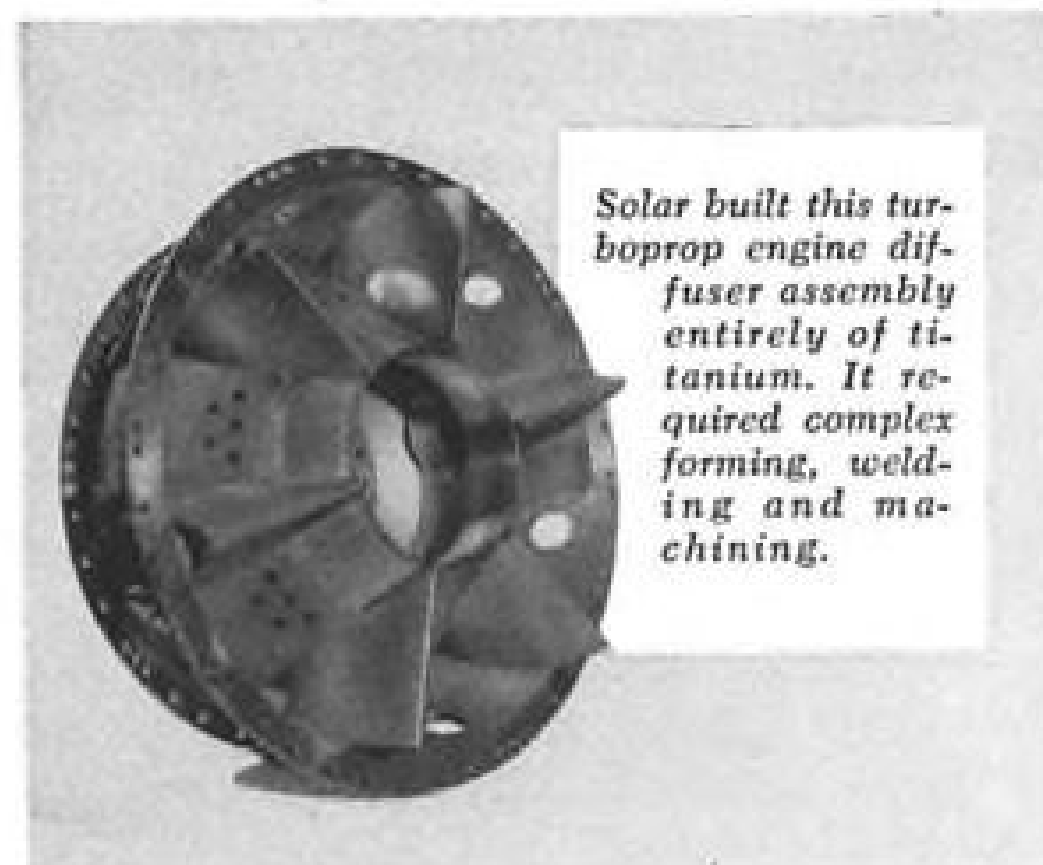
Allegheny Airlines; Tom Croson, general sales manager of West Coast Airlines; Andre Seydel, Sabena interline manager; R. H. Herrnstein, Bonanza Airlines' vice president-traffic and sales; Keith Kahle, Central Airlines' president; Frank Buttomer, vice president-traffic and sales, North Central Airlines; James W. E. Humphrey, Lake Central Airlines' general sales manager, and Alwin Johnson, who is vice president and treasurer of Southwest Airways.

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Solar built this turboprop engine diffuser assembly entirely of titanium. It required complex forming, welding and machining.

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EDITORIAL

Security: Genuine vs. Phony Brands

Recently we had the pleasure of listening to Maj. Gen. Joseph Carroll, Deputy Inspector-General of the Air Force and former agent of the Federal Bureau of Investigation, speak to the Aero Club of Washington on the problem of military security. Gen. Carroll's speech was "off the record" but it is betraying no confidence to say that he believes this country has a grave and complex technical security problem.

No American even vaguely familiar with the technological race we are now running with Russia for supremacy in the atomic-air age would disagree with Gen. Carroll's basic emphasis on this problem.

New Security Problem

This country faces a technical security problem even more serious than during World War II because the pace of technical development is running much faster and consequently the time differential between an enemy's developments and our own is even harder to maintain.

However, the efforts of technically and professionally qualified people concerned with organizing and maintaining military security standards and applications to civilian industries developing defense products have been enormously complicated, seriously diluted and often publicly discredited by the actions of ignorant bureaucrats, amateur sleuths and political demagogues who know little and care less about genuine technical security.

Recently we had a good example of how a politician, uninformed on military technology and eager for a newspaper headline, used the pretext of military security to further his political aims.

George Edward Cecil Wigg is a Labor party member of the British Parliament representing the constituency of Dudley. Wigg's military career began just after World War I when he enlisted in the Royal Tank Corps as a private. He left the British Army a few years before World War II but re-joined in 1940 serving in the Army Educational Corps and attaining the rank of colonel. Britain's distinguished Prime Minister Sir Winston Churchill referred to him as "an army school-teacher" in a recent official debate.

With this background as a tanker and "army school-teacher," Wigg has now blossomed as an aviation expert. In a story on the front page of the London Daily Express, Wigg called for a parliamentary investigation of how British aviation "secrets" are leaking to the foreign press. He cited three items in AVIATION WEEK as examples of British "secrets" that had allegedly "leaked" into foreign print.

These examples were:

- "The first line day-fighter strength of the Royal Air Force now consists of 400 Canadian-built F-86s powered by General Electric and Avro Orenda turbojets. RAF will pass on its earlier J47-powered Sabres to Greeks and Turks when it finally gets operational squadrons of British-built Hunters and Swifts" (AVIATION WEEK July 12, 1954, p. 11).
- "Hawker Hunter now has its four 30-mm. Aden guns

mounted in a removable armament package similar to the arrangement of cannon on the Russian MiG-15" (AVIATION WEEK Oct. 4, 1954, p. 11).

• "Future British interceptors will be armed with de Havilland air-to-air missiles using an infra-red target-seeking device. Delta-wing Gloster Javelin all-weather fighter may be the first RAF interceptor to carry the de Havilland missile" (AVIATION WEEK Dec. 13, 1954, p. 11).

The first item came from a public statement in London by Brooke Claxton, Canadian Defense Minister. If Wigg read his home-grown aviation publications he would have known that our British contemporary Flight (much to our chagrin) printed this story before it appeared in AVIATION WEEK.

The second item was visible at a public display of the Hunter at the 1954 Farnborough show sponsored by the Society of British Aircraft Constructors. This show was seen by more than 200,000 people including military airmen and technicians from 90 foreign countries. The device in question was also copied from a Russian fighter that had been in combat over Korea for more than two years.

British Missile Lag

The third item was based on a public statement of Duncan Sandys, former British Minister of Supply, that all future RAF fighters would be equipped with air-to-air missiles and concerns a missile type and guidance system that date back to the end of World War II when both the United States and Germany were developing infrared guidance, commonly called "heat-seekers." De Havilland has publicly announced it is doing missile development.

Both the Sparrow developed by our Navy and the Falcon being used by USAF as air-to-air missiles for all-weather fighter squadrons are in production and actual use and have been discussed publicly by responsible Pentagon officials.

The only security involved in this item is that it revealed to the British people how far behind they are lagging in the modern air defense so vital to the future of their island.

Thus Wigg bases his case for a parliamentary investigation on:

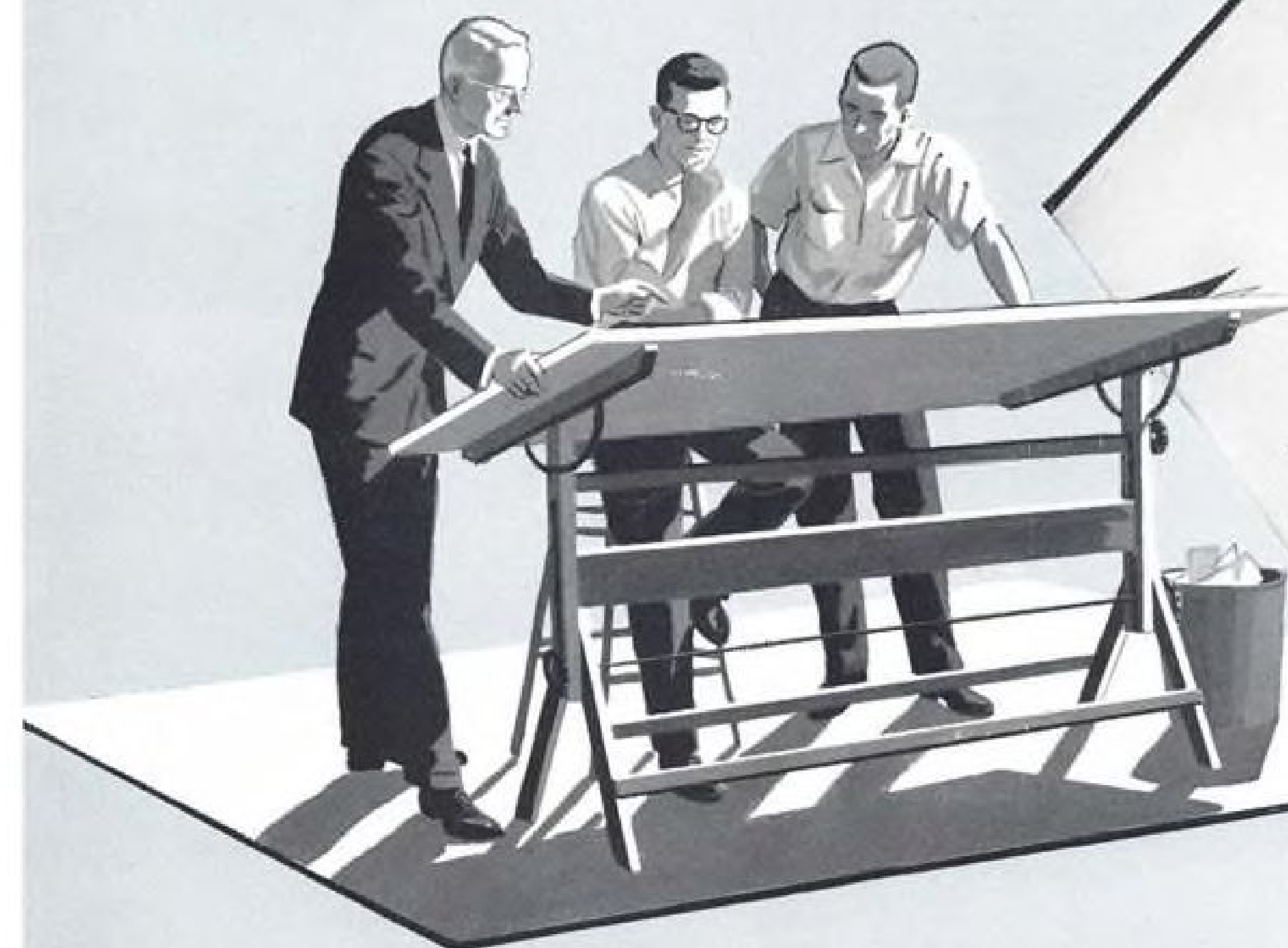
1. A public statement by the Canadian Defense Minister.
2. The 1954 SBAC show at Farnborough.
3. The revelation that Britain is pursuing World War II ideas in its badly lagging missile program.

In American slang we would reach a verdict that the M.P. from Dudley has "flipped his wig."

This is a prime example of how a poorly informed politician can befuddle the public on the real military security problem with his raucous cries of "wolf" when no real danger exists. This makes it doubly difficult for proper authorities to get effective co-operation from both public and the free press when a real security problem arises.

—Robert Hotz

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