

# AVIATION WEEK

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APR. 10, 1950



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J-54003-B

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## Now DC-4 operators, too, can cut brake maintenance costs

THE AIRLINES that have switched their DC-3s to B. F. Goodrich brakes have made important reductions in maintenance costs. TWA reports substantial savings on its Stratoliner brake maintenance after making the switch. Now DC-4 operators can do the same!

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## NEWS SIDELIGHTS

### Piasecki Advertising Sequel

Since Piasecki Helicopter Corp., Morton, Pa., advertised for help wanted in Sikorsky Aircraft's hometown newspaper, the Bridgeport, Conn., Post (AVIATION WEEK March 6) there have been new developments:

- Piasecki management apologized to the United Aircraft Corp. management for the advertisement the day after it appeared.

- Similar apologies were promptly made by Piasecki management to Bell Aircraft and McDonnell Aircraft for similar ads placed in Buffalo and St. Louis papers.

The ad was headed "Piasecki Wins Again" and called for experienced engineering personnel to "advance with the winner," referring to selection of Piasecki's H-21 as winner in a USAF Arctic rescue helicopter competition in which all four helicopter manufacturers entered.

AVIATION WEEK has learned that the Piasecki proposal for its model PD-22 (H-21) which used a Wright R-1820-76A engine rated at 1090 hp. (most powerful engine specified in the competition) was judged the only entry that fully met tactical requirements.

Air Materiel Command laboratories reviewed data submitted by the competing companies after which a 10-man service evaluation team (7 pilots and 3 maintenance specialists) visited each plant to evaluate a prototype in flight test. Their evaluation was further reviewed by the USAF Transport Helicopter Board at Wright Field which recommended the H-21 procurement in December. Six weeks later, after further review at the Pentagon, the award was made to Piasecki.

Last week detailed negotiations leading to signing of the official contract for the H-21 were virtually completed and signing was expected "any day now."

### More Saucers

Pentagon officials were up to their ears in rumors again last week—persistent flying saucers' rumors.

The fabulous discs are everywhere, so the stories went.

Final straw was the story which broke in David Lawrence's weekly, U. S. News and World Report. Typical of Lawrence's staunch Navy support, the story said the discs were piloted aircraft developed by the Navy. Details recited included: 105 ft. diameter,

### Scratch the War Babies

After four years of stretching the war-weary surplus fighters of World War II into higher speeds at the National Air Races at Cleveland every Labor Day, the Air Race management has called a halt in the interest of safety. There will be no high-speed piston-engine fighter Thompson pylon race this year, nor will the piston-engine fighter Bendix cross-country race be run.

Competition on Sept. 2-4 will be confined to USAF and Navy jet fighter events (jets will compete against time), and to midget-plane closed-course racing, with possible new emphasis on a static show of aircraft and equipment. Jets will compete on a 100-kilometer course to be set up over open country with emphasis on safety for pilots and spectators. A jet division of the Bendix will also be run from the West Coast.

A new sponsor for the midget races, to be named shortly, may be Thompson products. Good-year, which sponsored the midgets under a three-year contract, withdrew at completion of that contract. A possible additional event either this year or next may be another racing competition for planes larger than the midgets, probably of 350 to 500 cu. in. displacement as compared to the 190 cu. in. displacement of the midgets.

10 ft. thickness, jet nozzles variable in direction for control.

No sooner had that story got out than Henry J. Taylor, radio commentator, stated just as unequivocally that the flying saucers are secret developments of the "Army Air Force."

At President Truman's request, Defense Secretary Johnson stated:

"There is no intention of reopening Project Saucer, an Air Force special project closed three months ago (to investigate the saucers). However inasmuch as air defense is an Air Force responsibility, USAF has continued and will continue to receive and evaluate any unusual aerial phenomena. None of the three services or any other agency of the Department of Defense

is conducting experiments, classified or otherwise, with disc-shaped flying objects which could be a basis for the reported phenomena. As previously reported, there has been no evidence that the phenomena are attributable to the activity of a foreign nation."

AVIATION WEEK last week learned that one early USAF investigation report returned by Project Saucer, but discarded for lack of sufficient corroborating evidence, indicated that the "saucers" may be of Russian origin.

Meanwhile U. S. News and World Report stayed with its story, asserted it could prove its authenticity "if it could reveal its sources of information."

### Air Field Survey

Air force has assigned to Continental Air Command the task of surveying airfields throughout the nation for utilization as operational bases for jet fighters and bombers in event of war.

Pilot task force set up at Mitchel AFB, Long Island, N. Y., is composed of six-man team of Air Force reservists. The men are to determine which fields in the Zone of Defense area of New York have facilities to handle the fast jet combat aircraft.

Their findings and technique will be basis for similar studies throughout U. S. by similar teams.

### Who Wags What?

House Armed Services Committee's Chairman Carl Vinson (D., Ga.) has stopped concealing his resentment of Defense Secretary Louis Johnson and his rule of the department, arbitrary impounding of funds and "gagging" of subordinates.

In his speech last week urging a \$583 increase in the defense budget for aircraft procurement, Vinson put it bluntly: "The issue is clear cut. It is whether the Congress will say what kind of defense the nation will have, or whether the creature of the Congress, the Secretary of Defense, Mr. Louis Johnson, will tell us what kind of defense he will let the Congress have."

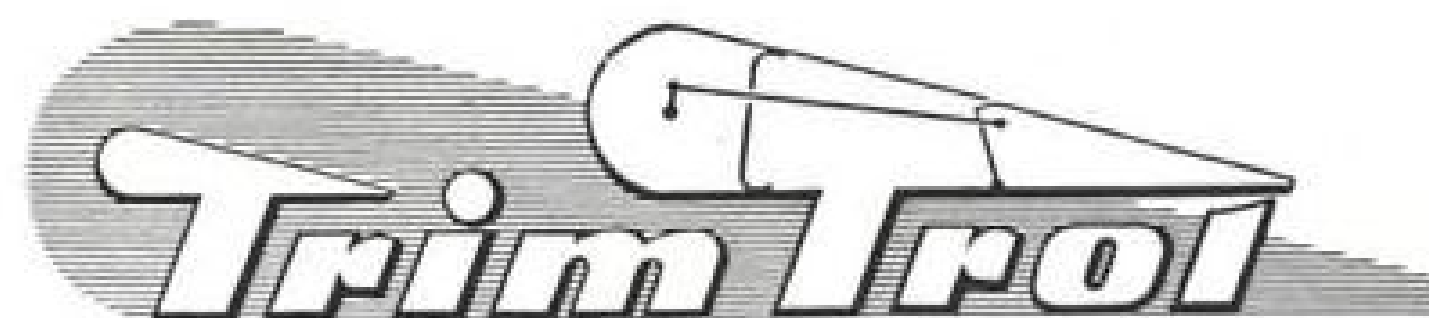
### Harmony at Commerce

Some government top-siders make the point that never before have CAA and CAB worked together so harmoniously as in recent months. Whitney, Davis, Rentzel and O'Connell have been setting the pace for staff agreements on the working level.



# The New COMPACT

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## AVIATION CALENDAR

Apr. 12—American Society of Mechanical Engineers, Aviation and Gas Turbine division, Hotel Statler, Washington, D. C.  
Apr. 16-20—Annual business meeting, American Assn., of Airport Executives, Neil House Hotel, Columbus, Ohio.  
Apr. 17-20—1950 national aeronautic meeting, Society of Automotive Engineers, Hotel Statler, New York, N. Y.  
April 18—Meeting begins of facilitation subcommittee of International Air Transport Assn., Heliopolis Palace Hotel, Cairo, Egypt.  
Apr. 27-28—Air traffic conference, sponsored by Air Traffic Conference of Air Transport Assn., Saxony Hotel, Miami Beach, Fla.  
Apr. 29-30—Fifth annual southeastern air show and exposition, Jacksonville, Fla.  
May 3-4—15th National Aircraft Standards Committee national meeting, Aircraft Industries Assn. offices, Los Angeles, Calif.  
May 12-13—Midwestern conference on fluid dynamics and meeting of American Physical Society (fluid dynamics div.) in conjunction with dedication of new mechanical engineering building, University of Illinois, Urbana.  
May 18-19—Annual meeting and third national forum of Corporation Aircraft Owners Assn., Hotel Statler, Washington, D. C.  
May 19-20—Seventh annual personal aircraft meeting, sponsored by Institute of Aeronautical sciences, Lassen Hotel, Wichita, Kans.  
May 24-26—Technical conference on telemetering, sponsored by American Institute of Electrical Engineers and National Telemetering Forum, Benjamin Franklin Hotel, Philadelphia, Penn.  
May 25-26—Aircraft Industries Assn. board of governors meeting, Williamsburg, Va.  
May 25-27—Spring meeting, Society for Experimental Stress Analysis, Hotel Statler, Cleveland.  
May 27—Annual spring air regatta, Philadelphia Aviation Club, Wings Field, Ambler, Penn. (May 28 is alternate date in event of bad weather.)  
May 27-30—Wright Memorial Glider Meet, South Dayton Airport, Dayton.  
June 8—Pratt & Whitney distributor operation and maintenance meeting, Airwork Corp., Millville, N. J.  
June 10-13—National Aeronautics Assn., annual convention, Hotel Statler, St. Louis, Mo.  
June 10-25—International aero exhibition, Centenary Palace, Brussels, Belgium.  
July 7-8—Royal Air Force 1950 display, Farnborough airfield, England.  
July 12-14—Annual summer meeting of Institute of Aeronautical Sciences, IAS western headquarters bldg., Los Angeles, Calif.  
Sept. 5-10—Eleventh flying display and exhibition, Society of British Aircraft Constructors, Farnborough airfield, England.  
Oct. 16-20—1950 annual general meeting of the International Air Transport Assn., Fairmont Hotel, San Francisco.

## PICTURE CREDITS

16—(upper) Convair; (lower) Dept. of Defense; 34, 36, 45—Boeing Airplane Co.; 47—Kellett Aircraft Corp.

## NEWS DIGEST

### DOMESTIC

Shipment of 215 one-to-ten-place personal and executive planes was made by nine companies during February. Included were 159 four-or-more placers, and 56 one- and two-placers with total net billing price of \$1,175,000. Companies reporting to Aircraft Industries Assn. were: Aeronca (17 planes), Beech (26), Bellanca (2), Cessna (55), Mooney (3), Piper (101), Ryan (7), Taylorcraft (1), TEMCO (3). Shipments by eight manufacturers in January totaled 152, valued at \$844,000.

Military and civil aircraft shipments for January totaled 1,985,500 lb. Civil planes numbered 165, valued at \$12 million. Military accounted for 74 percent in airframe weight. Total aircraft engine hp. was 4,321,800, with military accounting for 97 percent. Employment in aircraft plants was 165,531, against 163,145 for previous month. Engine plant employment for January was 39,837 compared with 39,961 for December.

Charles "Chief" Kidder, assistant to the president, Glendale Airport Co., and widely known engine overhaul expert, died in Glendale, Calif. He was 59 years old.

Airline-Port Authority agreement to use New York International (Idlewild) Airport was put in question by action of New Jersey legislature in failing to act on bill that would modify Authority's immunity to suit. Agreement between airlines and Authority last fall was partly conditioned on later passage by the legislatures of New York and New Jersey of bills to change the Authority's status regarding legal immunity. New York enacted the measure, but the New Jersey legislature did not put it on the "must" list as adjournment neared.

CAB and CAA heads O'Connell and Rentzel have asked 15 principal aviation organizations to participate in a meeting in Oklahoma City May 3-5 to form preliminary plans for a common program to win wider public acceptance and use of aviation. One object of meeting: To obtain agreement of all organizations to hold annual meetings simultaneously with a national aviation conference.

Vice Adm. Lynde D. McCormick last week was named vice chief of Naval Operations. He relieves Vice Adm. John D. Price who has been named Chief of Naval Training, Pensacola, Fla. McCormick is a submarine expert. Navy now has an aviation expert (Chief of Naval Operations

Sherman) and a submariner occupying two highest Naval posts.

Lt. Gen. Gilberto R. Limon, minister of Defense of Mexico, will arrive in this country late this month, reportedly to seek U. S. aid in purchase of single-engine trainers and lay foundation for transfer-purchase of several jet fighters for Mexican Air Force.

History of aviation is to be prominently featured at World Transportation Fair to be held at Santa Anita Park, Los Angeles, May 30-September 9, 1951. Foreign and domestic exhibitors are being urged to contrast new models with those of ancient vintage, with cash prizes to be awarded for oldest authentic models.

Air express service between all cities in the U. S. and Honolulu is to be inaugurated May 1 by Northwest Airlines and Railway Express Agency. Strato-cruisers are scheduled to make deliveries from New York in 21 hr., from Minneapolis-St. Paul in 15 hr., and Seattle-Tacoma in 8 hr.

Justice Dept. has vetoed a General Motors proposal to buy government's wartime propeller plant at Saginaw, Mich., stating that the deal would be "contrary to the purposes of the anti-trust laws."

### FINANCIAL

Stewart-Warner Corp. reports net profit for year ended Dec. 31, 1949, was \$2,163,106 on sales of \$54,609,713, compared with 1948 profit of \$3,154,316 on sales of \$72,534,085.

Northrop Aircraft, Inc., reports unaudited net earnings for six months ending Jan. 31, 1950, of \$890,895. Fiscal second quarter earnings were \$486,295. Jan. 31 backlog was \$54 million.

### INTERNATIONAL

Chrislea Skyjeep four-place British personal plane (AVIATION WEEK Dec. 12, 1949) has been ordered in undisclosed number by Uruguay and Brazil, prior to completion of craft's Certificate of Airworthiness trials. Skyjeep sells for about \$6300.

Four Olympia Eon gliders were scheduled to be towed by Newbury Eon powered plane across the Channel from Britain for delivery to buyers in Belgium and Denmark. Operation was scheduled to take about one week, and total mileage to be flown by tug is estimated at approximately 4300 mi.

Russia and China have signed a ten-year agreement for a jointly owned airline to operate between Peiping and Russian cities in Siberia.



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## WHO'S WHERE

### In the Front Office

Dhan Mukerji has been appointed sales manager for Pan American's Atlantic division with hq. at LaGuardia. Joining PAA in 1941, he played a leading role in developing the airline's postwar South Pacific operations, his latest mission being a trouble-shooting flight to Hong Kong to straighten out problems created by the Chinese war.

M. M. Frost has been named head of Eastern Air Lines' traffic and sales and will have as his assistant William T. Raymond, who came to the airline from Air Transport Assn. Frost joined EAL in 1945 as vp after serving in the Air Force, where he received Legion of Merit for services during preparation for air invasion of France. Raymond had been with ATA for seven years. When he left he was director of governmental affairs.

Otto E. Kirchner has been promoted to director of operational training for American Airlines and will serve as coordinator of AA's aircraft operating and performance problems in relationship with governmental agencies. Formerly director of engineering at Tulsa, he joined the airline in 1928.

Thomas F. "Tony" Piper has been made asst. general manager of Piper Aircraft Corp. Joining Piper in 1936 after graduating from Harvard, he has held various manufacturing, design, experimental, test flying, and administrative positions, and helped organize the Field Artillery Flying School at Fort Sill in 1942.

H. C. Pettit has been appointed sales manager of Aeronca Aircraft Corp.'s aircraft division, succeeding Walton B. St. John who has left the company to become sales manager of aircraft division of Lear, Inc.

### Changes

Roger Lewis, vp-sales for Canadair, Ltd., since 1948, has resigned to take another position... John Dee has been named head of sales order and quotation department for Durham Aircraft Service, and will be assisted by Werner Anderson... Roy Backman, general sales manager for Western Air Lines since 1946, has resigned to form his own sales organization, concentrating on western markets.

Robert G. Gorrill and Richard Loesch have been designated as B-47 Stratojet test pilots by Boeing Aircraft Co.... Howard B. Speyer and T. A. Hill have been promoted to vp and secretary, respectively, of Champion Spark Plug Co.

### Honors and Elections

Frederic B. Gustafson, of the flight research division of NACA's Langley Aeronautical Laboratory, has received American Helicopters Society's annual award for "meritorious achievement in the field of helicopter engineering, including research and theory." He joined NACA in 1938 and is a member of the subcommittee on helicopters and author of a number of technical reports on copter design.

## INDUSTRY OBSERVER

(This week's column is devoted to the observations of an AVIATION WEEK editor who covered the annual forum of the American Helicopter Society in Philadelphia.)

► New anti-submarine warfare requirements for improved helicopter stability have resulted in sending the Piasecki HRP-2 helicopter, recently delivered to Patuxent Naval Air Station, back to its home plant at Morton, Pa., for an experimental set of fins similar to those used on the older HRP-1. Without the added fins, the HRP-2 was described as having equal stability to that of the HRP-1 with fins. Piasecki's smaller HUP-1 is also being tested with additional fin area for more critical stability.

► Don't overlook Bell Aircraft's chances in the off-the-shelf anti-submarine warfare helicopter competition. Bell is just finishing up 11 of its H-12 ambulance helicopters for the USAF, and would like to make some for the Navy as well, for off-the-shelf ASW.

► U. S. Marine Corps is planning to replace liaison planes with small helicopters in its VMO squadron with each Marine division, because of the increased flexibility of movement of the small helicopters, thereby scoring another round for rotary aircraft in the see-saw liaison competition which has been going on since prewar days of the autogiro and the German Fieseler Storch slowplane.

► United Helicopters has broken the procurement ice with the armed services by sale of one off-the-shelf Hiller 360 to the Navy for evaluation purposes.

► Pulse-jet powerplants on the Top Sergeant XA-5 helicopter fire at a frequency of 100 explosions per minute. American Helicopters expects to have the experimental pulse-jet developed sufficiently for practical USAF use in another year.

► Hoppicopter powered with jets is expected to be the next development of Horace Pentecost, West Coast inventor, who sold the foreign rights to his original midget helicopter to an English group, Hoppicopters, Ltd., recently.

► Bell Aircraft has obtained CAA approval of its new skid landing gear for the Model 47 helicopter, which eliminates shock absorbers, wheels and tires. The skid gear is designed for quick attachment to floats if required. Considerably lighter than conventional wheel gear, the skid gear makes possible sizeable increase in payload of the Model 47.

► Success of Piasecki in the tandem rotor helicopter configuration is being followed by other companies. Bell is readying a tandem rotor configuration for the anti-submarine warfare competition, while Sikorsky is reported to have made some tandem configuration design studies, but has not, as far as is known, started a machine.

► Jet helicopter experiments are being closely watched by the entire helicopter industry. If the jet plants are successfully adapted to helicopters, they will eliminate torque, now one of the primary engineering problems in helicopter design. Possibility that Piasecki may get into the jet copter field is indicated in the recent acquisition by Laurance Rockefeller of controlling interest in Marquardt Aircraft Co., ram-jet engine maker. Rockefeller is also a principal stockholder in Piasecki.

► British flight operations with Sikorsky S-51 helicopters have shown the machines capable of satisfactory instrument flight operations with standard attitude instruments, at speeds above 40 mph., and have brought about government approval of the IFR operation of the machines under limitations of 1/4-mile visibility and 500-ft. ceiling.



## Pressure Builds Up for More Plane Funds

**In face of Eisenhower and Vinson pleas, Johnson shows signs of changing mind.**

Prospects brightened last week for a moderate cracking of the low ceiling clamped on modern U. S. airpower by the President's 1951 fiscal year budget.

• **Gen. Dwight D. Eisenhower** says the USAF should have more money.

• **Rep. Carl Vinson** says USAF funds should be increased by \$200 million, Navy by \$383 million.

• **Secretary of Defense Louis Johnson** shows the first sign of a willingness to reconsider the ceiling.

Threat of rapid obsolescence of USAF and Navy first-line combat plane strength, at the current procurement level, is responsible for a second congressional look at the air power picture. This came after the Appropriations Committee had approved intact the President's program of \$1365 million for USAF procurement, and \$633 million for Navy plane procurement.

USAF chiefs reported that with this level of plane buying, the so-called 48-group Air Force (44 effective groups and 4 obsolescent as of now) would deteriorate to 34 effective groups with 14 obsolescent by 1955-1956. Meanwhile Navy estimated a gradual weakening of its present 6233-combat plane strength to 3000 within 10 years.

Last week these developments indicated a strong move to let up on economizing of air defense:

• **Defense Secretary Johnson** announced that he would have a meeting with the Joint Chiefs of Staff on the proposed boosts in plane procurement funds, and would be guided by their recommendation. If the funds are needed, Johnson hoped they would be obtained by shifts from other defense items, without incurring an increase in the overall defense budget. This was the first sign of change of heart on the part of the Administration. To date, both Johnson and the President have stood pat on the budget estimates for plane procurement.

• **Eisenhower**, former Chief of Staff now president of Columbia University, proposed that the Air Force be reinforced into 48 effective groups with new aircraft. He suggested an additional \$150

million, boosting USAF's 1951 fiscal year procurement budget to \$1515 million. Testifying before the Senate Appropriations Committee, Eisenhower did not consider a 70-group USAF program "sacrosanct" and backed an effective 48-group program as "probably a safe minimum."

• **Vinson (D., Ga.)**, powerful chairman of the House Armed Services Committee, proposed an amendment increasing USAF procurement funds by \$200 million and Naval aircraft procurement funds by \$383 million. This would give USAF a total of \$1565 million and the Navy a total of \$1016 million for the coming year. It would provide for 77 additional USAF planes and 530 additional Naval planes, increasing USAF's total procurement to 1460 planes and total Naval procurement to 1347 planes. The President's budget, approved by the House Appropriations Committee, contemplated procurement of 1383 USAF planes and 817 Naval planes.

Vinson emphasized the Navy "because the Air Force is in relatively better shape. Heavier increases in Air Force procurement will be needed in subsequent years, but now any further enlargement of orders for that service would require expansion of plants making Air Force craft. Naval aviation, on the other hand, is in terrible shape. It is withering on the vine." The 77 additional USAF planes would include medium jet bombers, fighters, helicopters and medium and heavy transports.

The 530 additional Navy planes would be: 379 fighters, 123 attack planes, 19 patrol bombers, and 9 transports or other craft. Vinson's amendment would also provide \$34.5 million to step up construction of a radar defense screen and for conversion of 71 B-29s into flying tankers and 288 craft of various types into trainers.

• **Air Force and Navy** are buttressing the movement for additional plane procurement funds. Maj. Gen. F. H. Smith reported that an effective 48-group program would require a 1951 fiscal year procurement allocation of \$1500 million—approximately the amount recom-

mended by Eisenhower and Vinson—and a gradual increase to a leveling-off rate of \$2000 million by fiscal 1954.

The first major showdown will come when the House votes on the Vinson amendment to the \$29-billion 1951 fiscal year omnibus government appropriation bill—of which the Defense budget is part—after reconvening from an Easter recess on April 18.

The amendment is confronted with strong opposition from the Appropriations Committee, led by Rep. Clarence Cannon (D., Mo.), chairman, and Rep. George Mahon (D., Tex.), chairman of the Subcommittee on the Armed Services. Vinson's overwhelming success in steering 70-group USAF funds through the House—over the opposition of the Administration—in the past has been largely due to staunch support from the powerful Appropriations Committee. Cannon and Mahon have given him active and vocal support. Vinson lacks that support this year.

Politics, the pressing need to economize and minimize deficit spending, the Joint Chiefs of Staff view that a hot war is unlikely over the next two to three years, and the prospect that the President would impound additional funds even if they were appropriated—as he did this year—are the factors behind the shifts in position by Cannon and Mahon.

Outcome on additional procurement funds in House hinges heavily on the position that Johnson takes. Observers see the situation like this:

If Johnson supports the Vinson amendment—highly unlikely—it will have smooth sailing.

If the Defense secretary supports a more modest proposal to increase USAF and/or Naval procurement funds, this is likely to be compromised on.

If Johnson adheres to the budget estimate after his review with the Joint Chiefs of Staff, the Vinson amendment or any other proposal to boost procurement funds will have hard going.

Meanwhile, on the Senate side of the Capitol, Eisenhower's testimony left members of the Appropriations Committee warm to an increase in USAF procurement funds. Sen. Elmer Thomas (D., Okla.), chairman of the Subcommittee on the Armed Services, said he would support the Eisenhower proposal.

## Slick Asks \$30 Million Damages

**Anti-trust suit claims three lines, ATA and Air Cargo conspire to drive all-freight firms out of business.**

Charging that its passenger-carrying competitors have engaged in an illegal, long-term conspiracy to drive independent all-freight companies out of business, Slick Airways last week filed a \$30-million damage suit against American Airlines, United Air Lines, TWA, the Air Transport Assn. and Air Cargo, Inc.

The anti-trust action represents an effort by Slick to recover heavy losses suffered since the Texas company entered the all-cargo business early in 1946.

President Earl F. Slick said that the suit is also designed to stop the "unfair and unlawful competitive practices we are facing in the airfreight field today."

► **New Jersey Suit**—Slick's complaint was filed in Federal District Court in Trenton, N. J., as all affected carriers do business in that state. It followed closely President Earl Slick's testimony before the House Interstate and Foreign Commerce Committee in which he charged that the regular carriers were using mail pay subsidies to finance unprofitable freight services (AVIATION WEEK Mar. 27).

The suit alleges that American, United and TWA, because of their mail subsidy and other sources of revenue, were "under no compulsion—legal, economic or otherwise—to make a commercial or financial success of the airfreight business." It is claimed that the defendants have repeatedly used the subsidy provisions of the Civil Aeronautics Act to keep new carriers from entering any branch of the aviation industry.

Slick charges that the passenger airlines used these "improper and unlawful means" to capture all available freight traffic for themselves:

- **Unlawful rebates.**
- **Predatory rate practices.**
- **Threats to actual and potential Slick customers of serious business injury unless their accounts were transferred to one of the defendants.**
- **Dissemination of false and harmful propaganda about Slick and other independents.**

► **\$10-Million Ache**—The transcontinental cargo line said it suffered \$10 million damages as a result of the alleged unlawful acts. These damages included not only losses suffered by Slick in the past but harm to the all-cargo company's present competitive position and future prospects.

Under the Sherman and Clayton Acts through which Slick's suit was

brought, the company is seeking the trebled damages of \$30 million.

Slick asserted that the uneconomic cargo rates imposed on the freight industry by the defendants, together with other "improper activities," have seriously depleted the Texas carrier's reserves and hampered the raising of new capital. Result, Slick said, was a major impairment of its ability to maintain its organization, carry forward its freight business, and even to compete with the defendants.

Plans to purchase more economical equipment such as cargo versions of the DC-6 and Constellation have been held up by the passenger airlines' damaging competition, Slick indicated. The carrier said a shortage of funds (induced by the alleged unfair competition) has reduced its efficiency, increased costs and arrested the growth of its business.

► **Started in 1946**—Slick began service as a contract operator in March, 1946, and was certificated as a scheduled, all-cargo carrier last summer. The com-

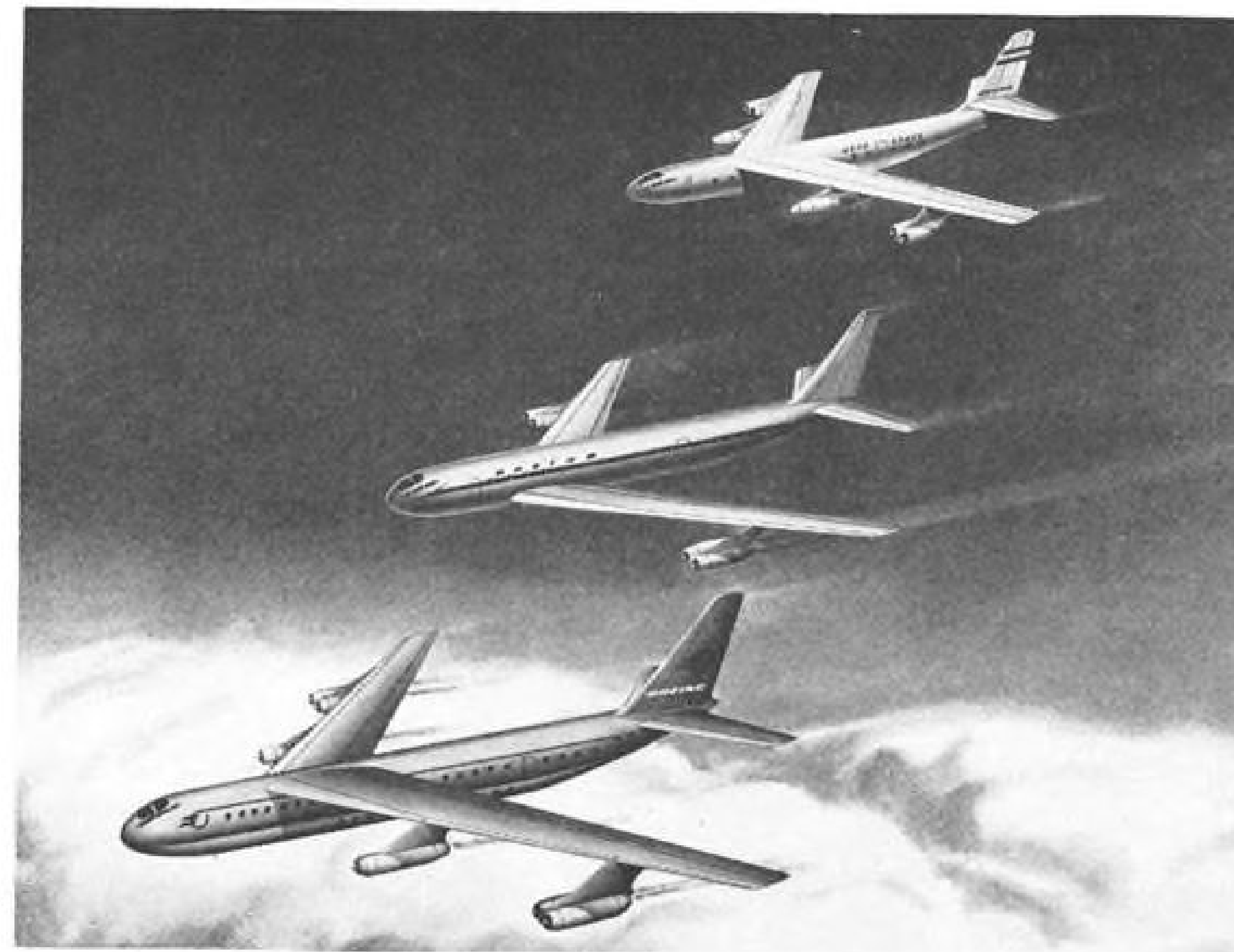
pany now has 21 C-46s and about 650 employees.

Except for brief periods, Slick has continued to show losses on its freight operations since its certification. But the carrier's losses in 1949 are believed to be somewhat below those of previous years.

Traffic has been good during recent months. Ton miles flown during the first three months of 1950 were the highest for any first quarter in the company's history. Slick hauled the greatest freight tonnage of any U.S. domestic carrier in 1946, 1947 and 1948, but fell behind American Airlines last year.

► **Monopoly Seen**—In attributing monopolistic practices to American, United and TWA, Slick said that these three carriers control the policies of the Air Transport Assn. and Air Cargo, Inc., the ground handling organization for a number of ATA members. Slick asserted that ATA serves the defendants "as a vehicle of concerted action and as an instrument of the conspiracy which is herein complained of."

Slick said the following actions by American, United, TWA and the Air Transport Assn. stand out as examples of the alleged conspiracy to restrain trade:



**JET TRANSPORTS**

Boeing artists' conception shows three proposed types of jet transports all based upon B-47 Stratojet medium bombers now in production for USAF. Version, top right, has twin turbojet installations mounted on outboard sections of high swept wing. Note inboard externally mounted fuel tanks for increased range. Center photo shows the four turbojet engines mounted on either side of low-wing version. This type would

be used for fast short-haul traffic. Long-range transoceanic version at bottom would use six turbojet engines mounted in pod fashion similar to Stratojet. It also incorporates the double deck feature of the Stratocruiser. Company officials state that the 500-mph. jet transports are still an artist's "dream" because of heavy development costs and the uncertainty of CAA licensing regulations.



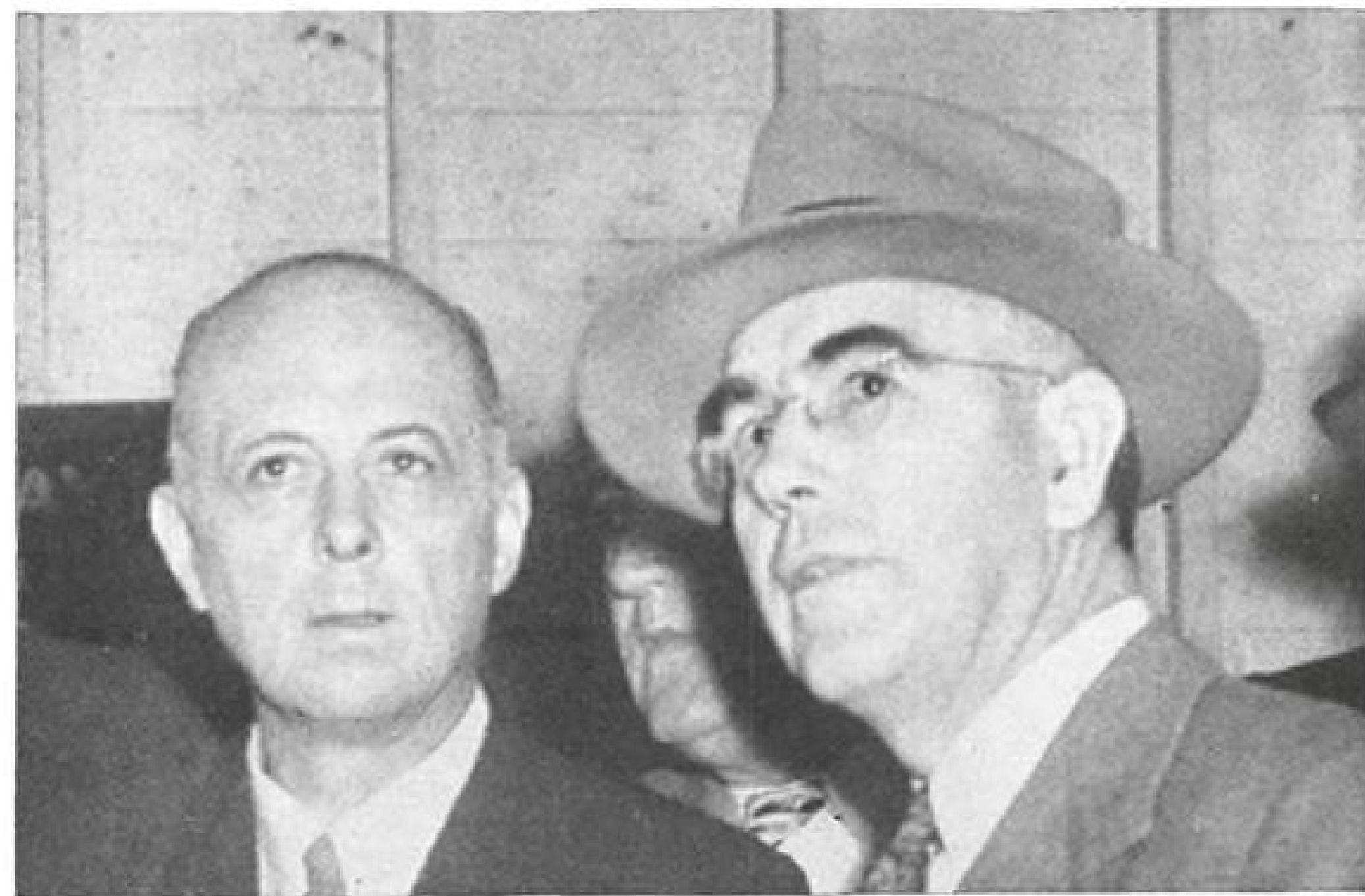
- **Opposition to certification of feeder lines.**
- **The fight to keep railroads and steamship companies out of the aviation industry.**
- **Opposition to certification or exemption of airfreight forwarders.**
- **Attempts to drive the Railway Express Agency out of the field of air transportation.**
- **Opposition to entrance of "irregular" or coach-type passenger carriers into the aviation industry.**

(Nonscheduled passenger-carrying lines last year filed a \$1.5-million suit against ATA and 10 certificated airlines charging them with a conspiracy and combination to restrain interstate commerce in violation of the Sherman

Anti-Trust Act. The suit is still pending in the courts.)

► **Rates Cut**—Slick noted that when it entered the airfreight business, American, United and TWA had freight tariffs averaging 26 cents a ton mile. It asserts that since 1946 these rates have been dropped to the lowest possible levels with the primary intention of damaging the business of the all-cargo lines.

During the course of its suit, and after conclusion of the trial, Slick wants the court to enjoin the defendants from continuing the acts complained of and to bar them from "all moves which directly or indirectly threaten to monopolize or establish their dominion over airfreight."



FINLETTER AND McCONE: Get new chance to promote the 70-group Air Force.

## Finletter Named USAF Secretary

McCone, also member of former policy commission, likely to take over the number two Air Force job.

Nomination of Thomas K. Finletter by the President as Air Force Secretary to succeed W. Stuart Symington promises the USAF a continuation of the forceful leadership which it has enjoyed in the Symington regime.

Symington is being shifted to chairmanship of the National Security Resources Board.

Finletter, as chairman of the President's Air Policy Commission two years ago, was a strong and outspoken advocate of adequate USAF and Navy air power. There has been no indication that he has since changed his views.

The 56-year-old international lawyer, next to Symington, was probably the most vocal and vigorous advocate of the 70-group Air Force-in-being. He knows better than anyone else how far the Air Force is behind the schedule he set for

attaining that Air Force of 70 groups.

In 1948 he was appointed to ECA and served in Great Britain with the rank of minister in the American Embassy in London. He earlier acted in capacity of consultant to the U. S. delegation at the organizational meeting of the United Nations at San Francisco in 1945.

He is a native of Philadelphia, received his law degree from the University of Pennsylvania in 1920 after serving two years in the Army during World War I as a Field Artillery captain.

Reports are that Finletter had indicated to Truman that he would accept Air Force secretaryship contingent upon subsequent nomination of John A. McCone as USAF under-secretary. Under-secretaryship is also open now

with the announced intention of Arthur S. Barrows, former Sears, Roebuck president to resign that post following temporary leave of absence.

► **McCone Opposition**—Opposition is now developing in some congressional circles because McCone, president of Bechtel-McCone Engineering Corp., is a Republican, and comes from California, where "too many" administrative appointments have been coming from recently.

Mr. Symington in assuming chairmanship of NSRB, will preside over an agency whose other members are the secretaries of State, Treasury, Defense, Interior, Agriculture, Commerce and Labor. Duties of this board are to coordinate military, industrial and civilian mobilization of defense in the event of emergency.

► **Reorganize OPI**—Sidelighting appointment of Symington is disposition of Office of Director of Information, USAF. Stephen F. Leo, holding post, is likely to follow Symington to NSRB should opportunity arise to do so. Sources close to Leo say that he is not too happy in present post.

Conditions could arise, however, to prevent Leo's transfer to NSRB even with a request to that end from Symington. Most important of these is fact that former White House press secretary Steve Early has been prevailed upon by President Truman and Secretary of Defense Johnson to remain another year as deputy Defense secretary.

Admittedly a public relations authority, Mr. Early indicated several months ago that he has "some definite ideas" about Department of Defense public relations. He also indicated that, should he remain on the Washington scene after his present "tour of duty" is up next month, his first step would be to reorganize and bolster the badly sagging Defense Office of Public Information.

Early favors a theory expounded by Leo (and demonstrated in Germany by General Lucius Clay) that military and civilians alike can and should occupy top administrative offices interchangeably, determined only by their fitness for the post.

Reliable sources say Early has been "continuously impressed" with Leo's capabilities and has often complimented the aptness with which Leo has directed Air Force public relations. Whether or not Leo could control overall defense activities as well as he has USAF problems, in face of inevitable protest from Navy unification diehards, is conjectural.

► **New AF Deputy Chief of Staff**—Coincident with these top civilian military administrative changes is unofficial but reliable report that Air Force Chief of Staff Hoyt S. Vandenberg has decided

upon Lt. Gen. Idwal Edwards as his deputy chief of staff. Edwards will succeed Gen. Muir S. Fairchild who died recently of a heart ailment.

• **Other changes** in Air Force headquarters which have been announced name Brig. Gen. Horace A. Shepard to post of director of procurement and engineering. He replaces Brig. Gen. Alfred A. Kessler, Jr., who was reassigned as deputy director of maintenance, supply and services for materiel. Brig. Gen. William L. Richardson, who has headed joint long-range proving ground group at USAF headquarters, has been named commanding general, USAF division, Joint Long-Range Proving Ground, Cocoa, Fla.

Brig. Gen. Roscoe C. Wilson former deputy to Chief of Staff for Armed Forces Special Weapons Project has been named senior Air Force member, military liaison committee to AEC. He is succeeded by Brig. Gen. Leland S. Stranathan who will assume Air Force directorship of activities dealing with "advanced" military weapons.

## New Topic Offered Maintenance Meeting

**Kansas City**—The system of idea-swapping and common attack on problems that has proven so successful among airline engineering and maintenance men may be given a proving run by airline management people.

That thought was put before nearly 500 airline representatives and observers here last week in the early stages of the annual Air Transport Assn. Engineering and maintenance conference.

**Cost Clinic**—In his opening address, R. M. Dunn, TWA's director of engineering and maintenance, and chairman of the conference, commented on the fact that all airline costs—administrative as well as operational—have risen out of proportion to revenue. He followed this up with the suggestion that next year's engineering and maintenance meeting should be broadened to include discussions of administrative and other costs.

If Dunn's idea jells, it will be something new in airline meetings. Bolstering the suggestion is the history of the engineering and maintenance meetings, which proves that "free and easy exchange of thought"—as Dunn put it—on airline problems really works. At least, the year-by-year increase in attendance and influence of the ATA meetings indicates that the conference formula has much to recommend it.

Dunn pointed out that at the first (1936) meeting, there were 50 people present and they talked about a fleet of 280 aircraft. Last week, U. S. carriers alone sent 125 engineering and

maintenance people here, and foreign airlines sent 17. Representatives from government agencies, aviation manufacturers and oil companies and suppliers, made up the balance of the 470 registrants. Under discussion was a fleet of 1083 aircraft.

At AVIATION WEEK's presstime, delegates were just beginning to make progress on the ten-point agenda, with discussions being completed on ground servicing and shop equipment maintenance, and on propellers.

## Jets to Star At SAE Meeting

Jet-propelled airliners and the various engineering problems they pose, from design to operations, will virtually dominate the Society of Automotive Engineers' 1950 annual meeting Apr. 17-20 at the Hotel Statler, N. Y. Also slated for review are the Wright Brothers' engineering achievements including exhibition of some of their original equipment such as wind tunnel, engine and prop, working drawings, etc.

A special highlight of the meeting will be an inspection trip to N. Y. International Airport, where the Canadian C-102 Jetliner will be exhibited along with U. S. jet planes, engines, and turboprops.

► **SAE Award Winners**—H. J. Wood and F. Dallenbach of AiResearch Manufacturing Co. are scheduled to receive the SAE Wright Brothers Award Medal for their paper, "Auxiliary Gas Turbines for Pneumatic Power in Aircraft Applications," presented at the SAE national aeronautics meeting in Los Angeles, Oct. 8, 1949.

Maj. Gen. Laurence S. Kuter, MATS commander, will discuss "The Transport Plane as Related to Future Military Plans" at the evening banquet on Apr. 19.

## List Top Salaries In Aircraft Industry

Top salaries paid by aircraft manufacturing firms during 1949 are listed in a partial survey by AVIATION WEEK. Companies not covered in the current survey will be reported later.

Salary details:

► **Douglas Aircraft Co.**—Donald Douglas, president and director, \$102,400, plus \$5756 pension fund payment; F. W. Conant, senior vice president and director, \$45,150, plus \$2785 pension fund payment; Arthur Raymond, \$44,950, plus \$3918 pension fund payment. Total payment to all directors and officers: \$351,682, plus \$18,385 in pension fund payments.

► **Bell Aircraft Corp.**—Lawrence Bell, president and director, \$55,800, plus \$16,224 pension fund payment; Ray Whitman, vice president and director, \$41,000, plus \$11,-

302 pension fund payment; Julius Domonkos, vice president, \$30,000, plus \$3722 pension fund payment. Total payment to all directors and officers: \$185,400, plus \$38,938 in pension fund payments.

► **Ryan Aeronautical Co.**—T. Claude Ryan, president, \$30,833, plus \$3685 pension fund payment (the only official paid over \$25,000). Total payment to all directors and officers: \$96,661, plus \$10,000 in pension fund payments.

► **Glenn L. Martin Co.**—Glenn L. Martin, chairman of the board, \$55,846, plus \$15,568 pension fund payment; Harry Rowland, executive vice president and director (no longer with the company), \$41,906, plus \$7250 pension fund payment; George T. Willey, vice president and director, \$30,300, plus a \$4754 pension fund payment; Morgan Schermerhorn, vice president and director, \$26,281, plus \$3260 pension fund payment; Daniel Evatt, vice president and director, \$25,110. Total payment to all directors and officers: \$272,697, plus pension fund payments of \$38,835.

► **North American Aviation, Inc.**—James H. Kindelberger, chairman of the board, \$125,000; J. L. Atwood, president and director, \$85,000; Raymond Rice, vice president, \$42,000; R. A. Lambeth, vice president, \$30,000. Total payment to all officers and directors: \$334,760.

► **Curtiss-Wright Corp.**—Paul V. Shields, chairman of the board, \$70,883; Roy T. Hurley, president and director, \$29,526; Joseph McCarthy, vice president and director, \$51,584; Robert L. Earle, vice president, \$47,580, plus \$1753 pension fund payment. Total payment to officers and directors: \$439,650, plus \$6505 pension fund payments.

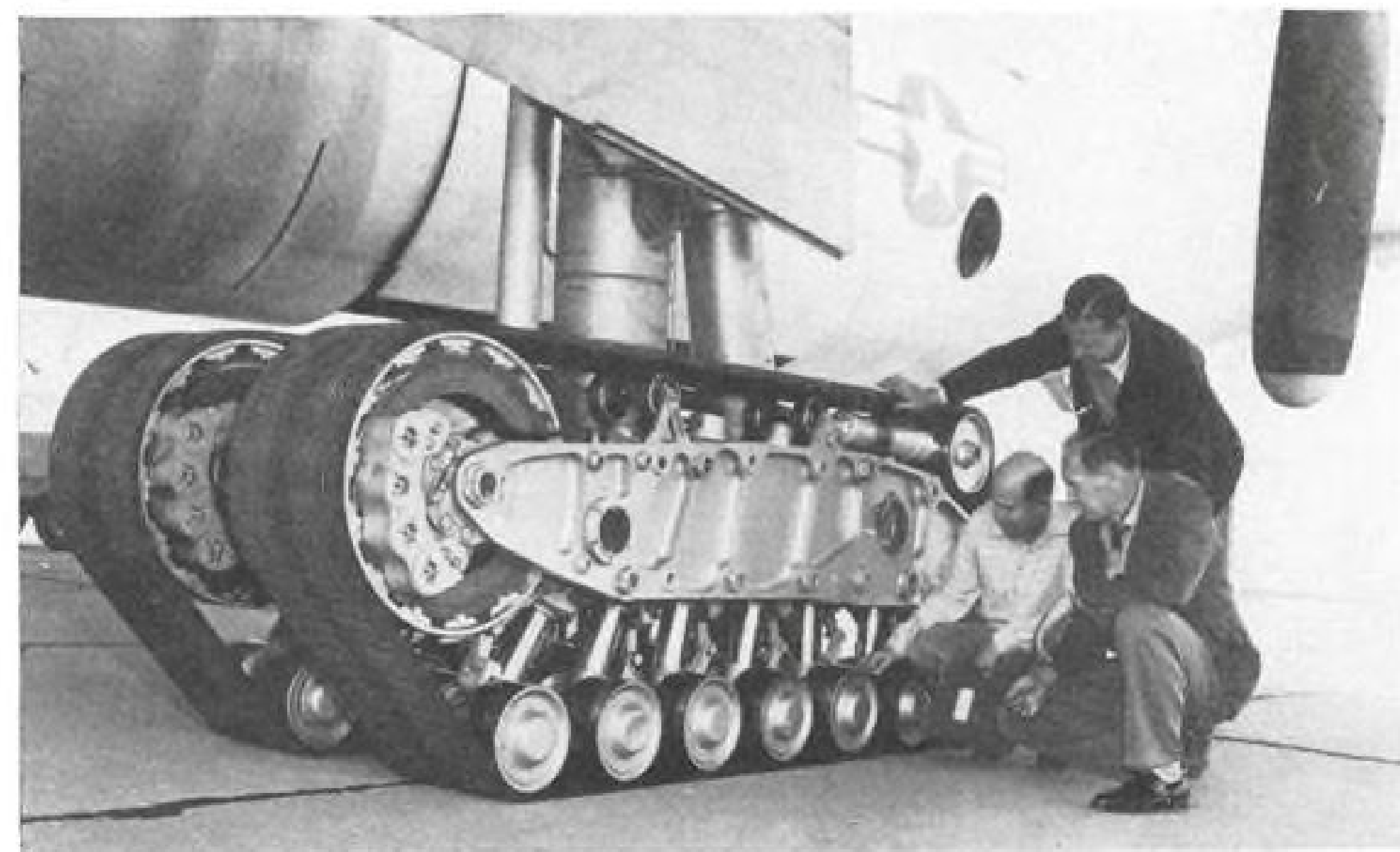
► **Minneapolis Honeywell Regulator Co.**—Harold Sweatt, president, \$75,000, plus \$22,500 bonus and \$22,052 retirement fund payment; Charles Sweatt, executive vice president, \$50,000, plus \$15,000 bonus and \$9741 pension fund payment; Willard Huff, executive vice president, \$50,000, plus \$15,000 bonus and \$16,026 pension fund payment; George du Toit, vice president, \$23,400, plus \$2000 bonus and \$7361 pension fund payment. Total payment to all officers and directors: \$416,882, plus \$73,500 bonus payments and \$82,783 pension fund payments.

► **Consolidated Vultee Aircraft Corp.**—LaMotte Cohn, president and director, \$72,500; plus \$4724 pension fund payment; Robert Watts, vice president, \$36,000, plus \$3366 pension fund payment; Ben Howard, director, \$28,300. Total payment to all officers and directors: \$371,790, plus pension fund payments of \$19,071.

► **Piper Aircraft Corp.**—No one salary of over \$25,000. Total payment to all officers and directors: \$58,398, plus \$3621 in pension fund payments.

► **Sperry Corp.**—Thomas A. Morgan, chairman of the board and president, \$126,890; Thomas B. Doe, consultant, \$54,325, plus \$4550 pension fund payment; John Sanderson, vice president, \$77,040, plus \$5186 pension fund and \$14,070 annuity payment; Harry Vickers, vice president, \$83,353, plus \$3960 pension fund and \$11,134 annuity payment. Total payment to all officers and directors: \$547,219, plus \$25,096 pension fund and \$43,886 annuity fund payments.





Packet (AVIATION WEEK, July 5, 1948). Experimental tests conducted at Wright Field during World War II involved use of smaller track gears on such planes as a Douglas A-20 attack bomber, Curtiss P-40 fighter, and Fairchild PT-26.

An AVIATION WEEK reader, H. G. D'Estout, CAA engineer at San Diego, has recalled that probably the earliest track gear installation was the French Vinay gear patented Nov. 22, 1928, and flown on a Gourdon LaSeurre monoplane. Another pre-World War II installation was the British Dowty gear which was test flown on a Westland Lysander and from which most of the subsequent American gears descend.

## SEC Reports Stock Sales

Purchase of 12,000 shares of Consolidated Vultee Aircraft Corp. common stock, with a market value approximating \$150,000, by LaMotte T. Cohu, president, is reported in Security and Exchange Commission's recent survey of major transactions.

This is Cohu's total present holding in the firm.

Other aviation transactions reported for the mid-January to mid-February period were:

- **AVCO Manufacturing Corp.** Sale of 800 common shares by C. Coburn Darling, director, leaving a holding of 10,000 shares; sale of 1000 common shares by Raymond Pruitt, director, leaving a holding of 21,420 shares.

- **Capitol Airlines.** Purchase of 3700 common shares by Charles Murchison, director, making a total holding of 4700 shares.

- **Consolidated Vultee Aircraft Corp.** Purchase of 2800 common shares by each of the following: Robert Biron, officer, total holding; L. W. Miller, officer, making a total holding of 2900 shares; William Rockefeller, director, making a total holding of 3000 shares; V. C. Schorlemmer, officer, making a total holding of 2845; Raymond Sebold, officer, total holding; Robert Watts, officer, making a total holding of 3253 shares.

plated steel cables and are tested to withstand a pull of 150,000 lb. Bogie wheels inside the track belt are made of a new magnesium alloy containing zirconium to give a high impact resistance. To reduce friction, 185 tapered roller bearings, weighing approximately 500 lb., are used.

Advantage of spreading the 358,000 lb. (maximum gross takeoff weight) of the B-36 over a greater landing gear area, was foreseen by Convair engineers, who replaced the original huge single-wheel B-36 main gears, with quadruple-wheel gears. The track gear however carries the idea much further, with a result that the main gear tracks show a maximum average pressure of 57 lb. per sq. in. as compared to 156 lb. per sq. in. for the quadruple-wheel gear tire treads.

Track-type gear weighs 5600 lb. more than the conventional gear, although original estimates were that the weight increase would be 7500 lb. Total weight of the main and nose track gear is approximately 21,600 lb.

The Boeing B-50 track gear installation, tested successfully last year, was the installation next smaller than the B-36 gear. First relatively large plane to use similar gear was a Fairchild C-82

## New 'Foot-Print' for B-36

Newest USAF-sponsored development of track landing gear designed to spread the weight of an airplane over a greater "foot-print" area on a runway is the largest yet developed—an installation on the Convair XB-36 now being taxi-tested at Ft. Worth in preparation for first track-gear flight tests soon. (Use of track gear for the B-36 and for its huge transport counterpart, the XC-99, was forecast in AVIATION WEEK July 5, 1948.)

The B-36 track gear was designed by Convair and fabricated at Ft. Worth, with the exception of the main gear bogie shock struts, made by Cleveland Pneumatic Tool Co.; the track belts and brakes, made by Goodyear; and the nose gear bogie shock struts, made by the Karl-Douglas Co., Los Angeles.

Essentially similar to earlier, smaller track gears developed in a continuing USAF program, the B-36 development uses two endless belts on each gear. Each of the belts on the main gears is 16 in. wide, 275 in. in circumference and has a thickness of one inch, except for a two-in. thickness in the center. This wedges into a slot in the bogie rollers which centers the belt.

Belts are rubber reinforced with brass-

- **Lockheed Aircraft Corp.** Sale of 483 capital shares by Charles Barker, Jr., leaving a holding of 484 shares.

- **Northrop Aircraft, Inc.** Purchase of 1700 common shares by Oliver Echols, director, total holding.

- **Solar Aircraft Co.** Sale of 400 common shares, total holding, by Laurence Klauber, director; sale of 200 common shares by Herbert Kunzel, officer, leaving a holding of 100 shares; sale of 100 common shares by Joseph Padgett, director, leaving a holding of 1000 shares.

- **United Air Lines.** Purchase of 5000 common shares by William Patterson, president, making a total holding of 5850 shares; purchase of 500 shares by Carroll Blanchar, officer, making a holding of 501 shares; purchase of 2000 shares by Harold Crary, officer, making a holding of 3172 shares; purchase of 2000 shares by John Herlihy, director, making a holding of 2968 shares; purchase of 1000 shares by Donald Magarrell, officer, making a holding of 1080 shares; purchase of 650 shares by Samuel Martin, officer, making a holding of 850 shares.

Capital stock holdings of officers and directors of Pan American World Airways were reported, as follows:

Charles Adams, director, 300 shares; Erwin Balluder, officer, 13,711 shares; Prescott Bush, director, 550 shares; Howard Dean, director, 7000 shares; S. M. Fairchild, director, 20,700 shares; Robert Ferguson, officer 571 shares; Henry Friendly, director 2470 shares; Franklin Gledhill, director, 1162 shares; Harold E. Gray, officer, 846 shares; David Ingalls, director, 1344 shares; Robert Lehman, director, 1300 shares; John Leslie, officer, 551 shares; Willis Lipscomb, officer, 1665 shares; Edward McDonnell, director, 100 shares; H. Preston Morris, officer, 1486 shares; Wilbur Morrison, officer, 8450 shares; Andre Priester, officer, 4553 shares; Samuel Pryor, director, 4098 shares; William Standley, director, 100 shares; Vernon Taylor, director, 2000 shares; John H. Towers, officer, 235 shares; Juan Trippe, president, 49,039 shares, plus control of 20,000 shares in trusts; John Woodbridge, officer, 1363 shares.

Aviation transactions reported for the period from mid-December to mid-January were:

- **Braniff Airways.** Sale of 2500 common shares by T. E. Braniff, president, reducing his holdings to 279,824 common shares.

- **Capital Airlines.** Sale of 2400 common shares by George Hann, director, reducing holdings to 5100 shares; purchase of 100 common shares by James Austin, officer, total holding.

- **Colonial Airlines.** Purchase of 500 capital shares by Karl Bissell, director, making a total holding of 3000 shares; purchase of 800 capital shares by Fran-

cis Hartley, making a total holding of 13,804 shares.

- **Consolidated Vultee Aircraft Corp.** Purchase of 4200 common shares by the Atlas Corp., making a total holding of 422,400 shares; purchase of 1000 shares by Oswald Johnston, director, total holding.

- **Eastern Air Lines.** Sale of 400 common shares by Hugh Knowlton, director, leaving a total holding of 100 shares.
- **Grumman Aircraft Engineering Corp.** Sale of 2100 common shares by L. R. Grumman, leaving a total holding of 89,900 shares.

- **National Airlines.** Purchase of 100

## Air Force Contracts

Curtiss-Wright Propeller div., Curtiss-Wright Corp., Caldwell, N. J., received an Air Force contract totaling \$11,016,559 for installation and spare propeller assemblies with spare parts for Convair B-36 bombers. Contract date is Jan. 5, 1950.

Other recent contracts in excess of \$100,000 include:

- **Abrams Instrument Corp.,** Lansing, Mich., B-8 intervalometers, Feb. 15, \$105,929.

- **AC Spark Plug div.,** General Motors Corp., Flint, Mich., test unit, field engineering and basic handbook data, Jan. 16, \$134,371; type AC 181 spark plugs, Feb. 15, \$555,388.

- **Airquipment Co.,** Burbank, Calif., trailer with storage racks, spare parts and data, Jan. 27, \$158,972.

- **Akeley Camera & Instrument Corp.,** N. Y., N. Y., cameras and magazines, Jan. 23, \$484,252.

- **American Cord & Webbing Co.,** Inc., N. Y., N. Y., parachute webbing, Jan. 18, \$104,336.

- **Cheney Bros.,** Manchester, Conn., Nylon cloth ripstop parachute, Jan. 18, (two contracts) \$173,600; \$450,600.

- **Cole Instrument Co.,** Los Angeles, Calif., signal generator TS-13/U, Feb. 9, \$130,575.

- **Curtiss-Wright Airplane div.,** Curtiss-Wright Corp., Columbus, Ohio, modification of B-29 airplanes Jan. 20, \$1,400,000.

- **Davison Chemical Co.,** Baltimore, Md., dehydrating agent, grade A, Feb. 21, \$225,696.

- **De Vilbiss Co.,** Toledo, Ohio, booth, paint spray, floor type water wash, and maintenance data, Feb. 1, \$101,178.

- **Eclipse Pioneer div.,** Bendix Aviation Corp., Teterboro, N. J., multi-purpose pressure transmitters, Feb. 3, \$106,711; type J-2 fuel flow rate transmitter, Feb. 13, \$127,494; hydraulic pressure indicators, Feb. 17, \$147,214; type J-4 starters, Feb. 7, \$283,838.

- **Filtrol Corp.,** Los Angeles, Calif., dehydrating agent, grade B, Feb. 21, \$244,926.

- **General Electric Co.,** Schenectady, N. Y., 54 type CH7-B1 turbosuperchargers, Feb. 9, \$252,342; BH-1 turbo-

superchargers, spare parts and data, Feb. 17, \$2,871,305.

- **Goodyear Tire & Rubber Co.,** Akron, Ohio, spare parts for brake assemblies, Feb. 21, \$227,152.

- **Gray Television & Research,** Boston, Mass., audio oscillator TS-382A/U, Feb. 1, \$199,855.

- **Hastings Instrument Co., Inc.,** Hampton, Va., Raydist tracking system, Jan. 30, \$112,218.

- **Jack & Heintz Precision Industries, Inc.,** Cleveland, Ohio, 400-amp. wide speed range aircraft engine driven generator, spare parts and data, Feb. 2, \$645,333.

- **Hughes Aircraft Co.,** Culver City, Calif., services of technical representatives, Feb. 21, \$251,210.

- **Lear, Inc.,** Grand Rapids, Mich., F-5 autopilot, Feb. 1, \$1,808,391.

- **McGrath & Co.,** St. Paul, Minn., 12D40 surplus propeller assemblies, Feb. 8, \$175,000.

- **Pratt & Whitney Aircraft div.,** United Aircraft Corp., E. Hartford, Conn., 2 cutaway R-4360-41 and 2 cutaway R-4360-35 engines, Feb. 14, \$146,338.

- **Rhodes Lewis Co.,** Culver City, Calif., 20-mm. feed mechanisms, gun heaters, heating elements, Jan. 24, \$148,114.

- **Specialty Assembling & Packing Co.,** Brooklyn, N. Y., radar receivers, tuning units, etc., Feb. 8, \$316,884.

- **Sperry Gyroscope Co.,** Sperry Corp., engine analyzers, Feb. 2, \$750,000.

- **Sundstrand Machine Tool Co.,** Rockford, Ill., component spare parts for constant speed drives, Feb. 3, \$933,419.

- **Switlik Parachute Co.,** Trenton, N. J., 28-ft. parachutes, personnel, jettisonable canopy, Feb. 27, \$572,000.

- **Texas Engineering & Mfg. Co.,** Dallas, Tex., services and materials for overhaul and reconditioning of 20 T-6 airplanes, Feb. 16, \$150,000.

- **U. S. Gage div.,** American Machine & Metals, Inc., Sellersville, Pa., hydraulic pressure transmitters, Jan. 23, \$305,434.

- **Western Lace & Line Co.,** Glendale, Calif., braided parachute cord, Jan. 18, \$138,250.

common shares by Joseph Merrick Jones, director, making a total holding of 4400 shares.

- **Northwest Airlines.** Sale of 200 common shares by Malcolm MacKay, director, leaving a holding of 1500 common shares and 3200 preferred.

- **Pan American Airways.** Purchase of 1000 capital shares by Howard Dean, director, making a total holding of 7000 shares; purchase of 666 capital shares by Henry Friendly, director, making a total holding of 2470; purchase of 151 capital shares by H. Preston Morris, officer, making a total holding of 1486 shares; purchase of 363 capital shares by John



Woodbridge, making a total holding of 1363 shares.

- **Solar Aircraft.** Sale of 200 common shares by Alexander Black, director, leaving a holding of 50 shares; sale of 500 common shares by Jack Oatman, leaving a holding of 500 shares.

New officers and directors reported holdings, as follows:

- **Beech Aircraft Corp.** Dwight Wallace, 150 shares.

- **Bendix Aviation Corp.** C. S. Harding Mott, an indirect interest through 16,000 shares held by the C. S. Mott Foundation.

- **Capital Airlines.** Crawford Johnson, 100 shares.

- **Northrop Aircraft.** William Willett, no holdings.

## ACC Transport Plan Chances Seen Dim

A revised Air Coordinating Committee transport prototype testing program calling for government expenditure of \$12 million in five years, is being sent back to the Bureau of the Budget as probably the last attempt in this session of Congress to get any kind of federal financing for new transport aircraft. Chances for outright government financing of prototypes, meanwhile, appeared almost hopeless in the present Congress state of mind.

Two congressional highlights were:

- **Sen. Edwin Johnson (D., Colo.),** Chairman of the Senate Interstate and Foreign Commerce Committee, wrote off possibility for a prototype program. "All interested factions are sticking to their own little corners; there is no indication that they can be brought together in agreement on a program; and, until they are, it would be futile for Congress to try to solve the matter," he told AVIATION WEEK.

- The revised program under which the Department of Commerce would finance flight testing costs on new transport types, drawn up by the ACC, was set for submission to the Bureau of the Budget.

Program had the backing of civilian ACC representatives—Civil Aeronautics Administration, Civil Aeronautics Board, National Advisory Committee for Aeronautics, and the approval of the Department of Defense. It would authorize a \$12-million expenditure over five years, but this amount may be scaled down. The original ACC testing proposal (AVIATION WEEK Jan. 30), authorizing the Air Force to finance a \$12-15-million program, was objected to by the Budget Bureau. USAF was unwilling to undertake the program, it is understood.

ACC proposal would finance service testing on two prototypes: a turboprop transport and a turbojet transport.

Presumably the turboprop transport would be the Convair-Liner or a proposed Martin turboprop plane. None of the transport aircraft companies have admitted to having turbojet transports under construction although reports persist that Lockheed has one past drawing board stage.

In recent testimony before the Commerce sub-committee of the House Appropriations Committee, CAA Administrator Del Rentzel reported:

"We will have to do something to break the log jam and get some development in this field so we can get such (jet) transports; whether turbojet or a jet propeller combination does not make too much difference as long as we get them.

"The national defense people do not anticipate an immediate need for any jet transport types. Because of their cargo lifts they are content with piston-engine types.

"However I believe the door is open for a modified program to be undertaken by industry and government jointly."

Basic argument among prototype development advocates is whether program should be directed at:

- **Solving** the Department of Defense's acute deficiency in the airlift requirement estimated for M-Day. This would entail development of advanced, but conventional, long-range cargo and transport types, suited to military utilization. Emphasis would be on increasing the existing airlift capacity and assuring speedy production to fill any deficit existing on M-Day, or

- **Assuring U. S. Leadership** in commercial aviation through the development of far-advanced jet transport types.

Sen. Johnson favors the first pro-

gram, but is cool to the second. "It is a thousand times more important to fill the gap between the airlift capacity and requirement than to promote commercial jet developments," he declared. The Department of Defense concurs. When Budget Bureau turned down USAF's program to construct two low-cost, long-range cargo or transport aircraft (AVIATION WEEK Feb. 6), the department announced that it would oppose "any other bill which provides for prototype development at government expense." The department has accepted the Budget Bureau's rejection and is not pushing its own program.

On the basis of Joint Chiefs of Staff finding that a hot war is at least two to three years away, the department is content to postpone solving its airlift deficiency.

The air transport industry, on the other hand, has thrown its weight behind a program to meet the challenge of British advances in the commercial jet field. Air Transport Assn. is cold to the Defense Department's program because it would pose the knotty problem of utilizing a vastly expanded air fleet not economically justified by traffic potential. Sen. Owen Brewster (R., Me.), a leading advocate of prototype development, also favors a commercial jet development program.

From the practical standpoint, however, this program, aimed primarily at benefiting the commercial airlines, has little chance for obtaining congressional approval.

"Considering the present state of the country's finances," Johnson commented, "the only program which Congress will approve will be one to increase the airlift and justified on the basis of national defense need."

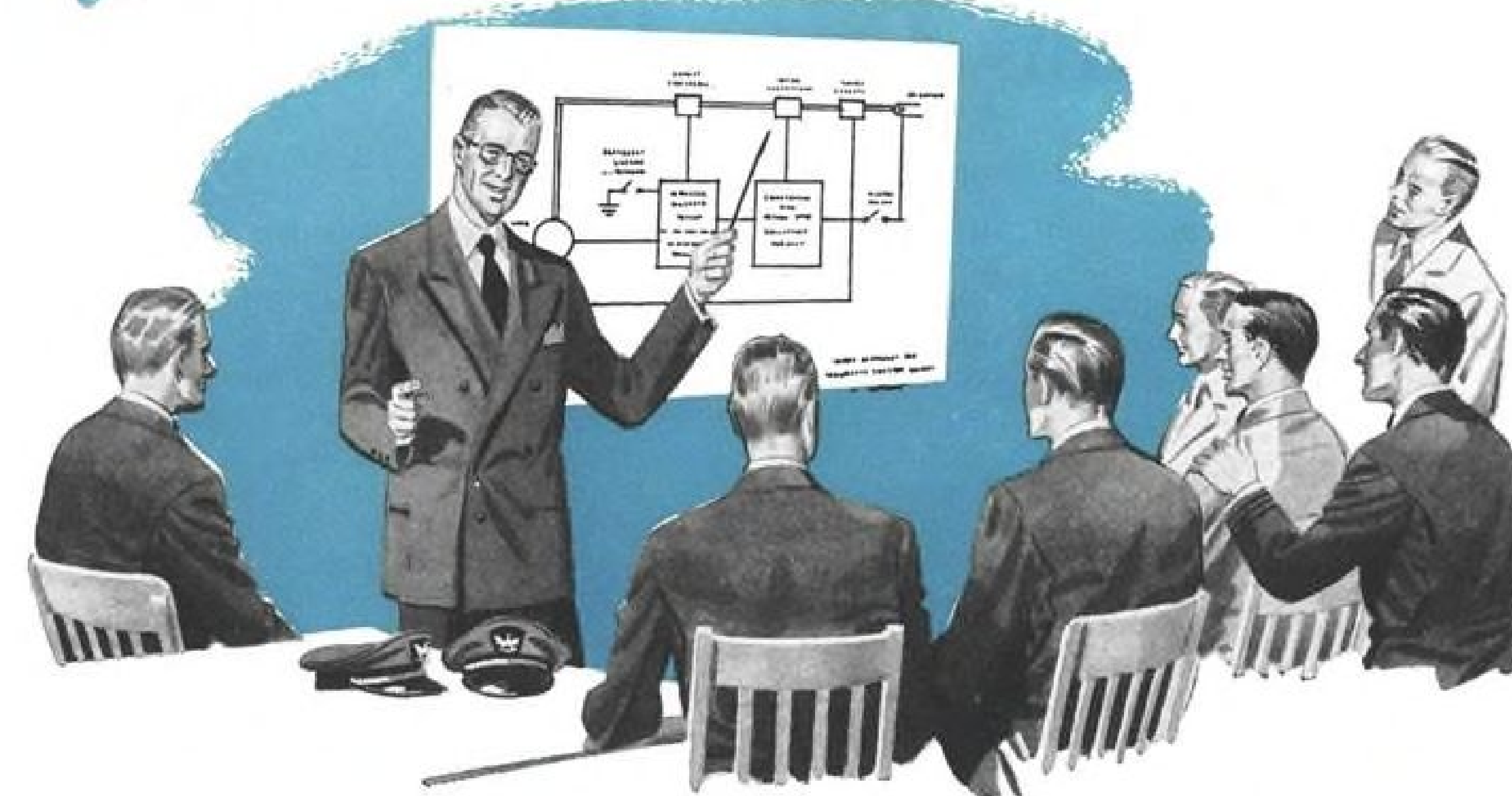


FIRST KAMAN FOR NAVY

On its way for flight tests is this Kaman K-225, first helicopter of its kind delivered to the Navy. It is shown taking off from Bradley Field at the company's Windsor Locks,

Conn., plant for the trip to the Naval Air Test Center at Patuxent River, Md., where Navy pilots and engineers will put it through its paces.

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# AERONAUTICAL ENGINEERING

## Research Gains Consolidated By NACA

Committee's latest annual report discloses accent on rounding-out of data accumulated in past few years.

Following enormously rapid progress in transonic and supersonic research in the postwar years, the National Advisory Committee for Aeronautics devoted its major effort during the past year to consolidation of these gains into more thorough analysis of available theories and creation of supporting experimental data. While progress in the search for new ideas continued, greatest attention was devoted to "filling out" the knowledge on existing ideas.

The 35th Annual Report of the NACA, covering its activities during the 1949 fiscal year, reveals that in aerodynamics, attention was devoted principally to subsonic problems of supersonic craft—characteristics at the low speeds associated with takeoff and landing. This required expansion of knowledge on boundary layers and their behavior on radical new craft configurations. In the propulsion field, it became increasingly clear that the aerodynamic aspects of propulsion are of predominate importance.

Major attention in construction was devoted to fatigue life of structures and complete aircraft, their importance accentuated by new high-strength materials and radical new plane configurations. Operating problems research concentrated on phases of atmospheric turbulence, icing and fire prevention.

Here is a detailed summary of the Committee's research results during the year:

### AERODYNAMICS

► **Airfoils**—Increasing size and speed of aircraft have created demands for data on airfoil characteristics at high Reynolds numbers, and tests of NACA low-drag airfoils were carried out at numbers up to 25 million. The investigation included a systematic study of the effects of airfoil thickness ratio, thickness distribution and camber. This activity gave further proof of the necessity of having available test data at high Reynolds numbers for selection of airfoils for a specific design project.

As Reynolds number increases, its effect on the airfoil characteristics grows increasingly profound so that conventional extrapolation, useful at low numbers, becomes tenuous at very high Reynolds numbers. A particularly in-

teresting result was the relatively large increase in maximum lift coefficient of NACA 63-006, 64-006 and 65-006 airfoils, indicating more promise for these thin, 6-percent sections at very high speeds.

► **High-Lift Devices**—Attempts were made to solve the problem of abrupt stalling of thin airfoils but little progress was made toward solution, although the phenomenon is now more clearly understood. As the angle-of-attack of the thin airfoil is increased, the laminar boundary layer near the leading edge suddenly fails to reattach itself to the airfoil surface. Combinations of increased leading-edge radius, increased leading-edge camber, and the use of nose flaps,<sup>1</sup> all of which increased the maximum lift coefficient and the angle-of-attack for maximum lift, failed to alleviate the sudden stalling characteristic of thin airfoils.

One possible solution to the problem is the use of leading-edge slats,<sup>2</sup> in combination with trailing-edge flaps. While principal interest in this combination is in its ability to provide greatly increased maximum lift coefficients, it also has been observed that the combination causes the stall to become more gradual.

Tests of a double-wedge section using nose and trailing-edge flaps showed that the lift coefficient for minimum drag increases with increasing chord of the nose flap, with the net result that the largest chord flaps provided the least drag at the highest lift coefficients.

► **Wings**—Large loss of longitudinal stability created by large angles of sweepback was confirmed in tests of a 63-deg. sweptback wing.<sup>3</sup> At moderate lift coefficients the reduction in stability was equivalent to a 50-percent mean aerodynamic chord shift in the neutral point. However, tests show that this large reduction in longitudinal stability can be delayed to a higher lift coefficient by incorporating either a full-span nose flap or drooped nose with a half-span split flap at trailing edge and utilizing an elevon for balance.

Attention has been given to the effects of changes in twist and camber of a swept wing on its low-speed stability. Results show that even moderate changes in these geometric char-

acteristics produce marked improvement in low-speed characteristics.

► **Boundary Layer**—A continuing study of the boundary layer and stalling characteristics of airfoil sections in the Ames 7 by 10-ft. tunnels has added much to the understanding of the mechanism of the stall of thin airfoils.

It has been found that there are three general types of airfoil stall: (1) that resulting from turbulent separation beginning near the trailing edge of relatively thick airfoil sections and gradually progressing forward along the airfoil upper surface as the angle of attack is increased; (2) from sudden failure of a separated boundary layer near the leading edge of moderately thick airfoils, to reattach to the airfoil upper surface at the angle of attack for maximum lift; and (3) from flow separation from the leading edge of thin, sharp-edged sections, but reattaching to the airfoil at positions progressively farther downstream as the angle of attack is increased.

These types of stall are found separately or in combination, depending on the airfoil under consideration.

Study of boundary-layer control as a means of improving the aerodynamic characteristics of airfoil sections is under way in the Langley low-turbulence section. Boundary-layer control may be applied to thin airfoils to increase maximum lift coefficient, and to thick airfoils to reduce profile drag coefficient.

Both suction slots and suction through porous areas have been studied. Tests of a suction slot near the leading edge showed it effective in delaying complete flow separation and increased the maximum lift about one-third above that of the basic section. However, turbulent separation occurred at the trailing edge prior to the attainment of maximum lift. Accordingly, an additional slot located at the midchord was installed and operation of this slot in conjunction with the nose slot resulted in substantial gains in maximum lift over that with nose suction alone.

However, these, as well as other tests at Langley and Ames labs indicate that the effectiveness of boundary-layer control in improving maximum lift coefficient is about the same as would be obtained from a well-designed leading-edge slat or flap.

In an effort to clarify the present status of research on boundary-layer control and its possible applications to air-

craft design, a survey was made of the results obtained from numerous individual investigations of various applications of boundary-layer control. This indicated that sufficient information is not available to permit practical application of some types of boundary-layer control and that other types do not promise sufficient increases in airplane performance to warrant their use.

The application appearing to offer the most immediate promise of improved airplane performance is use of suction to eliminate turbulent separation over the rear of very thick airfoils. This would permit their use as root sections of wings having very high aspect ratio. This application should result in substantial improvements in lift-drag ratio and range of long-range, relatively slow aircraft.<sup>4</sup>

► **High-Speed Aerodynamics**—A new series of airfoil sections, the NACA 8-series, was designed to have favorable lift characteristics at supercritical Mach numbers. Expectations were confirmed by wind tunnel study to the extent that little or no variation in lift coefficient was found up to Mach numbers of about 0.9 at the constant design angle of attack. It was not found possible, however, to improve the lift-curve slope or the drag at supercritical speeds by use of these airfoils.

Studies in the Langley 16-ft. high-speed wind tunnel on effects of compressibility on maximum lift characteristics of unswept wings have been extended to include effects of deflected split flaps. The flaps were shown to be effective in producing increases in maximum lift at all speeds up to the maximum test value of M 0.7. Although the flaps increased the values of maximum lift over the test speed range, the trend of maximum lift with increasing Mach number was similar to that previously shown for plain wings without flaps.

Merits of the swept wing planform at transonic speeds have been established qualitatively from both theoretical and experimental investigations.<sup>5</sup> The full exploitation of such planforms, however, requires further investigation. Several studies were made along this line to add to existing knowledge for proper design of swept wings.

An investigation was conducted in the Ames 12-ft. low-turbulence pressure wind tunnel on a wing having 37 deg. sweepback of the leading edge. The aerodynamic characteristics and load distribution for this wing were measured and compared with theoretical estimates for Mach numbers up to 0.94 at constant Reynolds numbers in the range from one to three million. A theoretical method for defining critical flow conditions at high Mach numbers was found to be in good agreement with

## Index to NACA Research Data

In its annual report, the National Advisory Committee for Aeronautics covers in a few sentences, or in a paragraph, work of enormous interest and importance to the aviation industry. Much of this work already has been spotlighted and explained in detail in previous issues of AVIATION WEEK. References in this article are keyed to these stories, a list of which follows:

1. "Droop Snoot" Configuration Aids Jet Fighter Landings. Mar. 15, 1948.
2. Slots: Advantages and Disadvantages. April 26, 1948.
3. Swept Wing Taxes Piloting Skill. Mar. 8, 1948.
4. Research Narrows Boundary Control Use. April 18, 1949.
5. A Primer of Sonic Aerodynamics. Aug. 16, 1948.
6. Solving a Wind Tunnel Problem. June 20, 1949.
7. Guided Missile Heat is Problem. Oct. 11, 1948.
8. NACA Shows Ames Laboratory Progress. July 26, 1948.
9. NACA Lowers High-Speed Flight Hurdles. May 9, 1949.
10. Air Brakes: Standard Fighter Accessory. Nov. 14, 1949.
11. Wing Divergence: Danger in Fast Flight. Dec. 19, 1949.
12. Plan Trans-Pacific Robot Flight Without Crew for Automatic C-54. Oct. 27, 1947.
13. Summing Up Findings on Stall Warnings. Sept. 12, 1949.
14. Dorsal Fin Aids Stability, But How? June 7, 1948.
15. Douglas Skyrocket Hits Supersonic Speed. Oct. 3, 1949.
16. Convertiplane Interest Grows Fast. Dec. 26, 1949.
17. Helicopter Instability Investigated. Aug. 23, 1948.
18. New Hull Fineness Slashes Drag. Mar. 14, 1949.
19. Altitude Blow-Out of Jet Engines. Nov. 24, 1947.
20. Combustion Studies Offer New Efficiencies. April 4, 1949.
21. New Propulsion Factors Analyzed. Nov. 7, 1949.
22. Ceramal: New Turbine Blade Alloy. May 23, 1949.
23. Results of Afterburner Program. May 2, 1949.
24. Aeroelasticity: A New Science. May 30, 1949.
25. Gust Loads Challenge Aircraft Designers. Sept. 19, 1949.
26. Evaluation of New Stiffener Form. Oct. 24, 1949.
27. Joint Air Meeting Gives New Data. June 27, 1949.
28. NACA Fire Research. Nov. 21, 1949.
29. NACA Research Ends Ice Hazard. Dec. 22, 1947.

experimental results and thus offers a satisfactory means by which the Mach number for drag divergence could be estimated for this wing.

A study was made in the Langley 8-ft. high-speed tunnel to determine effects of the addition of a triangular area ahead of the inboard part of a conventional sweptback wing. This addition formed a wing with two stages of sweepback. Results were obtained for a Mach range of 0.40 to 0.94. The triangular wing planform continues to be of interest and several investigations of transonic speeds have been conducted.

Experimental studies have indicated that the optimum airfoil shape for two-dimensional supersonic flow is not necessarily that indicated from theoretical considerations based on a non-viscous flow. An investigation at supersonic speeds in the Ames 1 by 3-ft. supersonic tunnels has indicated that principles other than those heretofore considered may lead to airfoil sections with improved characteristics.

► **Schlieren, Nacelle Data**—A method has been developed for evaluating from shadow or schlieren photographs the

pressure drag of axially symmetric and two-dimensional bodies operating with detached shock. The method can be used also to determine the external drag of supersonic inlets with detached shocks and to evaluate external shocks of perforated inlets.

An experimental investigation has been conducted to study means for increasing the force-divergence Mach number of sweptwing-body combinations. A method for alleviating the adverse interference between swept wing and body was tried which involved the contouring of the fuselage sides to conform to the normal path of the streamlines of the swept wing. A second method involving modifications to the wing-root section was also investigated experimentally.

Effects of a nacelle on the aerodynamic characteristics of a swept wing have been investigated in the Langley 16-ft. high-speed tunnel up to Mach 0.61 for the wing-nacelle combination and 0.70 for wing alone. Results show that the presence of the nacelle had no effect on the lift-curve slope of the unswept wing, increased the lift-curve slope about 10 percent with the wing



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swept back 45 deg. and decreased the lift-curve slope slightly with the wing swept forward 45 deg.

Presence of the nacelle did not appreciably alter the stalling characteristics of the 45-deg. swept-forward and swept-back wings, but caused an appreciable reduction in maximum lift for the wing in the unswept position. The drag increment due to the nacelle was generally lower for the swept configurations than for the unswept case. Addition of the nacelle to the wing reduced the longitudinal stability of all the swept wings.

► **Gas Dynamics**—The extreme altitudes at which sounding rockets and missiles operate have introduced a new field of fundamental aerodynamic research. At these heights the air must be considered as composed of individual molecules rather than a continuous medium. New facilities have been utilized for exploring the phenomena encountered in very low density flows. Difficult problems of technique have been encountered in the design of these facilities and the greater part of the effort has been concentrated on the development of research methods.

One example of difficulties is the visualization of low-density flows. At very low densities the schlieren technique for flow visualization becomes impracticable or impossible. A new and promising method of flow visualization has been investigated in which the phenomenon of afterglow was used.

► **Heat Transfer**—Because of aerodynamic heating, operation of aircraft and missiles at high speeds is dependent on adequate insulation and cooling systems or on keeping the time of high-speed flight short. Calculation of surface temperatures and the design of cooling systems are dependent on adequate heat-transfer data and on a body of theory by which the data may be correlated and their application extended.

Experiments have been conducted during the past year to determine heat-transfer coefficients at supersonic speeds. During the course of these experiments comparisons were made with theoretical results, which indicate a stabilization of the laminar boundary layer when the direction of the heat flow is from the boundary layer to the surface.

► **Stability and Control**—Downwash and dynamic-pressure characteristics behind various swept wings have been investigated. It was found that, for the range of configurations tested, a low tail position provided the most satisfactory stability characteristics. Center of the wake was found to be located in a higher position for sweptforward than for sweptback wings.

Effects of tail length and volume on longitudinal stability characteristics of a powered model of a propeller driven,

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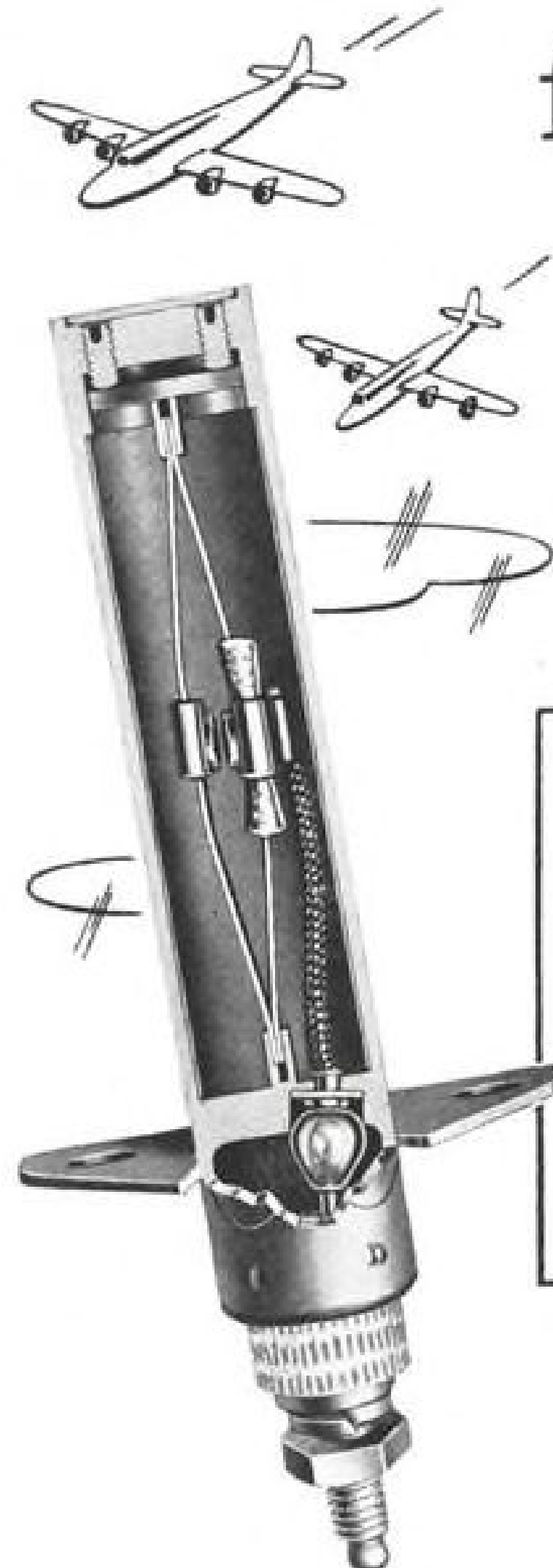
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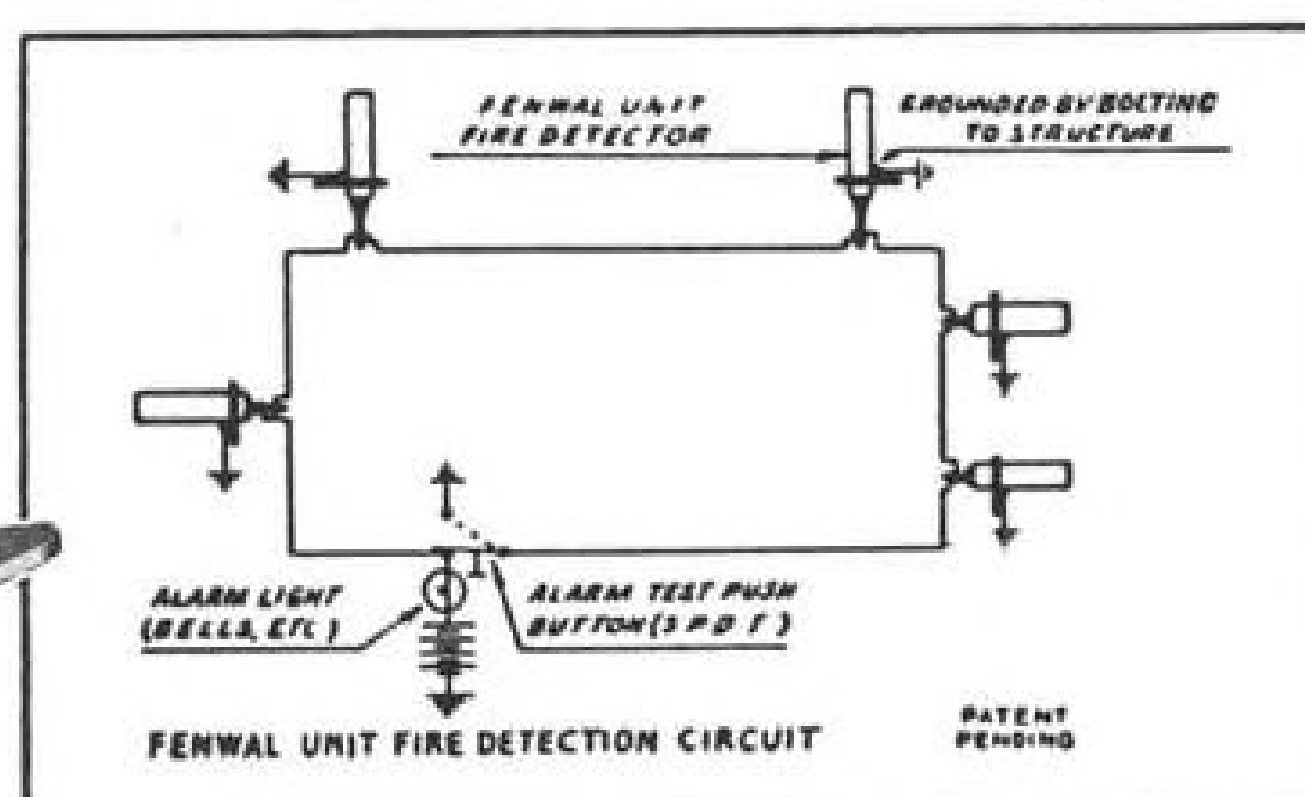
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low-wing, single-engine airplane were investigated and the results show that the destabilizing shift in the neutral point caused by power effects increases with increasing tail length or increasing horizontal-tail area.

For certain supersonic speed ranges, design studies have indicated that a thin, sharp-edged wing without sweep would have better performance characteristics than other wing arrangements.\* The Ames 12-ft. low-turbulence pressure wind tunnel has been used for investigation of an airplane configuration utilizing a wing of this type at high subsonic speeds. In addition to basic studies of the wing and fuselage combination, various locations of the horizontal tail were investigated.

Results indicate that, at least for one general arrangement, there are no erratic effects of compressibility on the longitudinal characteristics of the model up to the highest Mach number investigated.

In addition, the effects of leading- and trailing-edge wing flaps were investigated to determine maximum lift characteristics of the configuration.

► **Yawing Moment**—Effect of varying the yawing moment due to rolling over a wide range of values on the lateral oscillatory stability characteristics of a typical sweptwing fighter has been studied. The airplane loading conditions were also varied to simulate a craft with and without wingtip fuel tanks. Results show that increasing the yawing moment due to rolling in a positive direction increases the damping of the short-period oscillations. For any given value of yawing moment due to rolling, the addition of the wingtip tanks decreased the damping of the short-period mode.

Investigation of complete model configurations has included a low-speed study of the static lateral stability characteristics of a 52-deg. sweptback wing. This investigation, conducted in the Langley 19-ft. pressure tunnel, was undertaken to study the effects of Reynolds number, leading-edge flaps, and wing-fuselage combination on lateral stability characteristics. Static and rolling stability characteristics of triangular-wing models having various aspect ratios, airfoil sections and vertical-fin arrangements have also been checked at Langley.

Rotary derivative investigations in the Langley stability tunnel have covered pitching derivatives of wings, effects of airfoil section on rolling and yawing derivatives, effect of addition of wing leading edge slats on the derivatives of swept and unswept wings and rolling stability derivatives of a series of thin sweptback wings. Results of an experimental study of the effect of geometric dihedral on rolling stability



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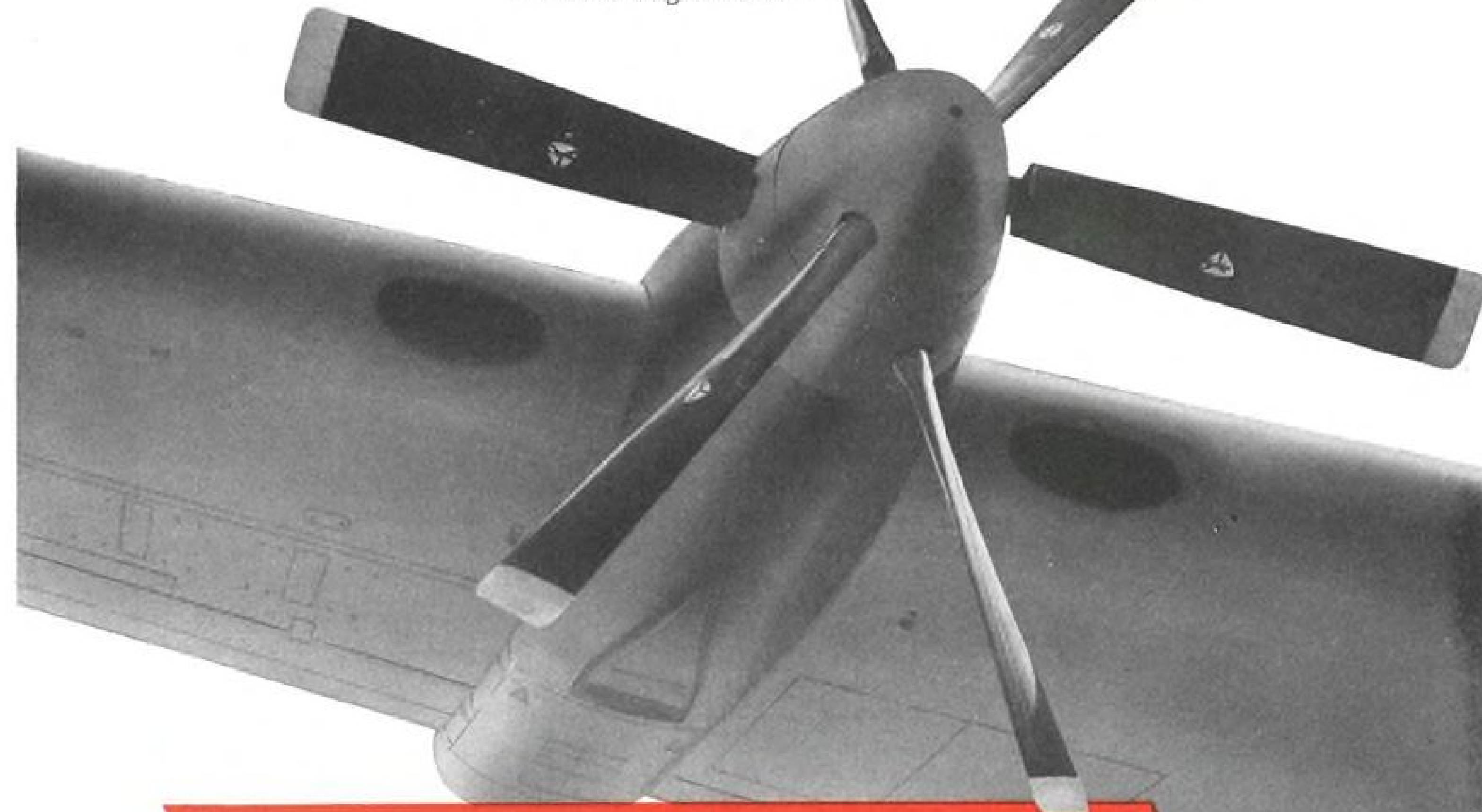
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derivatives indicates effects can be predicted with fair accuracy.

► **Controls**—An analytical and experimental investigation of the effect of planform changes on lift and hinge-moment characteristics of control surfaces has been made at the Ames Lab as a continuation of an extensive control program. Systematic experimental results obtained in this investigation have been compared with various theories for predicting lift and hinge-moment parameters for conventional and swept-back planforms, and results indicate a method of prediction sufficiently accurate for preliminary design purposes.

As part of the Ames program, high-speed tests of lateral controls of a swept wing with fences to improve the low-speed stalling characteristics indicated that the particular fences investigated will have no appreciable effect on high-speed control characteristics.<sup>9</sup>

To permit intelligent selection of aerodynamic brakes, the drag characteristics of various devices, as measured in flight and in wind tunnels, have been collected and summarized. Calculation procedures and graphs have been prepared that simplify determination of speed-altitude-time relationship for airplanes equipped with aerodynamic brakes, in various specified maneuvers.<sup>10</sup>

Investigations have emphasized that, particularly at supersonic speeds, large twisting moments are imposed on a wing by deflection of a trailing-edge control.<sup>11</sup> Hence, torsional stiffness required of supersonic wings to prevent aileron reversal is much greater than that required of subsonic wings. A study of wing twisting moment imposed by trailing-edge ailerons on unswept wings—and the resulting wing twisting and accompanying loss of rolling effectiveness—has been theoretically treated for the supersonic case.

► **Automatic Controls**—Research on automatic controls has been greatly expanded, not only because of the increased interest in the field of guided missiles, but also because of the interest in automatic-control applications to airplanes.<sup>12</sup> Studies of some current and projected airplane designs indicate that their flying qualities can be improved through the use of automatic devices.

As part of a control systems study for target-seeking missiles, work has been done in the Langley free-flight tunnel to determine the automatic lateral stability of a flying model equipped with a gyro stabilizing unit which applied control in response to bank and yaw. Free-flight tests were made with a flicker-type control system installed in the model and with this system modified to produce a hunting control which effectively gave proportional response. Effects of varying the cant angle and rudder deflections were investigated.

The normally small-size, high-velocity and high-maneuverability requirements of guided missiles necessitate automatic stabilization systems possessing extremely rapid response characteristics. The Langley Lab is studying factors limiting the response of basic types of automatic stabilization systems and the relevant aerodynamic characteristics of automatically stabilized missiles, in an effort to achieve the necessary response characteristics.

► **Study of 35-Deg. Sweep**—Flight tests of an airplane having a 35-deg. sweep-back wing have been completed.<sup>13</sup> Results present the lateral and directional stability and control characteristics of the airplane with and without an 80-percent span slot and with and without a ventral fin. This flight investigation showed that the directional stability of the airplane was positive in all conditions, but was reduced to an undesirably low value at high lift coefficients with the ventral fin removed.

The pilot considered a slight negative dihedral effect, present at low lift coefficients, more objectionable than a high positive dihedral effect present at high lift coefficients.

The longitudinal stability with an 80-percent span slot on the wing and with the flaps neutral was high throughout the speed range. With flaps down, the longitudinal stability became neutral or slightly negative near the stall. Stalling characteristics of the plane were considered good when the 80-percent span slots were used.

At present, flying quality characteristics can be generally compared with specific quantitative requirements except for stall warning and the behavior of the airplane in the complete stall. To provide a preliminary basis for quantitative evaluation of the stall-warning characteristics of plane, a study has been made at Ames correlating pilots' opinions of the stall-warning properties of 16 airplanes with a number of quantitative factors producing the warning.

Results of this study indicate the quantitative ranges over which satisfactory stall warning occurs for preliminary rolling motion, buffeting and rearward travel of the control stick. It was found that the degree of buffeting and rearward movement of the stick considered satisfactory as a stall warning was influenced by the magnitude of the rolling velocity in the complete stall.<sup>14</sup>

Results of an analysis of anti-spin fillets show that action of the fillets is such as to increase the damping effectiveness of the fuselage area below the fillets, thus tending to prevent spin. A study of dorsal fins, in conjunction with this project, shows that those investigated had little effect on the spin and recovery characteristics.<sup>15</sup> A check



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of the effect of tail length on spin-recovery characteristics showed that a model with a long tail length had better recovery characteristics than one with a short length where the models had comparable values of tail-damping power factor or even when the damping factor for the short-tail model was greater.

► **High-Speed Piloted Research**—The NACA, in cooperation with the USAF and BuAer, continued transonic flight checks of full-scale craft at Edwards AFB, Calif. The Bell X-1 and Douglas D-558-II were flown repeatedly at supersonic speeds<sup>25</sup> and a large number of successful flights were made with other research airplanes. These investigations have extended the knowledge of phenomena encountered in the high-subsonic, transonic and low-supersonic flight regimes.

During the past year the longitudinal stability of the Douglas D-558-I in accelerated flight has been studied and buffet boundary determined. The dynamic lateral stability and approach and landing characteristics have also been analyzed.

Measurement of the general aerodynamic characteristics and aileron effectiveness of the Bell X-1 was continued. Data have also been obtained for rudder-fixed aileron rolls during glides at high Mach numbers. Some of the longitudinal stability and control characteristics of the configuration were determined also by the free-fall-model technique. In this check, the elevator was automatically controlled, producing a constant value of normal acceleration throughout the speed range of the drop.

As one phase of the research airplane program, a series of tunnel tests was made of a scale model of a high-speed plane to determine static lateral and longitudinal stability characteristics at low and high subsonic Mach numbers. The study included measurements of the effectiveness of wing flaps, horizontal tail and ailerons as well as measurements of forces and moment acting on wingtip ramjets and auxiliary fuel tanks.

Investigations have also been carried out on models of a tailless glider, a canard (tail-first) and triangular wing aircraft at subsonic and supersonic speeds. Another investigation was concerned with the determination of the static longitudinal stability and control characteristics of a model of a convertible-type airplane with rigid and articulated propellers.<sup>26</sup>

► **Copters, Seaplanes**—As part of a study to establish satisfactory helicopter flying qualities requirements and to determine means of satisfying these requirements, it was found that the principal problems of current copters are instability with angle of attack in for-

ward flight; control sensitivity in forward flight, particularly for the smaller copters; and control forces following control movements during maneuvers.<sup>27</sup> Suggested remedies for these problems are being investigated.

Hydrodynamic characteristics of high length-beam ratio hulls have been continued to establish their motions while running on the surface. It is concluded that when the product of length squared times beam is held constant, as would very nearly be the case for interchangeable hulls on a given seaplane, the motions in trim and rise and the maximum probable vertical accelerations in waves are substantially reduced as the length-beam ratio is increased.<sup>28</sup> Maximum probable angular accelerations are increased until extreme length-beam ratios are reached because of the increase in hull length associated with decrease in beam for a specific design.

## PROPULSION

With the emphasis on higher speeds and on increased altitudes, the objectives of propulsion research are to obtain a maximum of thrust for a minimum of engine frontal area, engine weight, fuel consumption and manufacturing effort.

In achieving a greater thrust per unit frontal area the aerodynamic aspects of flight-propulsion research have assumed increased proportions and a need for further aerodynamic studies of propulsion problems is apparent. To obtain increased thrust per unit engine weight the research approach varies with the type of power plant. For turbojet engines emphasis is being placed on components of greatly improved performance and decreased size, such as supersonic compressors.

To obtain increased thrust per unit of fuel consumed an increase in the pressure ratio and operating temperature of gas turbine engines is indicated. Effort is being placed on possible simplification of the shapes of components to reduce the manufacturing effort required.

Ramjet and rocket power plants are inherently suitable for high-speed flight, since their elements are already reduced to a minimum of frontal area and weight, and emphasis is placed on obtaining improved performance.

► **Performance**—An investigation of altitude characteristics of a centrifugal compressor type turbojet engine has been completed. Results indicate that under standard atmospheric conditions best thrust per pound of fuel is obtained at the tropopause. Attempts were made to predict performance by conventional generalization procedures, but it was found that these were not applicable to these engines above 20,

000 ft. because of a change in compressor performance with decreasing Reynolds number.

Investigation of two axial-flow turbojets provided data on engine and component performance for altitudes up to 50,000 ft. and flight Mach numbers up to and exceeding the speed of sound. The data have been analyzed to show the performance of each of the major components of the engine. The combustion characteristics and blow-out limits were of particular interest.<sup>29</sup>

A ramjet engine was investigated at simulated altitudes to determine an efficient combination of flame holder and fuel. A series of flame holders was checked, using several different fuels. Results indicated the relative combustion efficiencies obtained with the different fuels, as well as the effects of flame holder configurations on combustion temperatures and efficiencies and operative range of fuel-air ratio.<sup>30</sup> Several flame holders and fuel-spray nozzles have been examined in experimental captive flight tests using a rectangular ramjet integral with a subsonic wing section. Because the combustion process in a ramjet engine may affect the efficiencies of the inlets and hence the net thrust obtainable, a study of the interaction between the combustion process and air inlet was made.

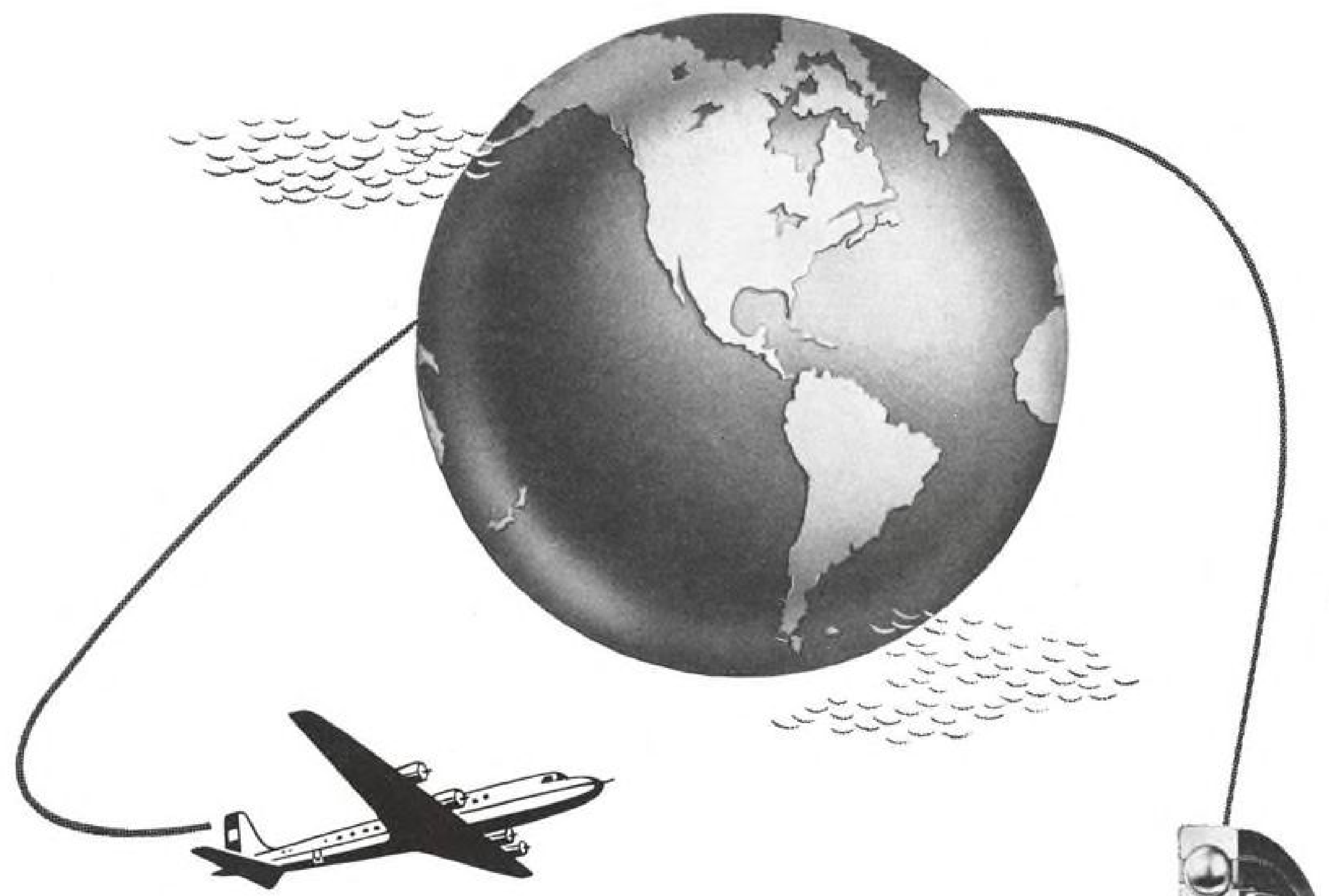
► **Fuels**—U. S. turbojet engines have been developed to operate with kerosene or high-octane gasoline. Consideration by the military services and the NACA Subcommittee on Aircraft Fuels indicated that in a national emergency such fuels would not be available in sufficient quantity for an air force with a large number of turbojet aircraft. A tentative specification was drafted that would include about half the refined products from a barrel of crude oil and this fuel was subsequently designated AN-F-58 by the military services.

The Lewis Lab evaluated the performance of this new fuel in current production turbojet engines. Two altitude test chambers, the altitude wind tunnel and flight test evaluations were conducted.

Results showed that AN-F-58 fuel gave performance equal in practically every respect to that with the standard fuel.<sup>31</sup>

► **Combustion**—Ramjet combustion requires stable, efficient burning in a high-velocity air stream with a minimum of physical obstruction. Because basic research showed the high efficiency of incandescent surfaces in supporting and stabilizing combustion, a performance comparison was made between a conventional single-row ramjet burner and burners embodying 1 to 4 rows of gutters immersed in the combustion zone.

► **Compressors**—Several studies were conducted to determine performance

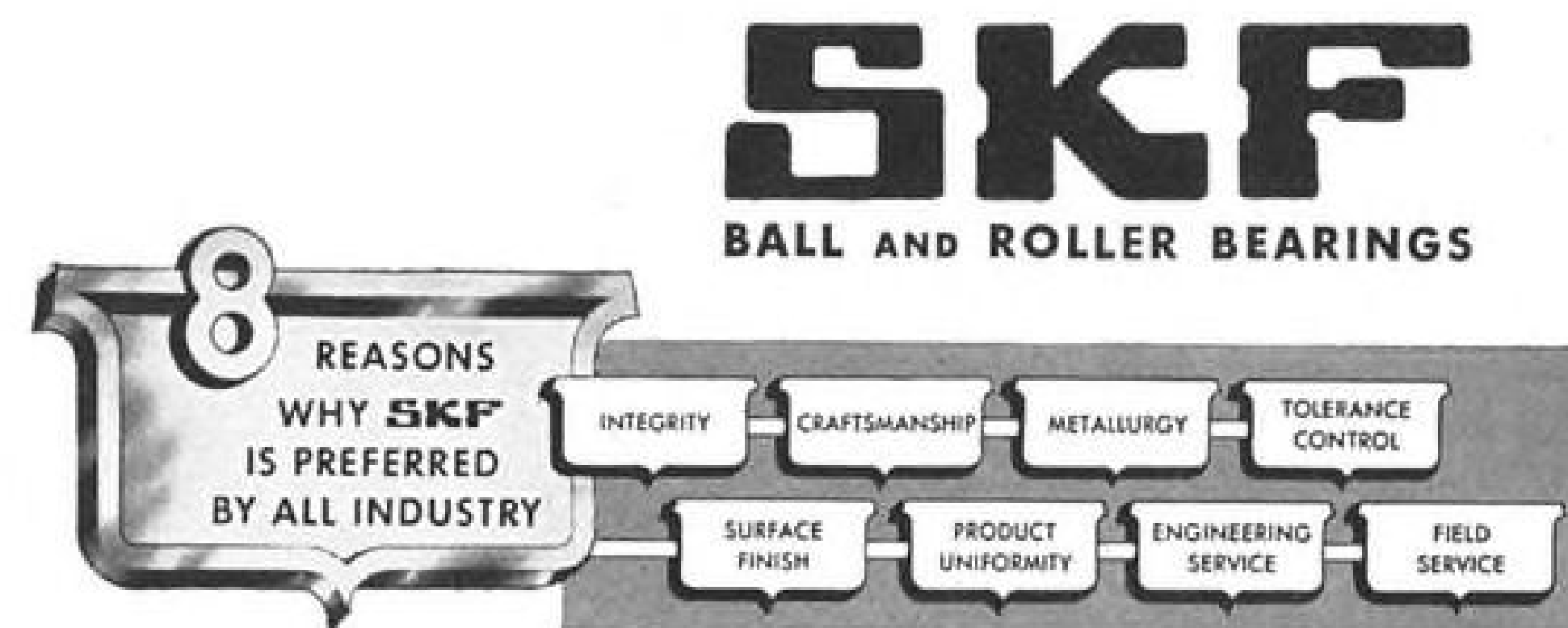


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of large centrifugal compressor components of aircraft gas turbine powerplants. A series of four compressor configurations was experimentally checked to determine possible sources of losses and to analyze improvements afforded by subsequent modifications.

Design changes in impeller and diffuser resulted in a 36-percent increase in weight flow, without any overall change in powerplant size, a five-point increase in overall efficiency and an increase in peak-pressure ratio off 11 percent at the operating speed of the powerplant.

Effects on compressor performance resulting from injecting water, or other fluids, into the impeller for augmentation purposes, have been analyzed. For the inlet conditions considered and for pressure ratios less than 8:1 this study showed that water-air ratios less than 0.05 were very effective in increasing pressure ratio and weight flow. When the water rate is increased above this figure, however, the excess water is essentially wasted, so far as compressor performance is concerned.

Analysis of a compressor utilizing supersonic flow throughout the rotor and experimental investigations on two dimensional turning passages to simulate blade shapes of such a compressor were completed. The measured losses on the two-dimensional turning passages varied from 5 to 15 percent of the inlet stagnation pressure, the smallest loss being obtained for a passage in which separation on the convex surface was minimized through introduction of a favorable pressure gradient.

► **Heat-Resisting Materials**—Certain gas turbine parts must withstand thermal shock caused by rapid cooling and heating. An analysis was made to determine which properties of ceramic materials affect their resistance to fracture by thermal shock. A criterion was developed from this analysis and was qualitatively verified by experiment. Resistance to fracture by thermal shock was shown to be dependent upon thermal conductivity, tensile strength, thermal expansion and ductility modulus.

Short-time tensile strength, thermal-shock resistance, coefficient of linear expansion and density of seven hot-pressed ceramics were determined. The compositions of the ceramics were magnesium oxide, titanium carbide, zirconium carbide, boron carbide, 85 percent silicon carbide plus 15 percent boron carbide, silicon and zirconia stabilized with 6 percent lime. Titanium carbide had the best resistance to thermal shock and showed the best overall characteristics of the seven compositions investigated.

Properties of ceramals of titanium carbide plus 5, 10, 20 and 30 percent of cobalt, molybdenum and tungsten were investigated. The properties eval-

uated were elevated-temperature tensile strength, elevated-temperature modulus of rupture, coefficient of linear expansion and density. A study was also made of the microstructure of the ceramals. The ceramals exhibiting the highest strength as determined by modulus-of-rupture evaluations at 1600 and 2000 F. was 80 percent titanium carbide plus 20 percent cobalt and at 2400 F. was 90 percent titanium carbide plus 10 percent molybdenum. It was thus shown that the use of metals having better refractory properties imparted higher strengths at the higher temperatures.<sup>22</sup>

► **Thrust Augmentation**—Performance of different types of "clamshell" variable-area exhaust nozzles for turbojet engines has been determined on afterburners and standard tailpipes, using full-scale jet engines at zero-ram sea-level conditions. This type of nozzle properly designed is mechanically reliable under afterburning conditions. Efficiencies of the various types were within 0 to 8 percent of the efficiency of conventional fixed-area exhaust nozzles.

Operation and performance characteristics of two different types of commercial and several NACA afterburner designs augmenting the thrust of commercial turbojet engines have been determined in altitude test facilities. Checks were made of the operable range of afterburner fuel flow, burner-ignition characteristics, stability of combustion and burner-shell temperatures over a range of simulated flight conditions for each configuration.

Marked improvements in the operation and the performance of tailpipe burners were obtained by means of systematic modifications of the flame holder and fuel system. Results obtained with these modifications extended the knowledge of design requirements for tailpipe burners.<sup>23</sup>

### STRUCTURES

During the past few years the trend in aircraft design and operating procedures has been such as to cause the problem of fatigue of aircraft structures to become of serious concern. The problem of predicting quantitatively structure fatigue life under service operating conditions may be considered to consist of two phases—determination of repeated service loads, and resistance of the structure to the repeated loads. These two phases are interrelated. Resistance of the structure to repeated loads depends on the manner in which the loads are applied, yet adequate measurement and expression of these loads require a knowledge of how the resistance of the structure depends on the manner of loading. This

interrelation requires that the fatigue problem be regarded as having a third phase—development of a reliable theory relating fatigue life to manner of loading.

► **Flight Loads**—Large variations in wing configurations which have accompanied the increased speed of modern airplanes and missiles have made it necessary to provide more general methods for computing span loading than those that were available previously. Before any of the newly developed general methods can be used with confidence, results obtained with them must be compared with experimentally determined distributions.

Two studies conducted at the Ames Lab have permitted such comparisons. In one of these the pressure distribution over a highly swept wing was determined for several angles of attack at supersonic speed, and in another study the load distribution on a similar wing in combination with a body was determined for a range of angle of attack through a range of supersonic speed. These results showed that the theory used predicts the loading due to angle of attack reasonably well, particularly at the higher Mach numbers investigated.

The increased speed of aircraft has also necessitated thinner and more flexible wings so that it has been necessary to include the effects of aeroelasticity in design calculations.<sup>24</sup> Thus the problem of predicting span loading has become more complex than it was a few years ago. A number of studies has been carried out on this problem and, as a result, a method has been developed by which the span loading of flexible wings of arbitrary plan form and stiffness may be determined.

► **Gust Loads**—A series of calculations of the transient response induced by gusts in airplane wings has been analyzed.<sup>25</sup> These were made for the purpose of comparing the response of present-day large transport airplanes with that of an older transport airplane which has proved itself satisfactory from the standpoint of gust experience. On the basis of the method of calculation used and the conditions selected for analysis, it is indicated that the newer airplanes show appreciably greater dynamic response in gusts than did the older reference airplane and that increasing the forward speed or the operating altitude results in an increase of the dynamic response for the gust with a gradient distance of 10 chords.

One of the problems associated with the design of planes having wings with large angles of sweep is the prediction of gust load factors. Previous research on this problem had been confined to a model with a 45-deg. sweptback wing. During the past year, investigations in



the Langley gust tunnel of the effect of wing sweep on the gust load factor have been extended and the results support previous findings that the maximum acceleration increment of an airplane with a swept wing will be generally less than that for one with an unswept wing under the same set of flight conditions.

► **Stability**—Theoretical results on the stability of various structural elements have been extended through broad series of experimental tests to provide data in the form of convenient design charts. Design charts have been prepared on compressive buckling strength of simply supported flat plates rein-

forced by longitudinal stiffeners, minimum-weight design of compressive panels with chordwise stiffeners, longitudinally stiffened panels of a variety of materials and panels using Y and Z type stiffeners. The Y-stiffener, previously developed, was modified by curved webs and results showed increased efficiency in panels designed to fail at high stresses.<sup>20</sup>

► **Fatigue of Metals**—For studies of notched specimens, it has been found that there is insufficient data available on the stress concentrations produced by notches, holes and fillets.<sup>21</sup> Photoelastic investigations have been initi-

ated to provide this necessary information. The Langley Lab has studied the effect of plasticity on stress concentrations.

In the vicinity of holes, notches and other discontinuities of structure, high-stress peaks are developed when a load is applied. If the peak stress is beyond the elastic limit of the material, there will be local plastic yielding; after release of the load, residual stress will remain in the structure and the peak stress caused by successive applications of the load will be decreased. This phenomenon was studied by tests on a series of large panels with round holes and the results are expected to be useful in developing methods of fatigue analysis.

#### OPERATING PROBLEMS

Important experimental results were obtained on effect of flight speed on aircraft operation, consisting of V-G records study; pilot escape, by free-flight models with jettisonable nose sections; noise, by investigation of several commercial muffler designs which proved relatively ineffective; and ditching, by tank tests of models of current four-engine commercial transports in cooperation with CAA.

► **Fire Prevention**—A bibliography has been assembled and a study is in progress on data obtained from aircraft fires. Study of flame propagation is being conducted by observing spread along an air stream over a flat surface, in a duct and over the external surface of a streamlined body, using a range of combustibles common to transports.

In addition, a program of destruction of surplus transport aircraft has begun to determine through instrumentation the ignition and spread of fire following a crash.<sup>22</sup> Work is also in progress to determine the state of development of less flammable lubricants and hydraulic fluids, to establish guides in undertaking research leading to the discovery of new compounds or additives.

► **Ice Protection**—Large amounts of design data are now available on the protection of wings, empennage, propellers and jet engine intakes from effects of snow, ice and water impingement.<sup>23</sup> A study of data on propeller icing indicates that with no ice protection, performance losses normally would be low and that large performance losses would be rare.

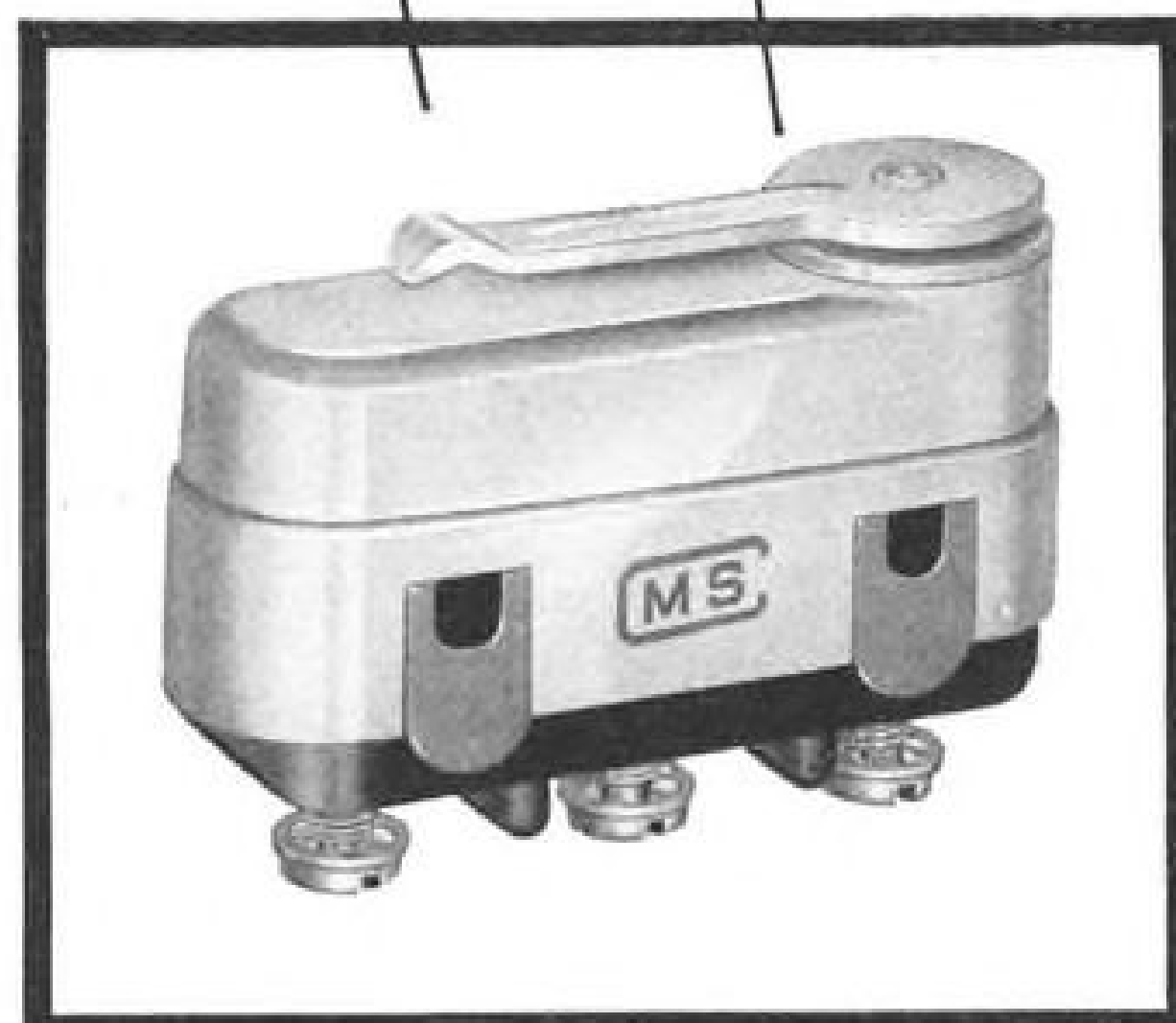
Jet engine ice-protection methods under investigation include inertia separation of freezing water from the air before it reaches the engine, heating the incoming water-air mixture above freezing by taking hot gas from the combustion chambers and injecting it into the air at the duct entrance and heating the critical surfaces of the duct and engine to prevent freezing of impinging water.

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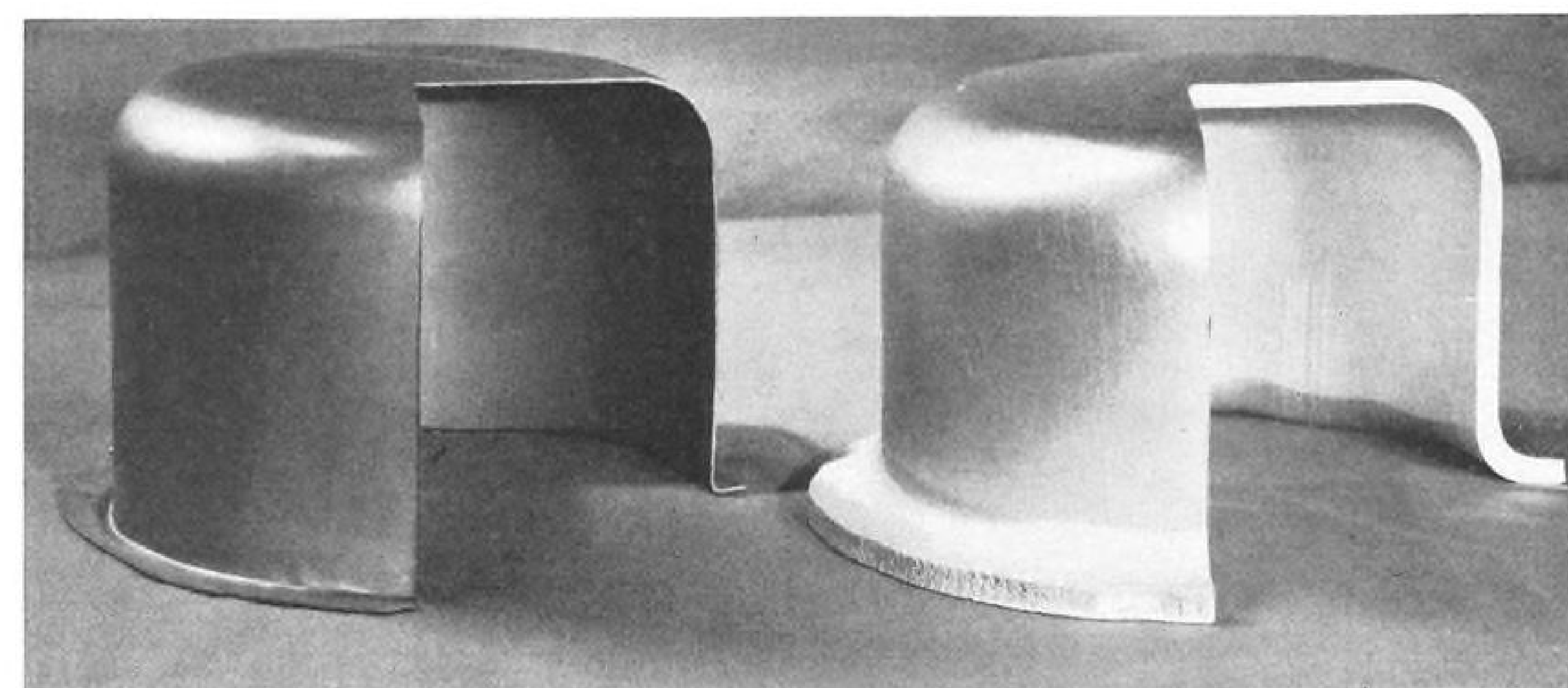
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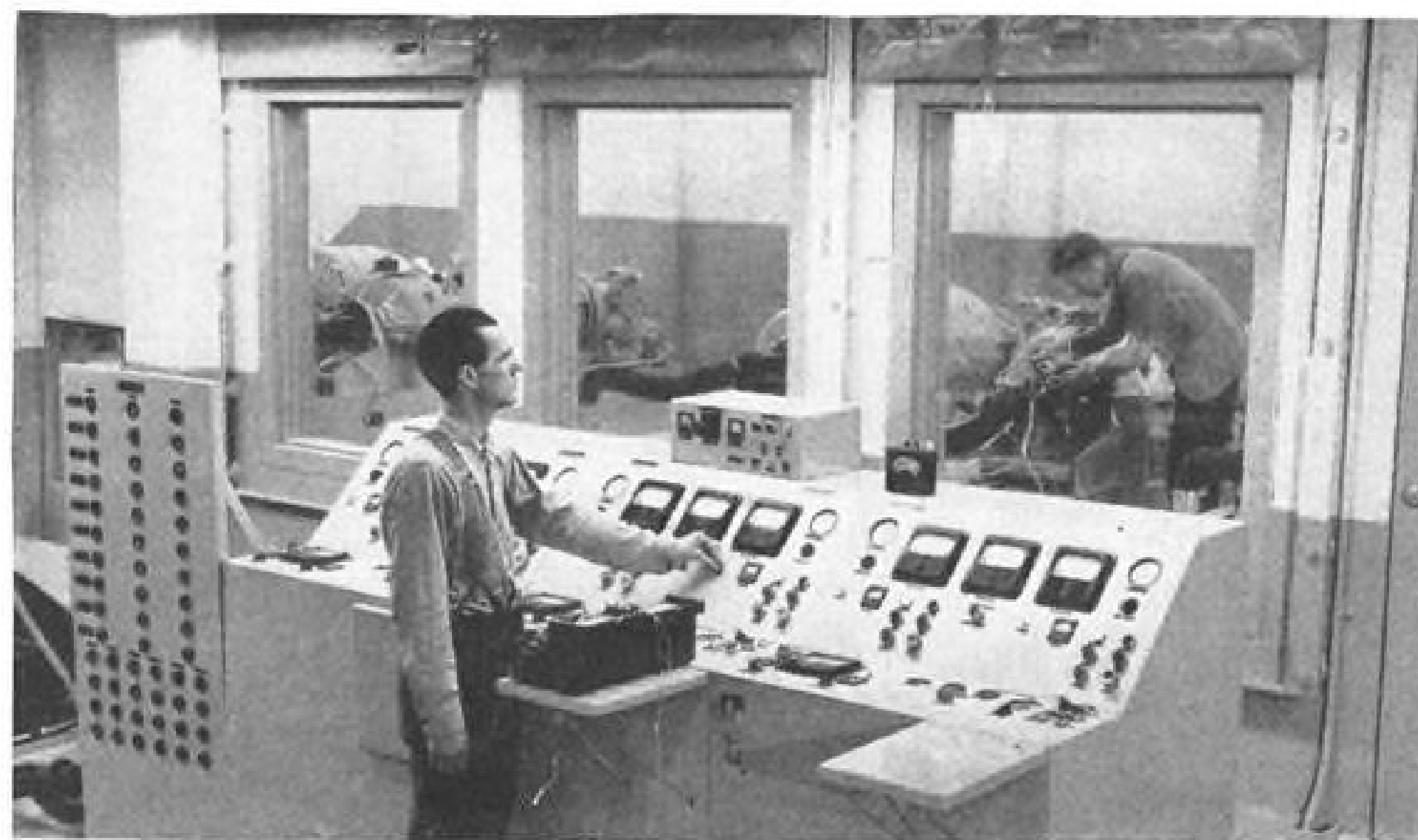
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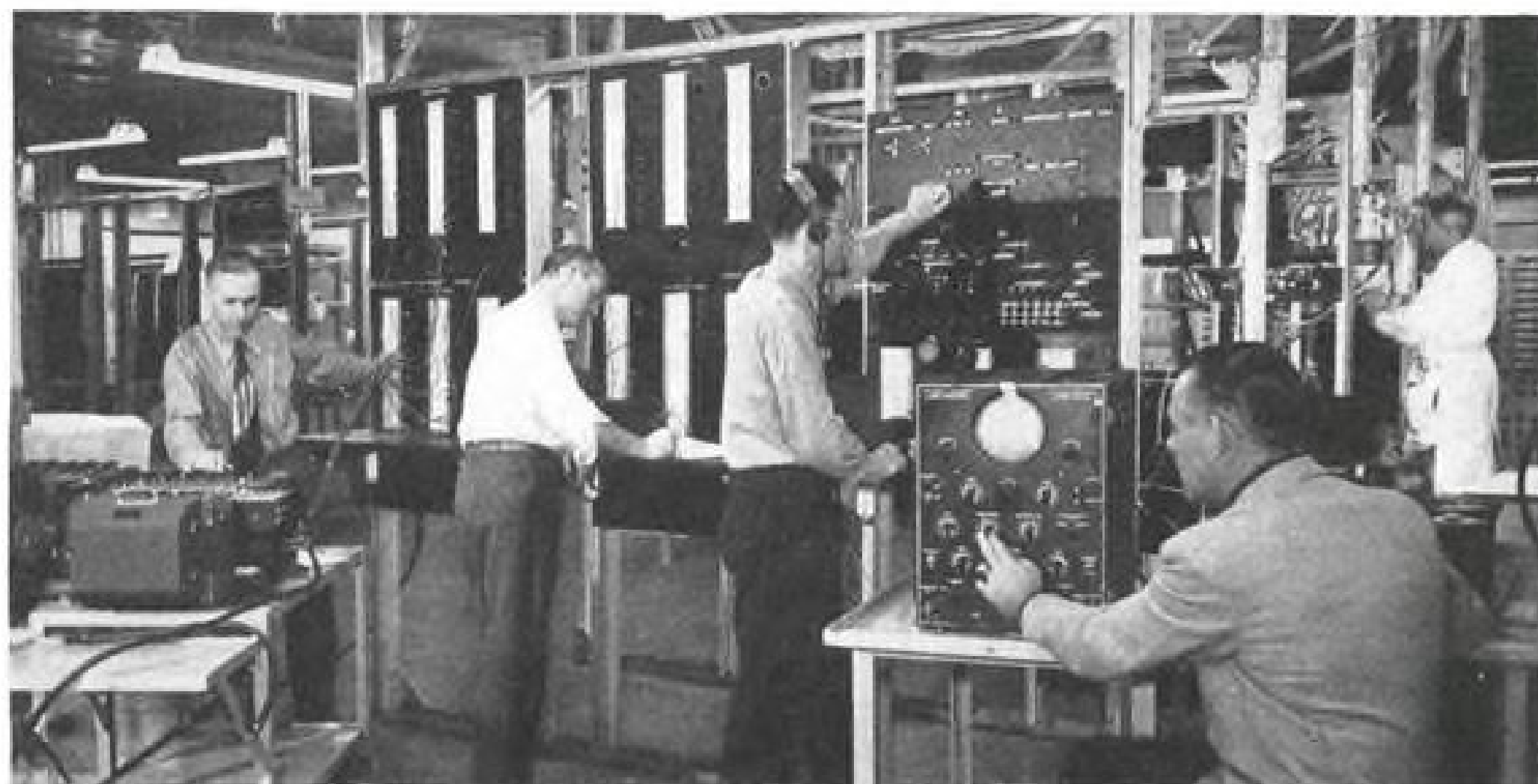


## AVIONICS



Master control console for engines and drive system for aircraft generators under test in new Boeing Airplane Co. electrical laboratory.

Operator views power source through double-glass, soundproofing windows. Technician is adjusting generator.



Electrical mockup is operated from pilot's panel. Oscillograph recording is utilized.

## Lab Speeds Electrical Proving

Boeing's new research and test facility avoids plane tie-up. Assignments from other companies undertaken.

An electrical laboratory expected to eliminate nearly all developmental flight test time previously required for aircraft generating and distribution systems has been placed in operation by the Boeing Airplane Co. at Seattle, Wash., in cooperation with the U.S. Air Force.

Cost of the lab has not been revealed, but is believed to be well in excess of \$500,000.

Considered the most advanced and versatile electrical research and test facility in the aircraft industry, the laboratory will avoid the extended tieup of modern, complex airplanes for electrical test programs, believes Karl

Martinez, head of Boeing's acoustics and electrical unit.

Virtually all electrical research and testing, with the exception of effect of engine vibration on the electrical system, can now be done in the laboratory while the plane is still in the mockup stage.

This pre-checking should materially reduce the cost of airplane construction by elimination of delays and rework on electrical installations.

► **Outside Projects**—Boeing was the logical company to develop such a laboratory, since it produces the most highly electrified aircraft in the world. Aboard its Stratocruiser, for example,

some 100 individual tasks are performed electrically. With large aircraft, the increase in speed and load-carrying capacity has been accompanied by a comparable increase in dependence upon electric drives for both vital controls and auxiliaries.

Although most of the work in the 8800-sq. ft. lab. will be under AF contract, potential is not limited to aircraft work. Boeing already has accepted projects from manufacturers of aircraft electric accessories, as well as from the aircraft industry, and probably will accept more such assignments in the future. New instruments are shielded by a cloth to protect a manufacturer's secrets.

The laboratory is staffed by some 50 engineering specialists in avionics, mechanical power, hydraulics, airflow, etc., and 17 technicians.

► **Former Practice**—It is the successor to one Boeing established during the war for the C-97 and later the Stratocruiser. Earlier, all testing had to be done on the finished aircraft. This procedure was difficult not only because of cramped quarters but because the engines had to be run to operate the generators. On the ground, these engines heated up quickly and thus had to be shut off frequently, preventing a continuous check on the electric system.

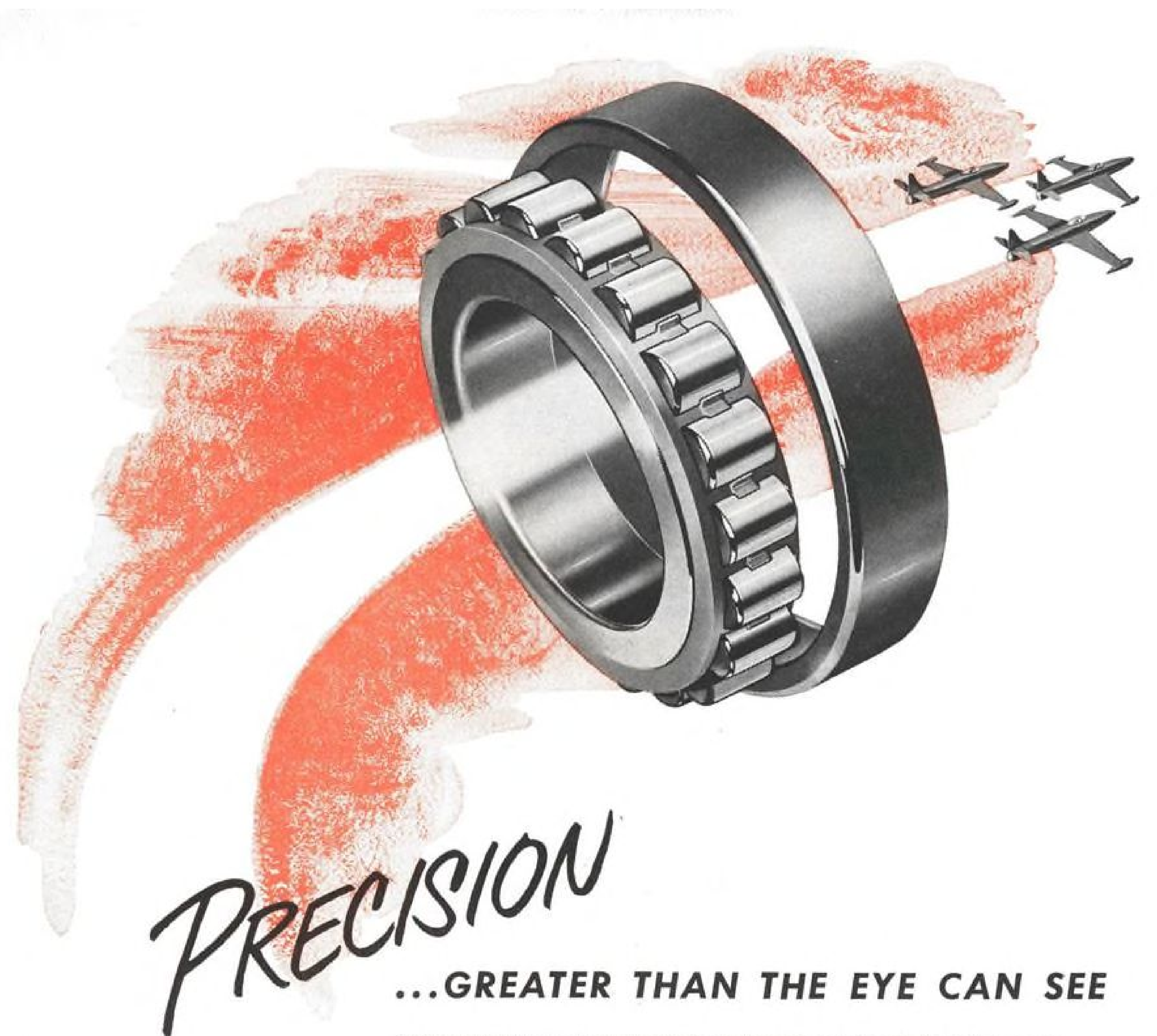
The original laboratory, although it could test the paralleling of generators and the protective features for generators and main bus bars, could check only half the generating systems. It also left unchecked the main bus, the electric loads and the distribution system from main bus to loads. Consequently, flight test time still was necessary to check these items under actual operating conditions.

► **Electrical Mockup**—In the new lab, the complete electrical installation for each new-type airplane will be "mocked up" precisely as it is intended to appear in the craft.

Presently, two such mockups are in place, one a research apparatus involving a 120v. d.c. system for aircraft, another duplicating the 24v. d.c. system of the B-47A to test for flak damage.

In the 50×60-ft. mockup area, the complete electrical system is strung up on vertical aluminum racks. The ceiling is of sheet aluminum to simulate aircraft conditions, thus making the impedance of conductors to the flow of current almost identical to that found on the airplane.

The engineers do not test the components as such, but the assembly of components into the electric system. Wherever possible, actual components, such as fuel boost pumps, are installed in the mockup. The fuel system does



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Flying a tight formation at speeds as fast as sound calls for extreme precision on the part of today's jet pilot. But in jet flying there is more precision than meets the eye! For instance, keeping a gas turbine spinning at rates as high as 40,000 RPM requires bearing tolerances measured in millionths of an inch! ☆ Bower bearings—because they are the finest precision bearings made—are used by nearly all manufacturers of jet aircraft engines. Pratt & Whitney, General Electric, Westinghouse, AiResearch, Solar—all have found Bower bearings thoroughly capable of standing the enormous speeds and temperatures so common to jet engine operation. New materials pioneered largely by Bower have proved more than equal to temperatures up to 600° F. And Bower bearings operate with complete efficiency on a "starvation diet" of lubricant. ☆ This is an excellent example of the high performance of Bower bearings in the aviation industry—bearings that are outstanding for precision, durability and quality.

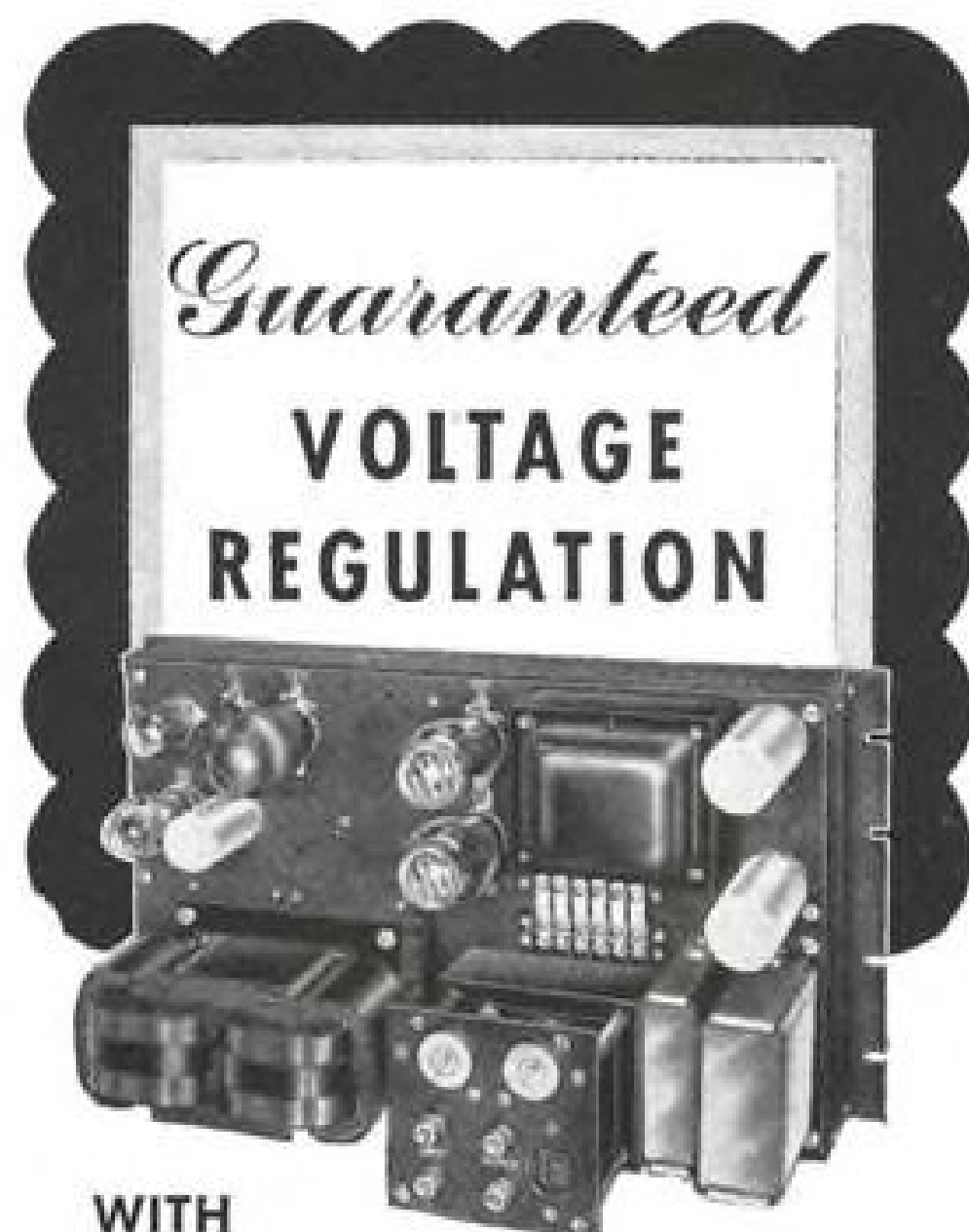
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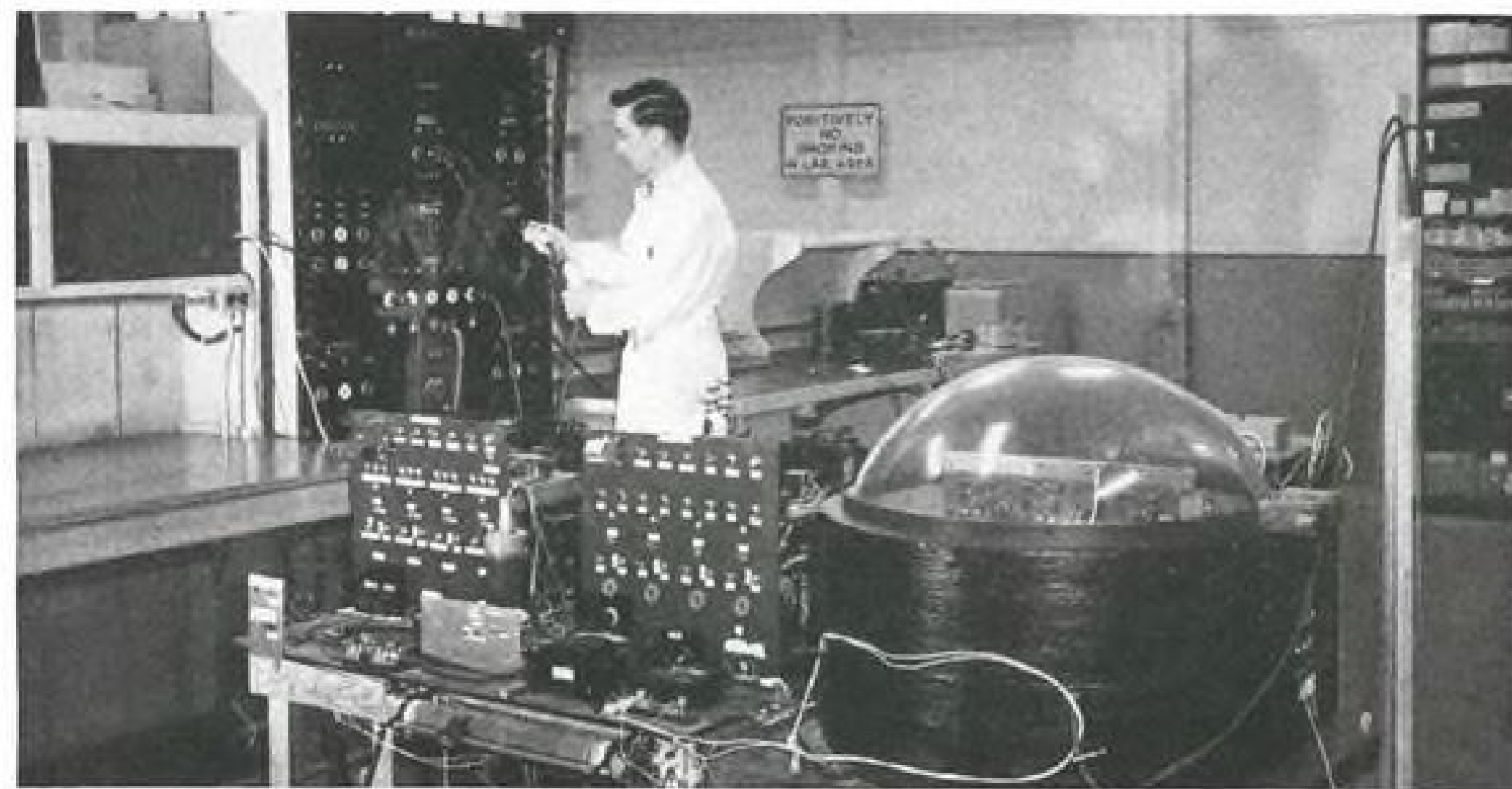
STABILINE Type IE is all-electronic. It acts instantaneously to keep delivered voltage to within  $\pm 0.1$  volts of the preset value, regardless of line variations. It will hold output to within  $\pm 0.15$  volts for any load current change or load power factor change from .5 lagging to .9 leading. Waveform distortion never exceeds 3%.

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Aircraft switches are performance-checked under a partial vacuum in the altitude test

chamber. Attendant is at one of 14 distribution panels in the Boeing laboratory.

not use gasoline, because of its high cost, but utilizes an oil-and-water mixture.

► **Cockpit Mockup Planned**—Temporary or changing loads, such as on landing gears and flaps, where these vary with the displacement, are simulated by the use of resistors. Actual gear and flap motors are used but, instead of powering the actual units, drive electromagnetic-fluid prony brakes providing the proper amount of mechanical resistance.

The entire electrical mock-up is operated from a condensed version of the pilot's panel. The only controls are switches for the equipment operated by electricity—gear, flaps, fuel boost, control-surface boost, aileron boosts, rudder and elevator boosts, defrosters, heaters, and miscellaneous loads simulated by use of resistors.

The next mockup to be built will have a complete cockpit, making possible the training of flight crews before a prototype is constructed.

Loads for each flight condition can be duplicated with the panel switches. To test the plane's starter, for example, switches may be thrown that start motors and gear boxes, setting up a condition similar to the starting of a plane's engines. Dynamic braking soon may be installed to get an even closer approximation of the starting loads of jet engines.

► **Equipment Layout, Details**—Three Ford V-8 gasoline engines drive the same number of d.c., single-bearing generators, developing a possible maximum of 840 kw. (Eventual replacement is planned with three electric motors of twice the capacity). Voltages range from 100 to 450 and amperages up to 3300.

The current generated is used to power six d.c. traction motors which, through step-up gears, drive airplane generators under test.

The coupling between each gasoline engine and generator is rigid radially

and torsionally but flexible longitudinally, thus permitting the generator armature to act as a flywheel for the engine. The generator fan is integral with the coupling, and the generator frame is flange-mounted on the engine. Each engine-generator set is supported by vibration-absorbing shock mounts. All connections to the engines are flexible, so vibration will not be transmitted to the lab.

Each engine has two power takeoffs, each consisting of right-angle drive, universals and V-belts, for driving a total of four auxiliaries (battery-charging generator and three amplidyne exciters).

And each auxiliary has an axial-flow contravane fan mounted on its shaft for circulating air through the engine's radiators.

Each battery-charging generator is rated at 6 kw., 30v. d.c., and is used to charge 24v. batteries needed for amplidyne excitation, power control and engine starting. One amplidyne on each engine is used for generator excitation and the other two for field-excitation of the motor to give speed control. Each has an output of 54v., 35 amp., with two 250-milliampere control fields and one 1.25-amp. field. Output of each is connected directly to the field of the machine it serves.

► **Control Console**—The engines are started from a control panel in the engine room, after which they usually are run from a master control console in the laboratory. This console consists of three separate master panels, with all controls and instruments for one engine and two electric motors on each panel.

Through this console, engineers can obtain and hold any desired speed on the generators, up to 10,512 rpm., comparable to the speeds of the generators on any current or presently contemplated aircraft.

The master console is the equivalent of that part of the pilot's controls with

# One Secret of INCREASED POWER LOWER MAINTENANCE LONGER ENGINE LIFE

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Standard aluminum alloy piston which failed in the top ring groove.



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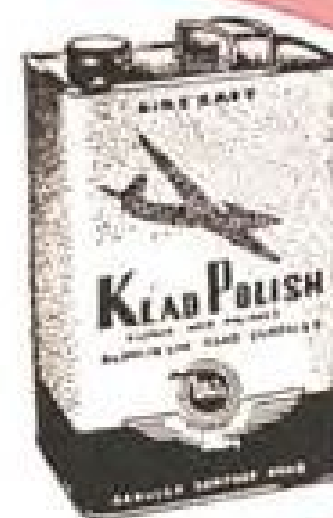
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which he applies power to the airplane's engines.

Visible from the console through large double-glass, soundproofing windows are six 250-hp. drive stands and associated motor switchboards and auxiliaries located in the generator-drive room.

Each motor is directly coupled to a Falk speed-increasing gear with a ratio of 4.2 to one. When suitable adapters are provided, each motor-and-gear may drive two aircraft generators, thus making a total of 12 generators under test at one time.

A blower driven by an 85-hp. motor sends cooling air to each generator. In the air duct leading to each of the generators is a calibrated flow tube, from which air is piped to a manometer panel in the laboratory. A remote-indicating, resistance-bulb-type thermometer enables the console operator to read values of air temperature in each tube.

► **Recording**—Above the console, a loud-speaker carries, at the will of the operator, the sound of each engine as picked up by a microphone mounted on the engine head. The operator has a hand microphone through which he may speak to technicians in any area of the lab.

Power from the generators reaches the mocked-up system through cables identical in length, size and number to those of the airplane. These cables can be plugged into load banks to check performance of the generators under test.

Five reactor panels provide the reactive load necessary for testing a.c. generators.

Five oscillographs and oscilloscopes are used to record whatever electrical information is required. A light beam moves with the amount of current in a circuit and is reproduced on the resulting oscillogram, representing intervals as brief as hundredths of a second.

These oscillographs record anything that can be translated into an electric current: the current itself, the voltage, time, torque, power, stress, etc. They can be used to check whether a relay opens or closes too fast or too slowly, whether instantaneous currents and voltages are excessive or too low, etc.

The laboratory includes a shielded room, free from static, where radio research and development is conducted, and a dark room for development of oscillograms and study of cockpit lighting.

Altogether, the lab has 14 working centers. Each has access to 6, 12, 24, 28 and 120v. d.c.; 200/115v., 400 cycle a.c.; 120, 208 and 480v., 60 cycle a.c., as well as gas and compressed air. The various centers can be connected directly through transfer circuits.

## It's powered by the J-47 Axial-Flow Turbojet Engine



This modern jet plane gets its speed and power from the General Electric J-47 axial-flow turbojet engine, which has a basic thrust of 5200 lb. Many of these engines have their oil cooled by Feather-Weight Oil Coolers, tested at 1000 lb. pressure.

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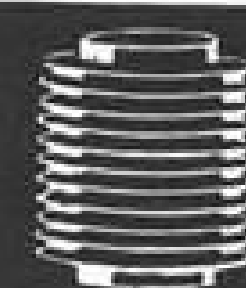


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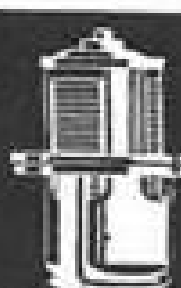


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AND BELLOWS ASSEMBLIES



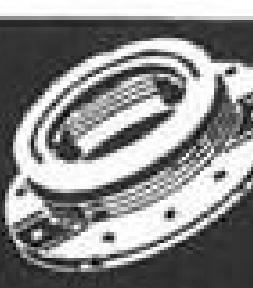
Instrument  
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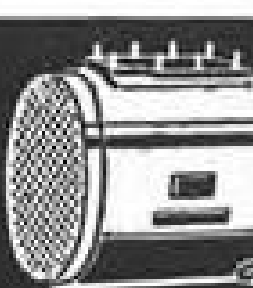
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# FINANCIAL

## 1949 Good to Lockheed, Douglas

Companies had year-end backlog of over \$200 million each; both showed profit on commercial work.

Financial strength among key aircraft companies is becoming more evident with the release of annual reports for 1949. Among the recent accounts revealed and displaying healthy attributes are those of Lockheed Aircraft Corp. and Douglas Aircraft Co.

Lockheed is particularly noteworthy in view of the long recovery strides the company has made during recent years. At the 1946 year-end, the company carried a very heavy inventory position (\$53 million) and was in debt to banks for \$40 million.

As of Dec. 31, 1949, inventories had been reduced to about \$35 million, and were no longer suspect, as they were a few years earlier. During 1949, the management liquidated all bank indebtedness by prepaying the remaining three installments totaling \$6 million on notes extending to July, 1951. With this action, Lockheed became free of all bank debt for the first time in the postwar period.

► **Lockheed Earnings**—Earnings for Lockheed also are well-sustained, amounting to \$5,491,000, equal to \$5.10 a share for 1949. This compared with \$6,239,000 or \$5.80 per share for 1948. Were it not for tax adjustments belonging to previous years and amounting to \$1,155,988, credited to and reducing the 1949 tax liability, earnings for the last year would have been less.

An important sidelight remains that instead of taking refuge in postwar tax credits in the carry-back of operating losses of past years, Lockheed is again an important contributor of tax money to the federal treasury. For example, during 1946 and 1947, with operating losses incurred, obviously no taxes were paid. In fact, substantial tax credits, amounting to more than \$13 million were received.

During 1948, the carry-forward tax credits resulted in a net saving of about \$2,800,000 and served to keep the total tax impost for that year down to \$1,588,844. Without the special tax credits resulting from accumulated adjustments of prior years, the 1949 tax assessment would have amounted to \$2,225,000.

► **Outlook Good**—Another interesting phenomenon in the Lockheed picture is the well-defined production outlook, ranging well into 1951 (AVIATION

WEEK, Mar. 27). Backlog was \$229,746,000 at the 1949 year-end, compared to \$195,901,000 a year earlier. The company is unique in that about 21 percent of its total backlog is represented by commercial orders. This amounts to 48 percent of the entire industry's commercial orders as reported to the U. S. Bureau of Census at the 1949 year-end.

► **Incentive Contracts**—It is this steady production flow of planes' series which is conducive to efficient and economical operations, advantageous to the government in lower costs, and desirable to the company because of greater profit incentive. Nearly all of Lockheed's military business received last year was under the so-called "target" contract.

These target contracts provide that any savings the company makes below the price estimates originally set for new airplanes are shared both by the company and the military service. Contracts of this type give the company 20 to 25 percent of these savings and return the rest to the military service. On the other hand, company can be penalized 20 to 25 percent of over-expenditures. The management declares itself in favor of target contracts because of the strong incentive to cut costs by providing a premium on improved efficiency.

Dividends paid during 1949, amounted to \$2.00 per share. While these were up from the \$1.50 per share disbursed during 1948, they were less than 40 percent of available earnings. With the heavy debt retirement program completed, it is conceivable that with increased sales and earnings prevailing for 1950, there will be strong pressures for increased dividend payments this year.

► **Douglas Strength**—The distinction of having the strongest financial position among the major aircraft builders probably belongs to Douglas. As of Nov. 30, 1949, the company had net working capital alone of \$96.28 per share. Net worth per share as of same date aggregated \$122.05.

Both of these valuations were down very fractionally from a year earlier. This decline did not distress stockholders. While the company earned \$9.19 per share last year, it paid total divi-

dends amounting to \$9.25—giving the company the accolade of being one of the very few industrial enterprises in the United States paying out more than it earned in the year in question.

There is good reason for the Douglas management to follow this liberal course. In the first place, its operating requirements do not require the husbanding of any additional capital resources. Moreover, with a backlog of \$275,499,000 at Nov. 30, 1949, compared with \$232,989,000 a year earlier, more than a year of good business appears assured.

Douglas has probably paid out a higher percentage of its postwar earnings in the form of dividends than any other aircraft company. For the years 1945 through 1949, dividends of \$29.25 per share, equal to more than 85 percent of the reported \$33.89 net earnings during this period, have been paid.

► **Sales Down**—With a modest decline in sales from \$118.6 million in 1948 to \$117.4 million in 1949, net earnings also decreased. Net income for 1949 amounted to \$5,516,700 compared with \$5,829,206 for 1948. Actually, however, the management showed an improved control over operating costs. For example, cost of sales, amounting to 82.2 percent for 1948, were down to 81.6 percent the following year. Selling, administrative and general expenses were similarly reduced from 5.2 to 4.9 percent.

These gains were largely offset by the increase in experimental costs from 1.6 to 3.4 percent. These experimental costs, amounting to \$4,064,557 for 1949, were primarily attributable to development costs incurred on the Super DC-3 and the DC-6A.

Douglas provided \$5,171,000 for tax payments for 1949, compared with \$5,263,232 a year earlier. This is a sharp contrast to the tax credits from carry-back of operating losses received during 1946 and 1947 amounting to \$4,200,000 and \$12,640,000 respectively.

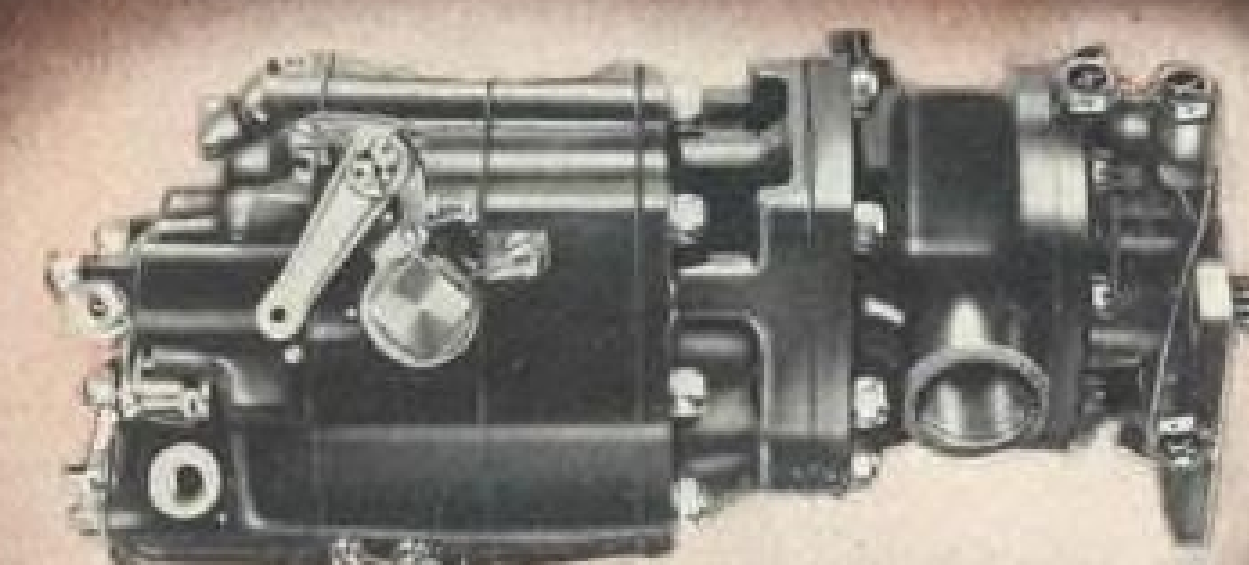
An interesting note is appended to the Douglas 1949 financial statement in respect to potential tax liabilities that may be imposed upon the company. The Treasury Department is contending that tax adjustments for 1946, 1947 and 1948 should impose an additional liability of \$6,600,000 plus interest. The company does not agree with this view and has made no provision in any special reserves for this contingency.

The 1949 results of Lockheed and Douglas are highly significant in that both companies have demonstrated the ability to show profits on their commercial business. It is equally noteworthy that the two managements express extreme caution in underwriting the development of new transports as represented by jets.

—Selig Altschul



The 700-mile-per-hour Army XF-88—powered by a WESTINGHOUSE J-34 turbo-jet engine. THE TURBINE CONTROL for this engine is manufactured by HOLLEY.



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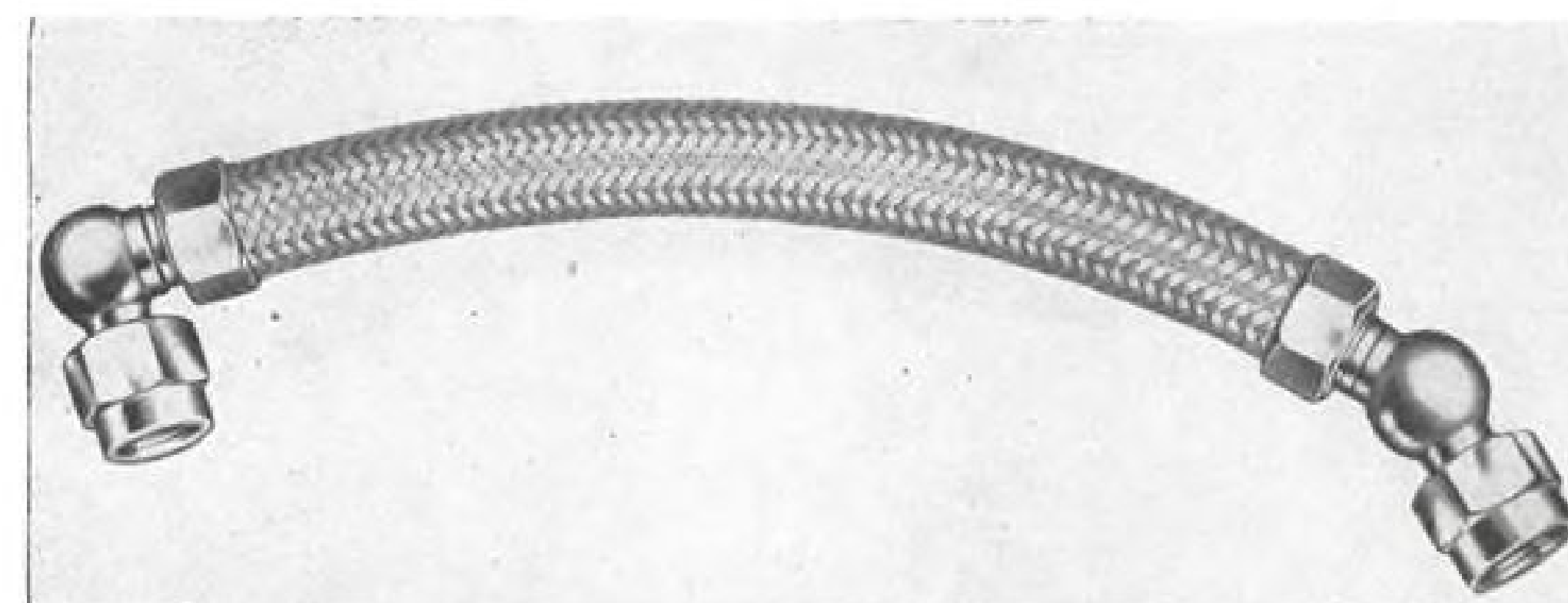
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## NEW AVIATION PRODUCTS



INTEGRAL COUPLINGS set at required angle is great plus factor of Avica's pipe.

### Flexible Metal Pipe for Jets

Custom made tubing with integral angle couplings saves space and weight and increases safety.

"Custom made" flexible metal pipes specially suitable for use in jet engines now are being marketed by Avica Corp., Portsmouth, R. I. They can be supplied with integral angle couplings set at any of six standard angles from 90 to 165 deg., and in several different metals to meet specific design requirements of individual customers.

According to Avica, use of the hose with its special couplings permits savings in weight, space, installation and maintenance time by eliminating extra joints required when separate elbows, tees, and other fittings are used. Also, piping runs can be shortened and sharp hose bends avoided, giving a compact, straight-forward installation.

These flexible metal pipes are corrosion-resistant and reinforced with wire braid to enable them to carry fluids and gases. They can be used in fuel, oil, medium and high pressure systems where high ambient temperatures are encountered, and where conditions of vibration and flexing must be met. They already are being used in some of the late-model military jet engines which have been developed.

► **High Temperature Use**—Available in stainless steel, Inconel, Monel and Armco, pipe ranges in sizes from  $\frac{1}{8}$  to  $1\frac{1}{2}$  in. i.d., coming in lengths specified by purchaser to meet his particular design requirements.

Stainless or Inconel steel pipe and fittings are recommended where ambient temperatures around 1500 F. are encountered. Slightly heavier than corresponding sizes of Avica synthetic rubber hose assemblies, these pipes can be used, for example, in installations where it is necessary to carry fuel to the afterburner of a jet engine. For temperatures

up to 1000 F., Monel hose and fittings are used.

For pressures up to 1000 psi. where temperatures do not exceed 500-600 F., Armco can be used. Avica says its Armco flexible pipe has "proven considerably lighter in weight" than corresponding synthetic rubber hose. In one instance, Avica adds, this saving was "half the weight of the synthetic rubber flexible pipe which it was designed to replace."

► **Coupling Advantages**—Hose can be fitted with straight couplings, or integral angle couplings at both ends set to any specified angular relationship from 0 to 360 deg. Couplings are supplied with swivel nuts to mate with AND 10056.

According to Avica, its integral angle couplings "take up far less space than the standard straight swivel nut hose coupling with the separate elbow." Further, "individual elbows to AN specifications are only available in 90 and 45 deg. angles whereas the Avica . . . coupling can be had at any desired angle. . . ."

Couplings of this type also are available with company's synthetic rubber, single wire braid reinforced hose, AN-H-24, and double wire braid rubber hose, AN-H-28. For use in ambient temperatures up to 200 F., these hose types also may be fitted with "T"s, "Y"s or other special couplings if specified.

While couplings generally come in six standard angles, Avica will make them to any angle to meet special design problems.

Avica Corp. is new name for firm which, until recently, was known as Avico Incorporated.

### Airport Lighting Aid

For use with airport lighting equipment, circuit selector cabinet assemblies, designed to meet CAA Specifications L-816 and L-817, are offered by Westinghouse Electric Corp., Pittsburgh, Pa.

Suitable for series or multiple operation, cabinets are used for the selection of runway or taxiway lighting circuits supplied by constant current regulators of 5kw. rating or less, having 6.6 amp. secondaries, or by transformers with 600v. secondaries.

Relays or contactors of cabinet assemblies are controlled remotely from airport control tower or operations center to select desired lighting circuit. Both single-circuit and three-circuit assemblies are available.



### Small Regulator

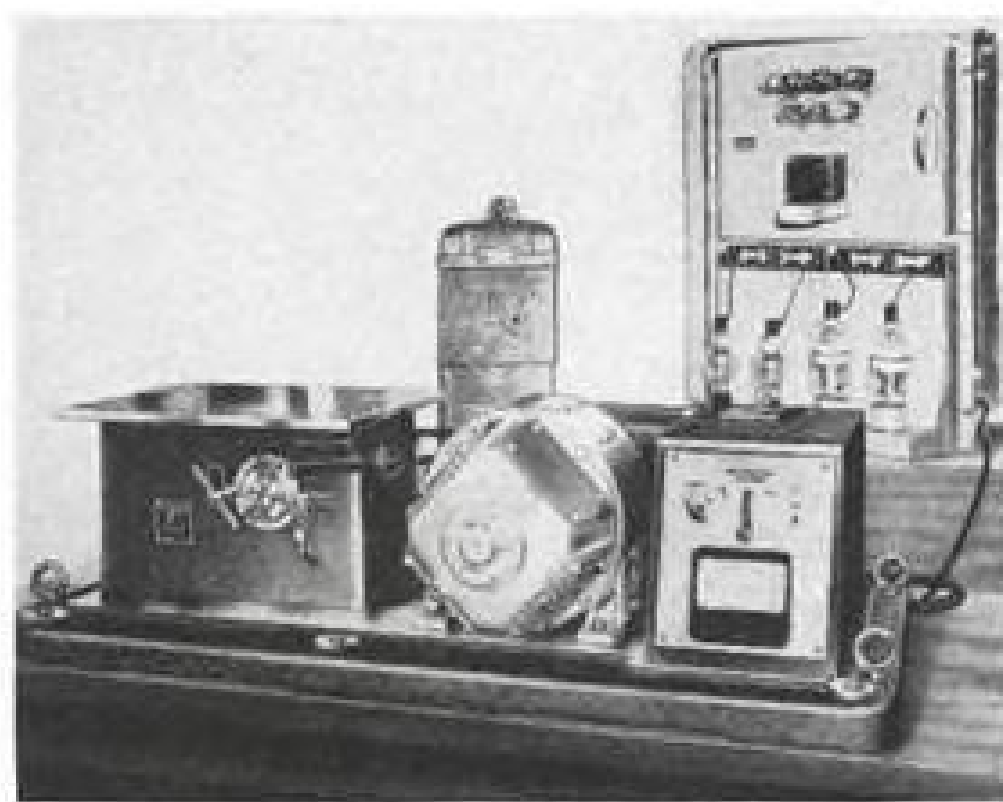
Miniature electronic regulator, incorporating what is claimed to be first "fail safe" circuit devised for remote positioning control, is announced by AiResearch Mfg. Co., 9851 Sepulveda Blvd., Los Angeles 45, Calif.

Because of its fail safe feature, this device is "the long awaited answer to such aircraft applications as automatic trim tab adjustment and multi-engine throttle control," according to AiResearch engineers. If electric system fails, unit instantly "holds" until manual control can take over.

Also suitable for automatic temperature and pressure regulation "to microscopic degrees," regulator can be used for carburetor and cabin air temperature control, anti-icing control and cabin pressure release control. It is designed to meet conditions demanding variations as low as  $\pm$  one percent.

Fail safe feature is incorporated in potted circuit about size of matchbox. New methods of producing printed circuits "make fast production of such electronic units more feasible than ever before," the maker says. Regulator is about 3 in. square and weighs less than 2 lb. It is a variation of the company's previously announced electronic "Weather Brain," but modified for more general use.





## Fatigue Tester

To check aircraft parts and components weighing up to 100 lb., Model 100-HA-1 vibration fatigue testing machine has been developed by All American Tool and Mfg. Co., 1014 W. Fullerton Ave., Chicago 14, Ill.

Device is designed to provide smooth, stepless acceleration from 10 to 100 cps., either manually by turning knob on control panel or automatically with uniform acceleration and deceleration, completing cycle within 1 min.

Cycle can be stopped at any point to take readings, and when operating automatically, it is possible to select any desired frequency range within the above-stated cps. limits of the instrument. Frequencies are recorded on an electric tachometer.

Equipment includes GE Thy-Mo-Trol electronic drive. Components as shown are: electronic control panel with power rectifier tubes (right background), anode transformer (left background), and 2-hp., d.c. motor drive between vibration unit and acceleration control panel (right foreground).

Parts are secured to 15 x 18-in. testing table which has tapped holes. Vibration is produced on horizontal plane and displacement (stroke) can be adjusted from 0 to .125 in. Machine will produce 10G with 100 lb. table load.



## Engine Controller

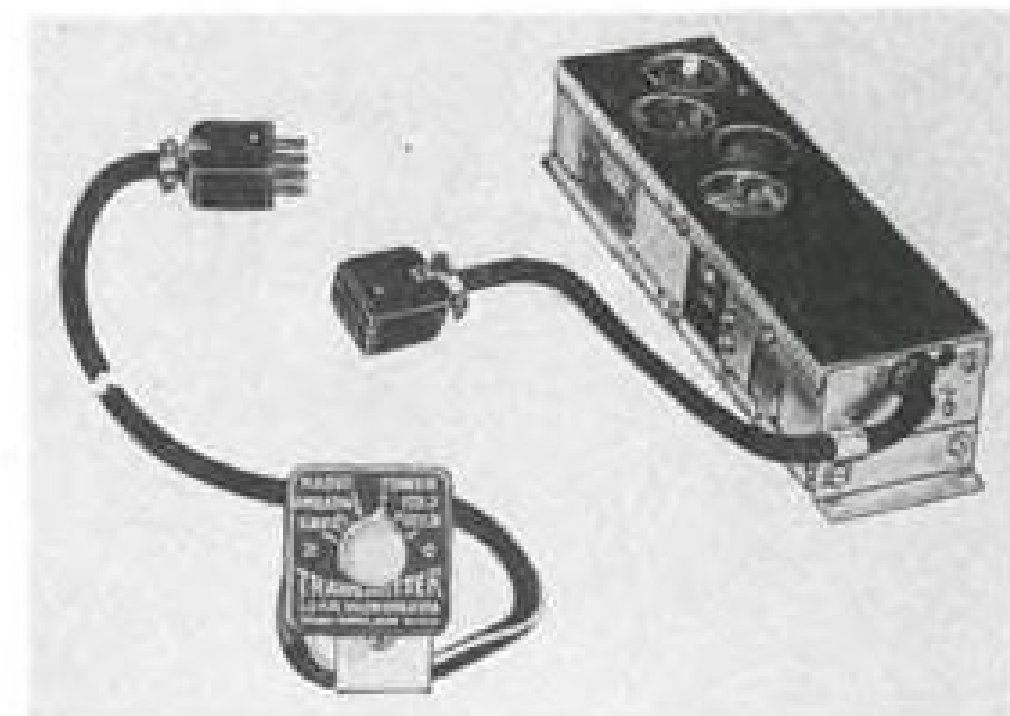
A pressure-activated automatic engine controller for engine driven pumps on fuel tank trucks, produced by A. O. Smith Corp. Meter div., Los Angeles

22, Calif., is stated to save operator's time, gasoline, and engine wear.

Control uses diaphragm which moves in response to varying pressures on outlet side of transfer pump. Diaphragm movement is linked to throttle rod to give desired engine speed.

Device is stated to eliminate need for operator to shift power takeoff to turn pump and rev up engine manually to pumping speed, return to hose nozzle to make delivery, and return to engine to reduce speed.

Controller is also claimed to eliminate excessive rpm. during time engine operates at pumping speed but is not pumping. Installation is said to take 2 hr. or less.



## Lightplane Radios

Two diminutive VHF transmitters, one permitting installation in convenient spot, the other designed to meet minimum space requirements of personal aircraft, have been announced by Lear, Inc., Grand Rapids 2, Mich.

Model RT-10CR (top), having 6-frequency, 2 watt output, permits placement of equipment in a location other than the instrument panel. Cable giving remote control of transmitter with selector attached where pilot desires, also permits flexibility in positioning transmitter. Weighing only 15 oz. and with overall dimensions of 1 3/4 x 2 3/4 x 7 3/4 in., transmitter easily fits into out-of-the-way places in the fuselage. Selector measures 1 7/8 x 1 1/4 x 1 1/4 in. and weighs 10 oz.

"Panclette" VHF set (bottom), Model RT-10CP, with integral selector, takes up 1 1/4 in. square space on the front of instrument panel. With same output as Model RT-10CR, this transmitter weighs only 10 oz. and measures 2 3/4 x 1 1/4 x 7 3/4 in. overall.



## Subminiature Relay

Small relay for guided missile or aircraft applications, designated series SM, has been developed by Potter & Brumfield Mfg. Co., Inc., Princeton, Ind.

Device can be used with miniature socket and shield with inner spring, permitting mounting in inverted position without working out of socket. Unit is available with coil power ratings up to 1.75w. and with d.c. windings from .155-8000 ohms for operation from 0.3 to 118v. d.c., and minimum adjustment for current operation to pull in on 3 milliamps at 75 milliwatts.

C: version relays are hermetically sealed in miniature glass tube envelopes with standard seven-pin bases. Also available in open-type construction with single screw mounting.



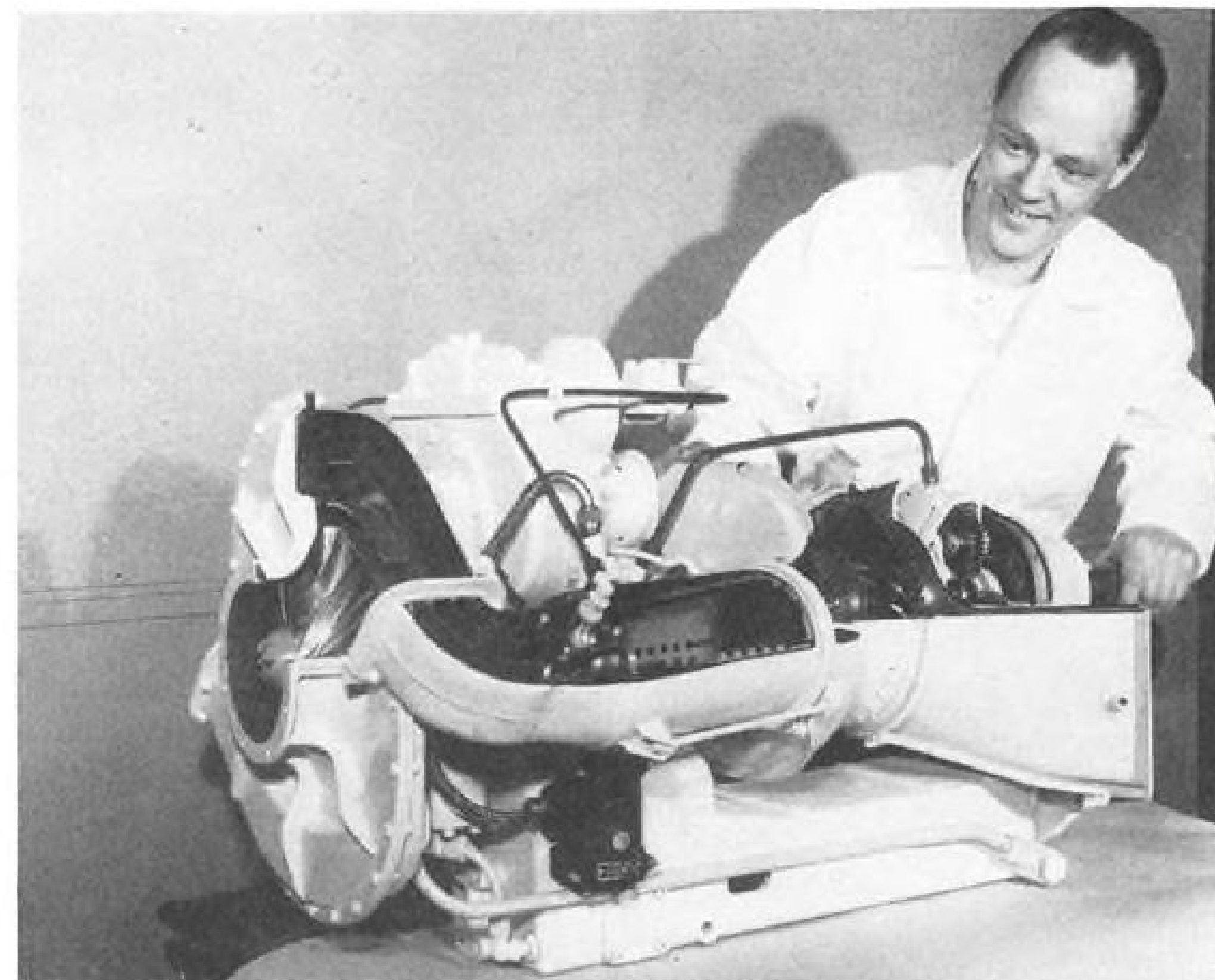
## Tiny Switch

For installation where space and weight are factors, a subminiature, plastic-cased, snap-action precision switch measuring 49/64 x 3/8 x 1/4 in. is made by Micro Switch, Freeport, Ill.

Designated 1SM1, it has a pin plunger actuator, and circuit arrangement is single-pole double throw. Terminals are solder lug type. Tentative characteristics are: Maximum operating force 7 oz.; minimum release force 1 oz.; maximum movement differential .030 in.; maximum pretravel .008 in.; minimum overtravel .005 in.

Electrical capacity tests indicate a rating of 5 amp., 115-230v. a.c.; and 2 amp., 28v. d.c.

# PRODUCTION



CUTAWAY of Boeing gas turbine that now is being placed on public exhibition.

## Boeing Readies Turbine for Market

Boeing is devoting increased attention to the development and potential marketing of its gas turbine, two recent announcements indicate.

First, Jay Morrison, staff assistant to William M. Allen, Boeing president, has been appointed manager of the gas turbine project, thus giving the program the status of an independent department.

He was a vice president of the Washington Mutual Savings Bank before joining Boeing in 1939 and has since served as production manager, vice-president and general manager of Boeing Aircraft of Canada, Ltd., and as management of Boeing procurement in Southern California. Chief project engineer will be S. D. Hage, who has been in charge of Boeing's propulsion development unit.

Second, Henry C. Hill, development chief for the project, announced to the Southern Gas Assn. at its annual convention in Galveston, Tex., that the gas turbine has been successfully test-run on a limited basis on propane gas.

Boeing has concluded, Hill said, that natural gas as well as liquid fuels can be utilized to power industrial applications of the turbine. The 200-lb., 175-hp. engine has shown remarkable fuel versatility and is completely non-sensitive to

octane or cetane ratings, Hill declared.

►Performance Gains—Stressing the relative speed with which the Boeing turbine has been developed and the possibilities for its future refinement, Hill pointed out that its original specific fuel consumption of 1 1/2 lbs. per hp. per hr. has been reduced in 18 months to 1 1/4 lbs., and horsepower has been increased from 120 to 175.

Boeing will exhibit a full-scale cutaway model of the turbine for the American Society of Mechanical Engineers at Washington, D. C., April 12-14, and at the annual engineering display of the Society of Automotive Engineers' National Aeronautic meeting in New York, April 17-20.

## Total '49 Sales Nearly \$2 Billion

Net sales of aircraft, engines, propellers, parts, and other products and services for period ending Dec. 31, 1949, totaled \$1781 million, according to the Bureau of Census and CAA. First three quarters amounted to \$1270 million (AVIATION WEEK Feb. 27), and sales for the last quarter were \$511 million.

Total backlog at Dec. 31 amounted to \$3011 million; \$153 million more

than backlog at the end of last year's third quarter. Backlog was divided: Aircraft and parts \$2015 million, engines and parts \$749 million, props and parts \$91 million, other products and services \$156 million.

New orders received during the last quarter of '49 totaled \$664 million; complete aircraft and parts being \$482 million, engines and parts \$163 million, props and parts \$7 million, and other products and services \$12 million.

## Navy Awards

The Navy has announced the following contracts for aviation items:

**Hamilton Standard division, United Aircraft Corp.**, E. Hartford, Conn., 200 propeller assemblies, \$418,000.

**Chance Vought Aircraft, United Aircraft division**, Dallas, Tex., F7U-1 aircraft, \$21,877,800.

**Jack & Heintz Precision Industries, Inc.**, Cleveland, Ohio, 4 aircraft generators and voltage regulators, \$55,848.

**British Yukon Navigation Co., Ltd.**, Seattle, Washington, 459,080 gal. off aircraft engine fuel and lubricating oil, \$144,870.

For aircraft engine fuel:

**Utah Oil Refining Co.**, Salt Lake City, Utah, 1,719,000 gal., \$348,966.12; **Tidewater Associated Oil Co.**, San Francisco, Calif., 87,200,000 gal., \$9,166,080; **Standard Oil Co. of Calif.**, San Francisco, Calif., 18,572,900 gal., \$2,350,306.36; **Richfield Oil Corp.**, Los Angeles, Calif., 15,320,000 gal., \$1,391,390; **Shell Oil Co.**, N. Y., N. Y., 12,565,600 gal., \$1,942,151.40; 1,077,000 gal., \$172,364.50; **General Petroleum Corp.**, Los Angeles, Calif., 2,100,000 gal., \$199,500; **Sinclair Refining Co.**, N. Y., N. Y., \$0,941,000 gal., \$5,357,748.60; **Esso Standard Oil Co.**, N. Y., N. Y., 42,804,100 gal., \$6,417,144.20; **Panhandle Producing & Refining Co.**, Wichita Falls, Tex., 3,000,000 gal., \$307,144.49; **Pontiac Refining Corp.**, Corpus Christi, Tex., 17,675,344 gal., \$2,262,444.03; **Humble Oil & Refining Co.**, Houston, Tex., 6,765,000 gal., \$1,239,926; **Phillips Petroleum Co.**, Bartlesville, Okla., \$1,726,020 gal., \$5,024,517.17; **Gulf Oil Corp.**, Pittsburgh, Pa., 23,682,000 gal., \$3,621,387.50; **Cities Service Oil Co. (Pa.)**, N. Y., N. Y., 23,154,000 gal., \$3,843,384; **Deep Rock Oil Corp.**, Chicago, Ill., 1,557,000 gal., \$142,103.30; **Bell Oil & Gas Co.**, Tulsa, Okla., 2,224,600 gal., \$188,583.32; **Skelly Oil Co.**, Kansas City, Mo., 716,000 gal., \$75,180; **Standard Oil Co. of Ohio**, Cleveland, Ohio, 5,982,000 gal., \$1,044,818.60; **Ashland Oil & Refining Co.**, Ashland, Ky., 1,515,000 gal., \$162,105; **Standard Oil of Indiana**, Chicago, Ill., 8,081,000 gal., \$1,249,507; **Sun Oil Co.**, Philadelphia, Pa., 7,415,000 gal., \$1,030,818; **Socony-Vacuum Oil Co.**, N. Y., N. Y., 6,934,000 gal., \$1,194,731; 500,000 gal., \$70,000; **Esso Standard Oil Co. of Pa.**, N. Y., N. Y., 481,000 gal., \$87,828.80; **The Atlantic Refining Co.**, Philadelphia, Pa., 900,000 gal., \$85,500; **Standard Oil Co. of Kentucky**, Louisville, Ky., 10,042,000 gal., \$1,663,981.50; **Socony-Vacuum Oil Co., Inc.**, N. Y., N. Y., JP-3, 400,000 gal., \$51,052.

## PRODUCTION BRIEFING

►Airquipment Co. has signed Lockheed Aircraft Service as sales representative to handle Airquipment's Aero-stands, Aeroramps, and other maintenance and ground handling equipment. ►Glenn L. Martin Co. has granted Hydropress, Inc., N. Y. C., the rights to make and sell Martin-developed Mar-form metal forming units.



# Most versatile of cargo-carriers—the Boeing C-97 Stratofreighter



**CATHEDRAL?** No—just the 71½ foot long (10½ feet wide—7½ feet high) upper deck of the Stratofreighter! Note, at rear, self-contained "drive-up" ramp (in closed position).



**HOOK AND HOIST!** Self-contained 5,000-pound capacity hoist and overhead rail facilitate positioning of heavy cargo in cavernous main cabin.



**ONE LOAD!** The Stratofreighter, with volume equal to two railroad boxcars, carries all this overseas freight with ease. Lower deck loading through cargo doors at truck-bed level simultaneous with main deck loading, cuts ground time to a minimum.

Built by Boeing for the U. S. Air Force are the new C-97 Stratofreighters, B-50 Superfortresses and B-47 Stratojet bombers; for the U. S. Army, L-15 Scout liaison planes; and for five of the world's leading airlines, fleets of the new twin-deck Stratocruisers.

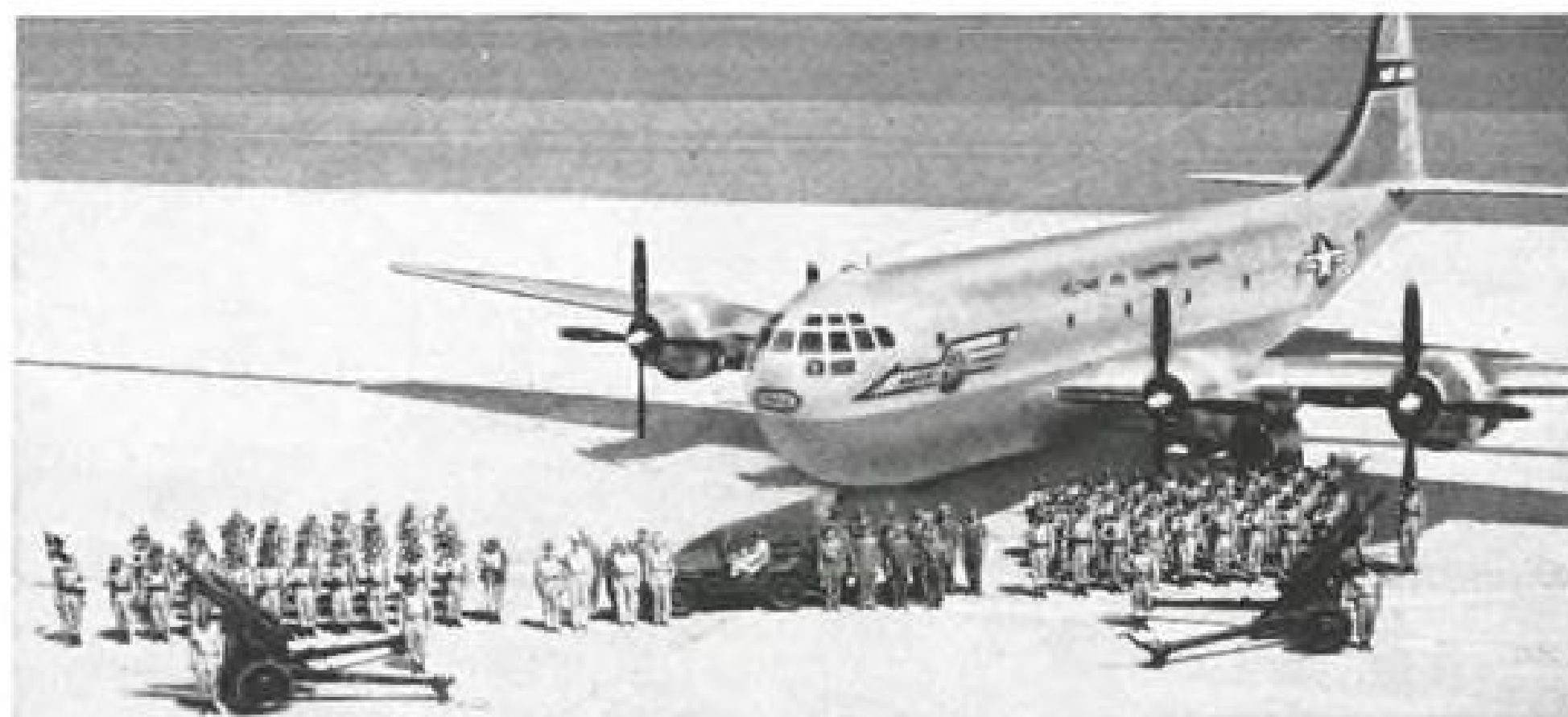
The great twin-deck Boeing C-97 Stratofreighter—sister ship of the Stratocruiser—is a working teammate of the new Boeing B-50 Superfortress.

The only military transport with altitude-conditioning, the roomy Stratofreighter is quickly adaptable to any type load. As a hospital plane, for example, it carries 86 litter cases comfortably.

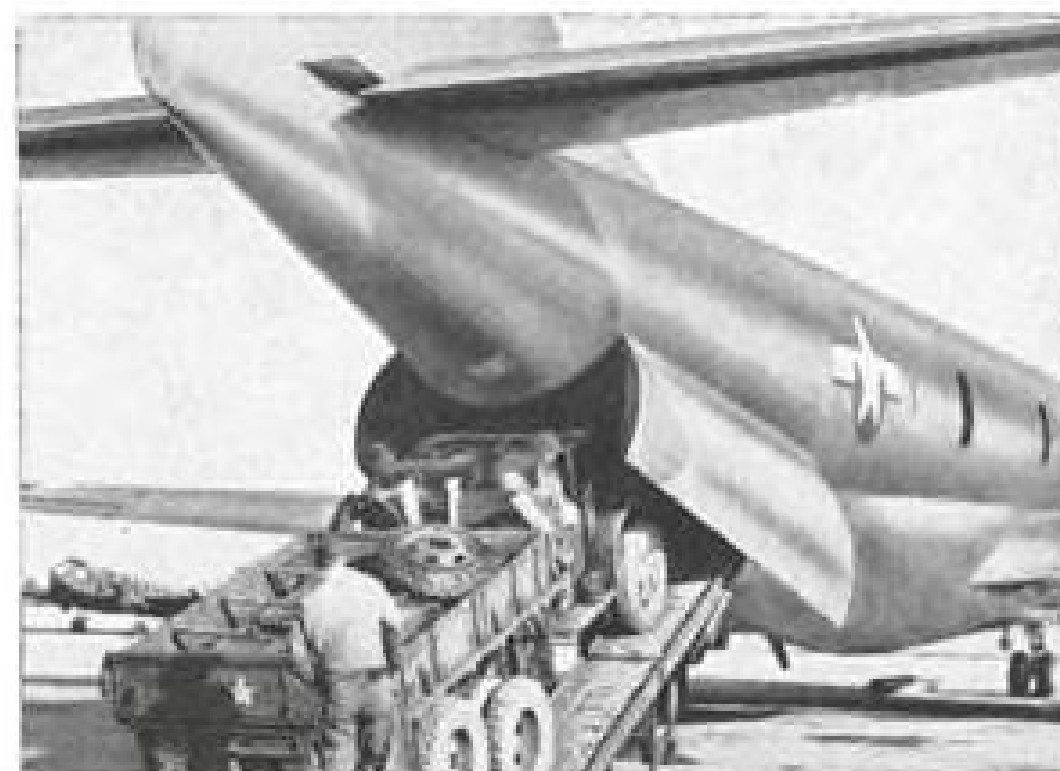
It is the fastest military transport in production and the first

to be equipped with radar. Its wings, tail surfaces, landing gear, engines and many accessories are interchangeable with the B-50s—thus reducing maintenance and spares problems as well as simplifying personnel training.

Now in use by the Military Air Transport Service, the C-97 combines speed, long range and heavy load capacity—plus all the dependability inherent in Boeing-designed, Boeing-built airplanes.



**ALL ABOARD!** Two platoons of soldiers line up with flight crew before boarding Stratofreighter with howitzers and jeep. America's only fully pressurized military transport, the Stratofreighter can carry 134 combat-equipped troops faster and at higher altitude than any other plane.



**TRUCKS FLY, TOO!** Stratofreighter swallows up big 10-wheel trucks, even carries tanks, heavy guns—up to 26½ tons of freight!

**BOEING**  
STRATOFREIGHTER

## AIR TRANSPORT

### No Technical Bars to Copter Use

Rotary-wing experts and airline traffic men agree that developments open way to transport applications.

By Alexander McSurely

Philadelphia—Future of the civil transport helicopter is closely tied up with technical developments already within reach. And it also depends on intelligent planning by operators and manufacturers to utilize the peculiar capabilities of the machines to their fullest advantage.

Technical advances now or shortly to be realized:

- Instrument flight operation of civil helicopters.
- Increased reliability through twin-engine helicopter models.
- Design for greater maintenance ease.
- Further improvement in ratio of payload to gross weight.

At the forum of the American Helicopter Society held here, two former Capital Airlines traffic men analyzed civil transport helicopter requirements from the standpoint of public acceptance and utility.

Fred Glass, now airport development director for the Port of New York Authority, pointed out the utility of the helicopter in terms of minutes to be saved between the New York airports and downtown Manhattan:

- To LaGuardia: by limousine 25 min.; by copter, 7 min.
- To Newark: by limousine, 38 min.; by copter, 9 min.
- To International: by limousine, 42 min.; by copter, 16 min.
- Between Newark and International: by limousine, 75 min.; by copter, 15 min.

Savings in time on the trips are 18 min., 29 min., 26 min. and 60 min., respectively.

Glass estimated that using a 10-passenger helicopter between LaGuardia and Manhattan, the required fare would be \$3.25 plus federal transportation tax, if calculated on a 60 percent load factor. This would be almost equivalent to taxi fare, but considerably more than the \$1.25 limousine fare. Savings in time, he believes, will offset the fare differential in varying degrees until larger helicopter capacity and lower passenger-mile operating cost can make fare reductions possible.

► More Problems—The Port Authority representative pointed out that development of larger and faster turboprop and

jet transports will accentuate already substantial problems in handling passengers at the four major New York airports, and accentuate the difference between ground speeds between airports, and those attained in flight. Even with present air speeds, ground times at each end of heavy traffic movements such as New York-Boston almost equal air times.

Helicopter service from the airport to the suburban town can save from 5½ to 18½ hr. in delivery time, Glass said, and a cost study reveals that helicopter air mail service provides almost three times as much time saving per dollar of expenditure as does conventional aircraft airmail service.

► Design Criteria—Harry S. Pack, vice-president of Piasecki Helicopter Corp. outlined the following design criteria for the large transport helicopter:

- Reliability. Safety in flight plus mechanical dependability and ease of maintenance plus sound airway traffic procedure.
- Performance. Continued improve-

ment in helicopter performance, particularly in ratio of payload to gross weight; in control; in reserve power; in higher speed; in instrument flying; in routine flying in heavy icing and high wind conditions; in center of gravity range for passenger and cargo landing.

• Accommodations. Application of experience in bus, railroad and air transport industry is needed in designing passenger accommodations to minimums that the public will accept. Pack outlined various seating arrangements ranging from the individual seating optimum, to the facing arrangement commuter version. He discussed three sizes; for 8 to 15 passengers, for 16 to 26 passengers, and for 27 to 40 passengers, and a converter version which could carry various combinations of cargo and passengers.

Other accommodation problems considered by Pack included: cabin sound-proofing, and exterior engine noise reduction; scientific study of heating, cooling and ventilation problems, for cockpit and passenger cabin; standardized helicopter instrument and cockpit layout; improved design for elimination or minimizing of vibration; design for visibility, including de-icing and windshield wipers; lighting for passengers at night; baggage and parcel racks; cargo compartment requirements, including tie-downs; ground handling for minimum time on the ground, including equivalent of underwing refueling provisions; loading provisions including rotor height of at least 7 ft.; ability to taxi helicopter



**KELLETT TRANSPORT COPTER MOCKUP**

Fully-engineered mockup of 12-16 passenger commercial version of Kellett's XH-10 military copter has been completed by the company and is available for inspection at Kellett's plant at Central Airport, Camden, N. J. Powered by 800-hp. Wright C7B6, gross weight for 12-seater is given at 12,762 lb., for the 16-seater as 13,620 lb. Top speed is to be 115 mph.; cruising, 90 mph.; rate of climb, 1400 fpm.; fuel consumption,

59 gph. Cabin volume is 480 cu. ft., with 60 cu. ft. of cargo space. Rotor diameter is 65 ft. Engines will be 100 percent cooled by exhaust jet, eliminating need for engine-driven cooling fans. Company states that deliveries of the KH-2 could be made 18 months from receipt of order and price would approximate that of current conventional transports when figured on a passenger seat basis.



## LAA May Use ILS in Night Smog

Certification of Los Angeles Airways for night flying of helicopters under instrument conditions for periods not exceeding 15 minutes, was announced last week by CAA. Announcement said that the helicopter mail carrier's tightly scheduled pickup and delivery operations were hampered by the smog problem in the Los Angeles area.

CAA studies indicated that if the LAA helicopter pilots were allowed to go on instruments while passing through the thin smog layer into contact weather above or below it that a substantial improvement in schedule regularity would result from the procedure.

Approval does not extend to all helicopters for instrument flight, or

for other Sikorsky S-51 helicopters (the type flown by LAA) but has been granted because of the special weather problem in the Los Angeles area and because of LAA's outstanding record of safety and dependability in more than two years of scheduled helicopter mail service, and its pilots' flight experience in the local area, CAA stated.

Other helicopter instrument flight certifications may be extended in other areas in the future, however, it was pointed out, and meanwhile helicopter manufacturers and military and civil agencies are seeking to improve stability of helicopters and develop new instruments and flight techniques for all-weather helicopter operation.

in 15-to-20-knot winds, plus attachment points for tow-bar fittings; folding rotors for storage; exterior lighting.

► **Cost**—Factors entering into costs of transport copters cited by Pack included: need for standardization of basic requirements by operators, for standardized production; high block speed requirements for economical operation; flexibility of interior, for various uses; adequate capacity.

The Piasecki executive indicated that while twin-engine helicopters were desirable, it was believed that the ability of the helicopter to make relatively simple emergency landings should be considered, and suggested use of floats for water emergency landing as an alternative for twin-engine operation.

Monroe R. Brown, secretary of the

Helicopter Council of Aircraft Industry Assn., reported that the opposition of the Post Office Department in the New York area helicopter case was a serious factor. Objections were made on standpoint of excessive cost, lack of landing facilities adjacent to New York General Postoffice, and duplicating surface transportation required for other than air mail letters.

Brown said the hearing showed clearly that "twin-engine helicopters will be a significant step forward" in utilization of the helicopter as a passenger transport in metropolitan areas. Current case is based on single engine equipment but all parties expressed strong interest in the great potential of twin-engine machines, both in safety and in selection of more convenient operating areas.

## High Cost of Reverse Thrust

CAB Safety Bureau chief says ALPA plan would require \$37,120,000 for present tricycle gear planes.

Equipping all existing U.S. scheduled airline transports of the tricycle landing gear type with reverse thrust propellers—as recommended by the Air Line Pilots Assn.—would cost about \$37,120,000, according to John M. Chamberlain, director of the Civil Aeronautics Board's Bureau of Safety Regulation.

► **Chamberlain Testifies**—Chamberlain gave the information to a House Interstate and Foreign Commerce subcommittee, which is holding hearings on ALPA-backed legislation to re-establish an independent air safety board. ALPA had charged CAB with delays in promoting new safety regulations (such as

a reverse thrust propeller requirement) and had asserted that a number of accidents could have been avoided had proper rules been adopted (AVIATION WEEK Mar. 13).

Only tricycle landing gear type transports currently being flown by U.S. airlines without reverse thrust propellers are Constellations and DC-4s.

► **\$335,000 per L-49**—Chamberlain said that equipping early model L-49 Constellations with reverse thrust props would cost about \$335,000 per plane. Late models could be equipped for considerably less per unit.

In all, about 64 Constellations of various types still lack reverse thrust

propellers. They could be fitted with the new props for about \$16,150,000, this being the direct cost which does not include any loss of revenue suffered by the airlines while the ships are out of service for modification. In the case of the L-49, this out-of-service period is estimated at two months per plane.

Twelve TWA Constellations reportedly are equipped with reverse thrust propellers with the reversing feature made inoperable. This is because pilots flying them would also be flying other TWA Constellations interchangeably, and the availability of reverse thrust on certain Connies and not on others might prove hazardous under emergency conditions.

► **Minimum Cost—\$20,970,000**—Equipping 233 airline DC-4s with reverse thrust propellers would cost a minimum of \$20,970,000—\$90,000 apiece. The expense could be held to this figure only if all the DC-4s were modified on a single contract basis—an unlikely arrangement.

Chamberlain noted that use of reverse thrust on the DC-3 with its non-tricycle type landing gear may be completely impractical and perhaps even unsafe. Even so, Douglas Aircraft Co. estimated that fitting 452 scheduled airline DC-3s with the new props would cost about \$23,052,000.

► **DC-3 Outmoded by '53**—The CAB Safety Bureau head pointed out that the conventional DC-3 presumably will go out of scheduled airline service by the end of 1953 because of existing airworthiness requirements applicable to transport-type aircraft. Unless extensively modified, the DC-3 can't comply with these requirements.

Figures cited by Chamberlain cover only the scheduled air carrier fleet and do not include the cost of modifying planes used by nonscheduled operators.

## Eastern Reports 15th Profitable Year

Eastern Air Lines' earnings were down last year, but it still established a new record in air transportation with completion of 15 consecutive years of profitable operations, the carrier's 1949 annual report reveals.

Net earnings of \$1,967,905 or 82 cents per common share were reported for 1949, compared with \$2,346,871 or 98 cents a share for 1948. Passenger revenues increased \$2,390,114 during 1949 to a total of \$63,068,936. This gain was attributed chiefly to experimental reductions in passenger fares. Such experimental fare cuts included special excursions, family fare plans and coach services.

► **Diversions**—Eastern noted that all of these reduced-fare experiments attracted new traffic and opened new markets to

air transportation, but they also diverted an unknown amount of traffic from standard-fare travel. The net result of this increase in traffic and decrease in average passenger fare was a small increase in passenger revenues.

Net working capital for Eastern amounted to \$16,339,291 at the 1949 year end and was down slightly from \$16,565,284 reported a year before. During 1949, however, the company repaid \$5,333,333 of its bank loan, owing only \$10,666,667 as of Dec. 31, 1949.

► **Obligations**—The company is committed to purchase 35 new Martin 4-0-4s at a capital expenditure of about \$20 million during 1950 and 1951. It is anticipated that this financing will be done in part from accumulated cash and funds to accrue in the interim. If additional financing is necessary, the management notes that it probably will be done through unsecured bank loans.

With respect to 1950, President E. V. Rickenbacker anticipated that the air transport industry in the next few years will develop large new markets for the transportation of passenger and cargo.

The extent to which this development progresses will depend in a large measure upon the action of the Civil Aeronautics Board, according to Capt. Rickenbacker.

## Faulty Procedure Blamed in Accident

Crash of an American Airlines Convair 240 last June 22 following failure of one engine shortly after takeoff from Memphis Airport probably was caused by improper procedures used in the attempted climb-out.

The Civil Aeronautics Board reports the transport was forced to make a crash landing after the engine failure because of its steep climbing attitude and retraction of the flaps, which destroyed the ship's climb performance. Loss of power in the right engine resulted from failure of the impeller shaft thrust bearing, which interrupted the flow of fuel.

Thirteen of 41 passengers and one crew member were seriously injured in the mishap; and 18 passengers and two crewmen received minor injuries. The Convair was damaged extensively.

► **Tests Made**—Subsequent tests made by American and Consolidated Vultee Aircraft Corp. with another plane flown under the same conditions showed that the craft had satisfactory single-engine performance (AVIATION WEEK Sept. 5, 1949). "If the (Convair) is properly flown, with the flaps remaining extended in the takeoff position of 16 degrees and the air speed at around 120 mph., the craft will perform substantially as described in the flight manual," CAB declared.

The Board hinted that the pilot's

failure to use the best emergency procedure may not have been entirely his fault. Information on flaps and single-engine performance with the Convair was contained in the performance curves of the CAA-approved airplane flight manual. But specific instruction on proper procedure under emergency conditions was lacking in both the Convair CAA-approved manual and American Airlines' Convair operating manual.

After the accident, Consolidated Vultee amended the Convair CAA-approved manual to incorporate specific instructions concerning flap management in relation to indicated air speeds for single-engine operation. Then Amer-

ican Airlines, which had left use of flaps to the discretion of the pilot, modified its operating manual similarly.

► **Reworking Completed**—At the time of the Memphis accident, American was in the process of reworking the impeller thrust front plates and impeller shaft thrust spacers to provide greater lubrication for the engine parts which failed. This work has now been completed on all of AA's Convair engines, and the trouble experienced at Memphis has been corrected.

During the Memphis accident investigation, the Air Line Pilots Assn. expressed concern that the right engine which failed was still developing suffi-



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cient power to help in takeoff at the time the automatic propeller feathering device was actuated. Indications were that such was not the case, but since operating data for single-engine takeoff with the Convair are based on use of the automatic feathering device, CAB made an extensive study of the situation.

The Board found there were a few cases where a single backfire in an engine was sufficient to actuate the feathering switch. But of all the complaints concerning the device no instance was found where the automatic feathering system failed to operate under conditions of complete or substantial power failure.

A modified feathering switch has now been placed in service, and CAB believes it will eliminate most of the difficulties previously experienced with the mechanism.

## NPA Turned Down By Mediation Board

Efforts of the National Pilots Assn. (now the International Professional Pilots Assn.) to unseat the Air Line Pilots Assn. as collective bargaining agent for National Airlines flight personnel have failed, for the time being.

National Mediation Board has dismissed an NPA petition calling for a new representation election at NAL. NPA claimed it represented over half of National Airlines' cockpit personnel. But NMB found that actually NPA represented only 58 out of 174 NAL pilots and copilots—too few to warrant a new election.

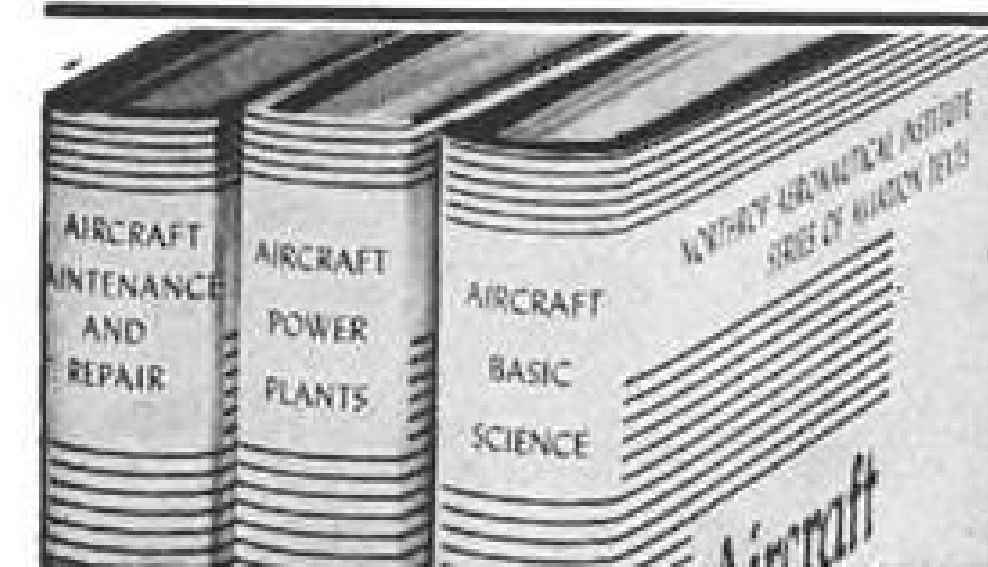
► **Strike Background**—NPA was chartered in November, 1948, and its initial membership consisted almost entirely of non-union pilots hired by National Airlines during ALPA's ten-month-long strike against the carrier. The new group said it wanted to organize a substantial portion of the 60,000 commercial pilots in the U.S. and also hoped to organize flight engineers, stewardesses and ground employees.

Through the NAL election, NPA hoped to get its first firm foothold in the industry.

► **Coercion Alleged**—ALPA has complained to the Mediation Board that NPA was aided, supported and directly influenced by the management of National Airlines. It was also charged that National kept NPA personnel on its payroll unnecessarily. ALPA said this "excess personnel" should not be permitted to participate in a new bargaining election.

NMB declared that since it had turned down NPA's petition for an election it was unnecessary for the board to investigate ALPA's charges of coercion and interference. The board said

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the present record is insufficient to warrant a finding of illegal interference by the carrier.

## Nonskeds Carried 1 in 100 in 1949

Forty-nine large irregular domestic airlines flew about 125,000 passengers 300 million passenger miles last year, the Civil Aeronautics Administration estimates on the basis of incomplete data.

The nonsked traffic total is less than five percent of the passenger mileage and less than one percent of the number of passengers flown by the certificated domestic carriers. Irregular domestic carriers during 1949 hauled about six percent as much freight as the domestic scheduled airlines (including certificated all-cargo companies).

In the international field, nonskeds are believed to have carried an even smaller portion of the total traffic.

► **Safety Comparison**—Domestic non-scheduled carriers had nine fatal accidents in 1949, resulting in 115 deaths. By comparison, scheduled domestic airlines last year had only four fatal accidents and 104 passenger and crew fatalities. Taking the scheduled airlines' greater passenger mileage flown into consideration, these preliminary figures indicate the nonsked fatality rate domestically was around 25 times as high as the regular operators last year.

## Freight Forwarders Get Foreign Rights

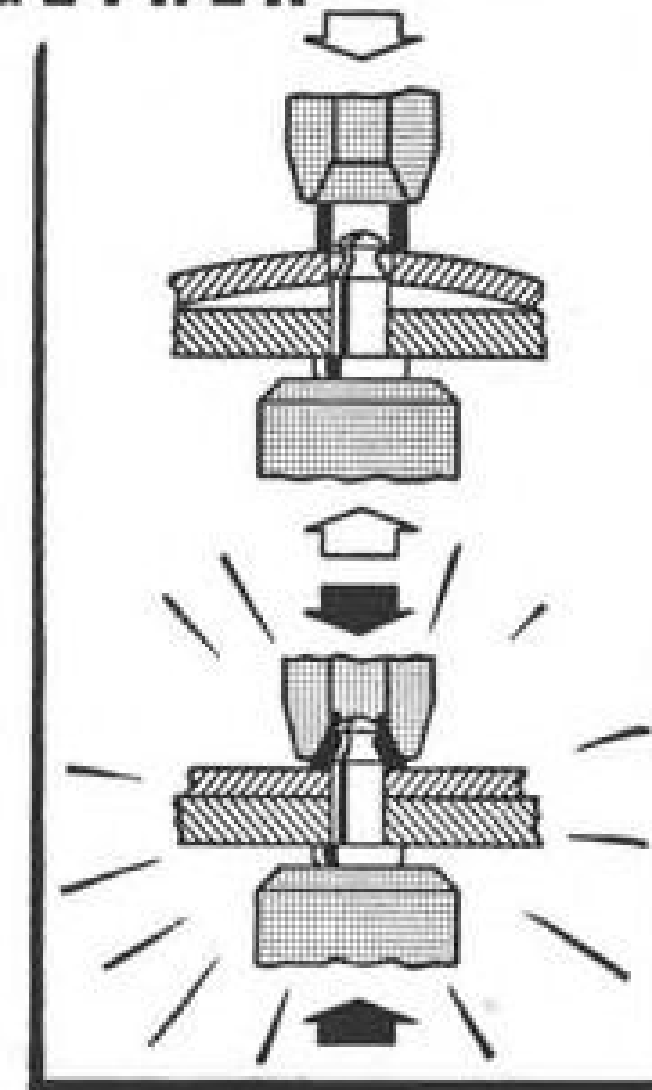
U. S. air freight forwarders have won the right to engage in business internationally.

The Civil Aeronautics Board has issued an exemption order and adopted regulations authorizing approved forwarders to function as indirect international air carriers of cargo for a period of five years and four months. The new economic regulation (Part 297) becomes effective Apr. 24 and will be a counterpart of the domestic freight forwarder operating authority granted in September, 1948.

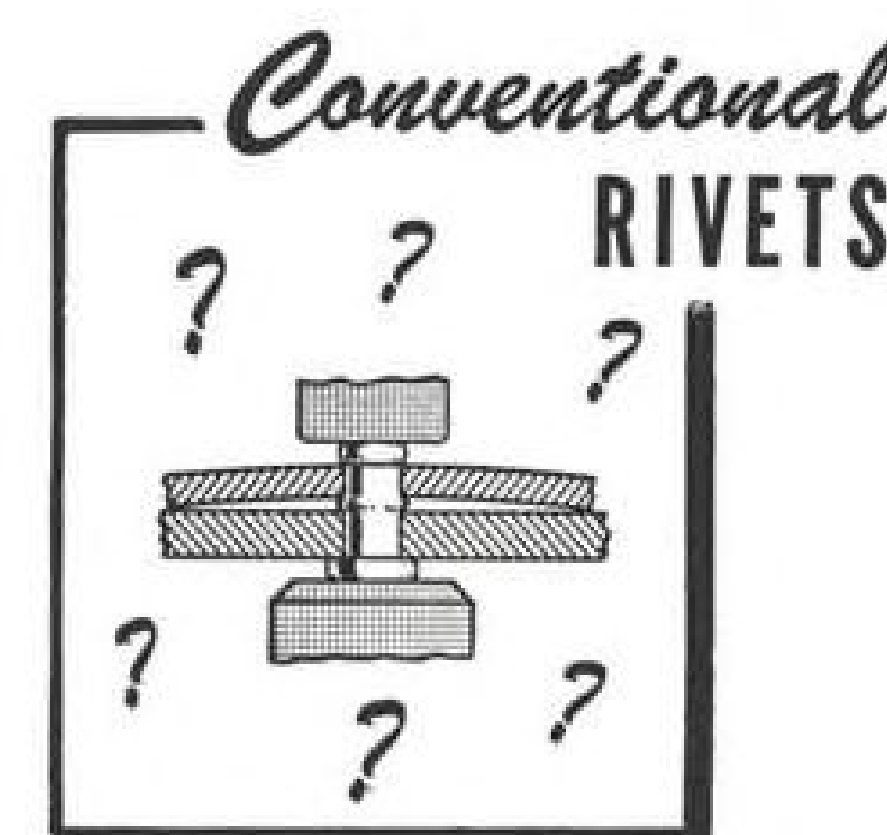
► **Activity Limited**—Part 297 sets forth the requirements and conditions to be met by international forwarders in order to qualify for a letter of registration. The regulation provides that international air freight forwarders be limited to use of certificated U. S. air carriers and foreign carriers holding U. S. permits.

CAB's opinion provided for deferral of Railway Express Agency's application relating to overseas and foreign air transportation pending outcome of negotiations looking to establishment of a new air express agreement. This

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action conforms with that taken in the domestic air freight forwarder case.

The Board will continue the present REA exemption to provide all the air express services it now offers to the public, including operations between the U.S., Canada, Cuba and Alaska.

CAB said no limitation will be placed on the number of overseas and foreign air freight forwarders to be authorized. But a screening process will be used to insure that only those applicants receive authorization who are found to meet the requirements of the adopted regulations. "Our experience in the domestic field leads us to believe that only a moderate number (of international forwarders) will qualify," the Board declared.

►Abuses Alleged—Meanwhile, certificated carriers, who opposed authorization of domestic freight forwarders services, have called on CAB to correct alleged abuses.

American Airlines wants Part 296 of the Economic Regulations amended so that "no freight forwarder may receive a commission from any direct air carrier for solicitation of traffic pursuant to an agency agreement or otherwise." Under the agreements complained of, a forwarder gets a commission from the direct carrier and pledges to use his best efforts to solicit and promote movement of freight over that airline.

►Dual Role—"This dual role of registered forwarder and agent of a direct carrier confuses the shipping public over where responsibility lies for a particular shipment and as to specific rates applicable to that shipment," AA declared. The practice renders meaningless the safeguards of a published tariff and constitutes a rebate to the forwarders in violation of the Civil Aeronautics Act.

"If the practice continues," American declared, "other direct carriers may be compelled for competitive reasons to enter into similar arrangements with other forwarders so that each carrier will have its own forwarder as an agent."

## Midway Being Closed

Air Coordinating Committee has approved plans to discontinue all Civil Aeronautics Administration facilities at Midway Island, effective May 1.

The decision to discontinue the CAA facilities, including a communications station, radio range and homing facility, followed an earlier announcement by the Navy that it was withdrawing from the island. The Navy had supplied runway maintenance, search and rescue facilities, community facilities and general support for the island.

Estimated cost to CAA of continuing Midway facilities without Navy assistance is \$600,000 annually, with an

added expenditure of \$695,000 to modify the facilities to meet civil needs. About four scheduled air carrier landings weekly, plus infrequent additional landings by other civil planes, have been made at Midway. These will in the future bypass Midway and use facilities on Wake Island, which will remain in operation.

## Trans-Canada Starts Montreal-N.Y. Run

Trans-Canada Air Lines has received its long-awaited foreign air carrier permit to operate between Montreal and New York, and service began last week.

The authorization was tied up in the courts for about six months when Colonial Airlines last summer challenged the validity of the U.S.-Canadian air transport agreement of June, 1949, which opened the way for granting TCA a competitive Montreal-New York route. Colonial abandoned its suit two months ago (AVIATION WEEK Feb. 13), although it still contends the new Trans-Canada competition will be damaging.

►White House Approves—In issuing the permit with White House approval, the Civil Aeronautics Board declared that the U.S. "cannot expect Canada to permit our airlines to serve that country . . . unless we accord similar rights to Canadian carriers." The Board indicated that Colonial's net earnings need not suffer from the new competition since mail pay can be awarded to meet the company's increased requirements.

TCA hopes to inaugurate Montreal-New York service this month using four-engine, 40-passenger Canadair DC-4M aircraft for three roundtrips daily.

## SHORTLINES

►Aero-Transportes, S. A.—The Mexican carrier has been asking quotations on small twin-engine aircraft of 8- to 10-passenger capacity. Company is based in Mexico City.

►Air France—Has been experimenting with tourist-class air service on some of its routes from Paris to African points. First-class travel is with 44-passenger DC-4s, while tourist-class DC-4s seat 55 passengers and have a 15 percent fare reduction.

►Air Transport Assn.—Has expressed dissatisfaction over its 10 percent fare discount agreement with the armed services. ATA says that despite the pact negotiated last year, military transportation officers are showing considerable ingenuity in thinking of reasons why traffic still cannot be routed by air.

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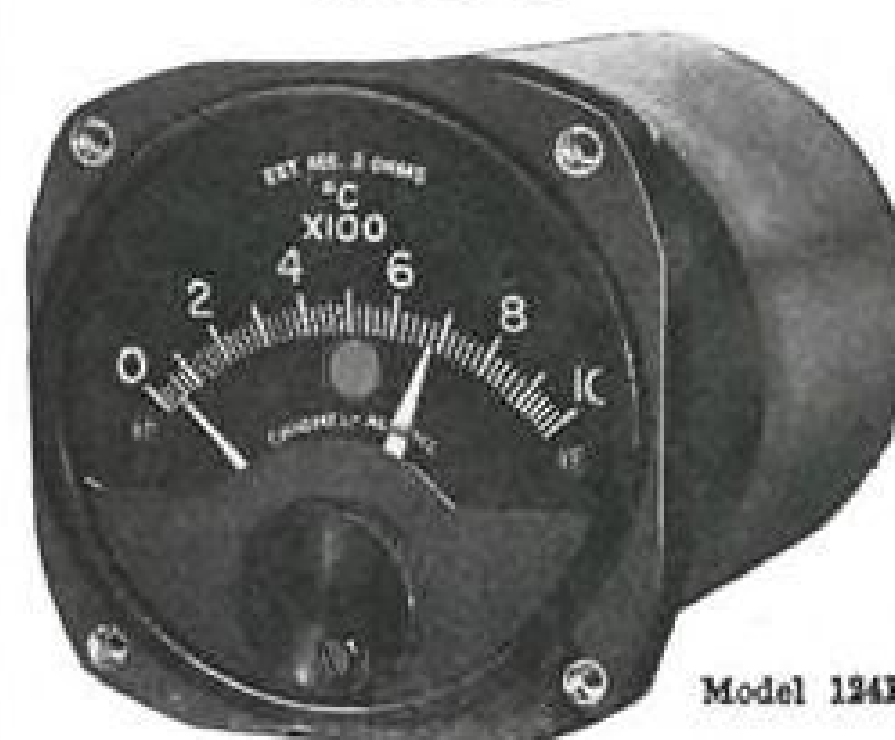
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## AIRCRAFT PYROMETER RELAY



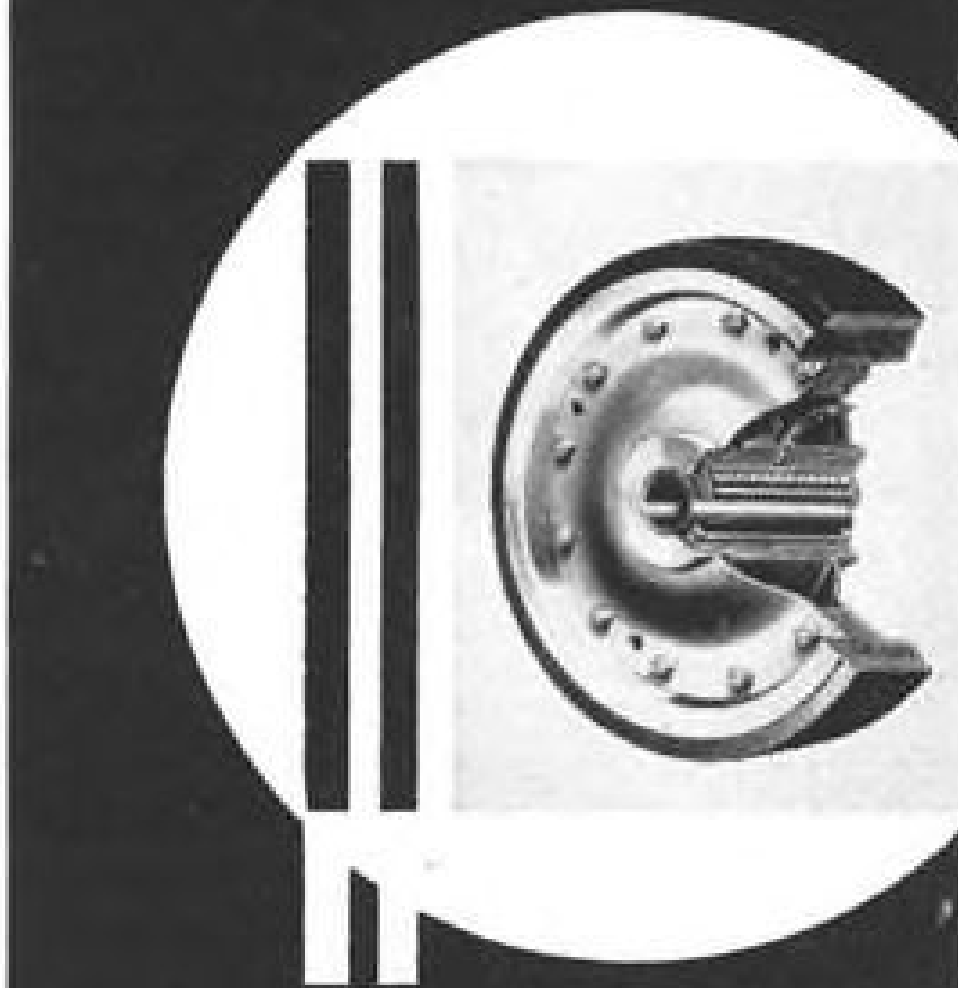
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ATA Executive Vice President Robert Ramspeck has declared the airlines will not be interested in renewing this discount at the end of this fiscal year unless they are assured of free competition for military business with the railroads.

► **All American**—Has asked CAB for a higher temporary mail rate to relieve its critical cash position. The feeder also says it is entitled to \$225,000 in additional mail pay for its pickup operations discontinued last summer. AAA would apply this money to reduction of an RFC loan which is now in default through non-payment of a \$200,000 instalment due last Dec. 31.

► **American Overseas**—Says that contrary to some reports, space to Europe is available on AOA this spring and summer.

► **British Commonwealth Pacific Airlines**—Has reduced fares on its North America-Australasia run.

► **BOAC**—Together with British European Airways carried about 917,000 passengers in 1949, compared with 713,000 in 1948.

► **Capital**—Plans to offer more packaged "mystery flights," first of which proved people will still buy a pig in a poke. Paying \$125 each, 40 passengers boarded the initial flight at Philadelphia Airport without knowing where they were going. They landed at Grand Bahama Island, off the Florida coast, for a round of sun

bathing, swimming, fishing and partying.

► **Civil Aeronautics Board**—Believes that within the next 5 to 10 years the majority of long-haul common carrier passenger transportation (over 1000 miles) may be by air.

► **KLM**—Has reduced its trans-Atlantic air cargo rates on over 50 commodities.

► **Miami Airlines**—CAB has refused the nonscheduled operator's application for an exemption to make regular flights between New York and Florida carrying magazines and newspapers.

► **Panagra**—Recently inaugurated JATO-equipped DC-4 service into La Paz, Bolivia.

► **Scandinavian Airlines System**—Has negotiated a contract to fly 3000-4000 students around Western Europe this summer in 59-passenger DC-4 equipment. Fares will be close to third-class rail rates.

► **Swissair**—Unofficial reports indicate the carrier may cut its fleet and staff because of an operating loss of over \$1 million in 1949.

► **TWA**—First of 20 new Constellations ordered by the carrier last year has been delivered and will soon be placed in trans-Atlantic service.

► **U. S. Air Coach Line**—Has started nonscheduled flights from Burbank and Oakland, Calif., to Honolulu using DC-4s chartered from the Flying Tiger Line. One-way fare of \$119 compares with \$160 on certificated airlines. Lou Powell is president of the company, which has headquarters at Burbank.

► **Wisconsin Central**—Has applied for a five-year extension of its feeder certificate, now due to expire Oct. 3, 1950.

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## CAB SCHEDULE

Apr. 10—Hearing on Twin Cities-Washington and Detroit-Washington through service investigations. (Docket 3661)

Apr. 10—Hearing on Florida-Bahamas service. (Docket 2824 et al)

Apr. 17—Hearing on CAB's enforcement action against Arrow Airways. (Docket 4199)

Apr. 17—Hearing on enforcement action against National Travel Club, Inc. Postponed from Apr. 3. (Docket 4194)

Apr. 17—Hearing on enforcement action against Trans American Airways, Great Lakes Airlines, Golden Airways, Edward Ware Tabor and Sky Coach Airtravel, Inc. (Docket 4161)

Apr. 20—Prehearing conference on Caribbean-Atlantic Airlines' mail rate. (Docket 2210)

May 1—Hearing on CAB's enforcement action against Peninsular Air Transport, Associated Airlines Agency and National Air Coach Systems. (Docket 4084)

May 8—Hearing on case involving American Airlines' Los Angeles-San Francisco cargo flights. (Docket 4211)

June 12—Hearing on applications of TWA and American Overseas Airlines to suspend service at Philadelphia on trans-Atlantic flights. (Docket 4228)

June 19—Hearing on CAB investigation of Northwest Airlines' tariff practices and uncertificated operations of Fly Freight, Inc., and Sterling Freightways. (Docket 4290)

## WHAT'S NEW

### New Books

"ASTM Standards on Petroleum Products and Lubricants-1949" brings together in convenient form the various ASTM standards and tentative methods of test and specifications pertaining to petroleum. Included are ten proposed methods of test published in draft form for the purpose of soliciting comments. Also included are recommendations on the form of ASTM methods of test for petroleum products and lubricants.

Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penn., 1422 pages, price \$5.50 (paper binding), \$6.15 (cloth binding).

"An Index of Nomograms," compiled by Douglas P. Adams, associate professor of graphics, Massachusetts Institute of Technology, is a listing of over 1700 alignment diagrams published in well-known periodicals. The book has two main parts. The first is an alphabetical index of key words associated with each of the diagrams, incorporating key numbers referring to the second index, which lists the periodicals, dates

of issue, volumes, numbers and page numbers of the nomograms.

Published in the U. S. by The Technology Press of Massachusetts Institute of Technology jointly with John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. London publisher, Chapman & Hall, Ltd., \$4.00.

### New Literature

Chart for aiding plant fire inspectors in keeping accurate records of fire extinguishers has space for 26 inspections of 38 extinguishers. Available on request to Ansul Chemical Co., Marinette, Wis.

"Selling to the Government" is a 64-page booklet explaining government operations and listing agencies making major purchases. The businessman is shown how to learn what agency commonly buys items he makes, where and how they are bought, and what kind of purchases are being made currently. Available from Chamber of Commerce of the U. S., Washington, D. C., price 50 cents.

Catalog 13 lists miscellaneous aviation books, including rare items for collectors. Write Aeronautical Book Co., Detroit 31, Mich.

Bulletin 5, covering a series of Waldes Truarc self-locking rings, gives complete

data and specifications for each type. Write Truarc Sales Division, Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N. Y.

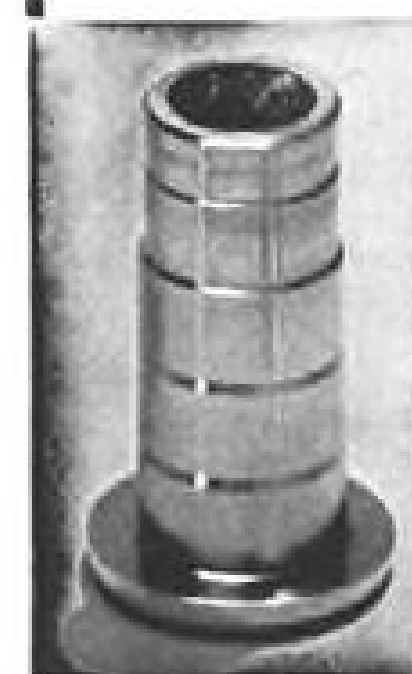
Booklet B-4687 describes new Life-Line chemical motors for operation in atmospheres where corrosive fumes and liquids are encountered. Available from Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

Bulletin G-102 gives 50 typical machine and equipment applications for vibration isolation media, and makes recommendations for proper types of vibro-isolators, with alternates for satisfactory operating efficiency for less exacting requirements. Write Korfund Co., Inc., 48-03-D 32 Place, Long Island City 1, N. Y.

Standard titled "Gaging Practices for Ball and Roller Bearings" specifies the most acceptable methods of determining whether bearings conform to specified dimensions. Defined are inspection methods, giving gaging loads and methods of measurements. Standard methods are given for obtaining dimensions of inner and outer rings, parallelism of sides, eccentricity, groove parallelism with sides, and other measurements. Also prescribed are methods of measuring internal fit and tolerances for side run-out of lock nuts. Write American Standards Assn., 70 E. 45 St., N. Y. 17, N. Y., price 50 cents.

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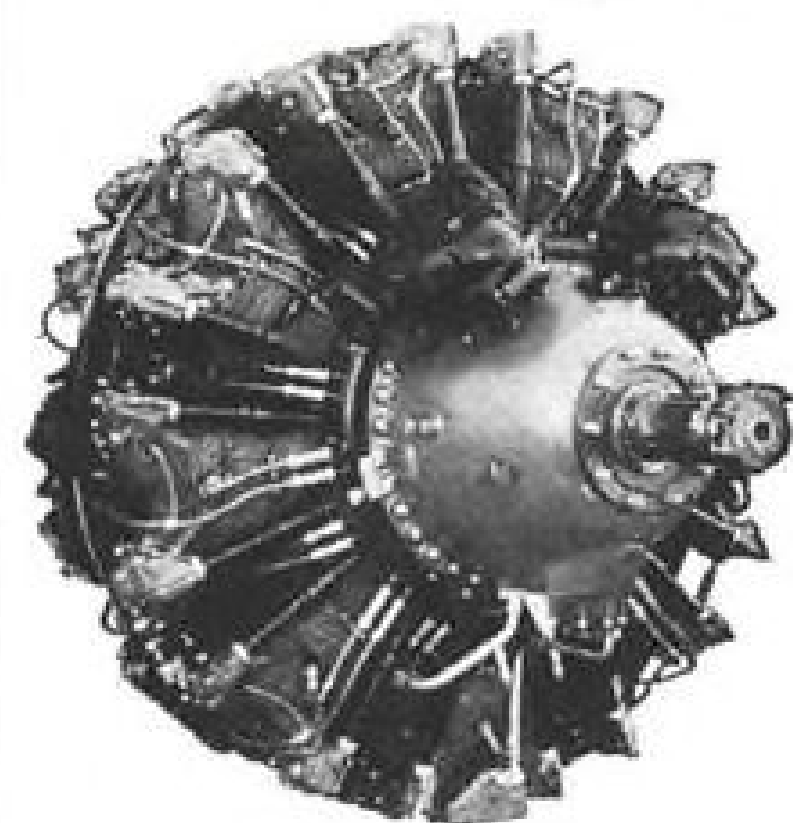
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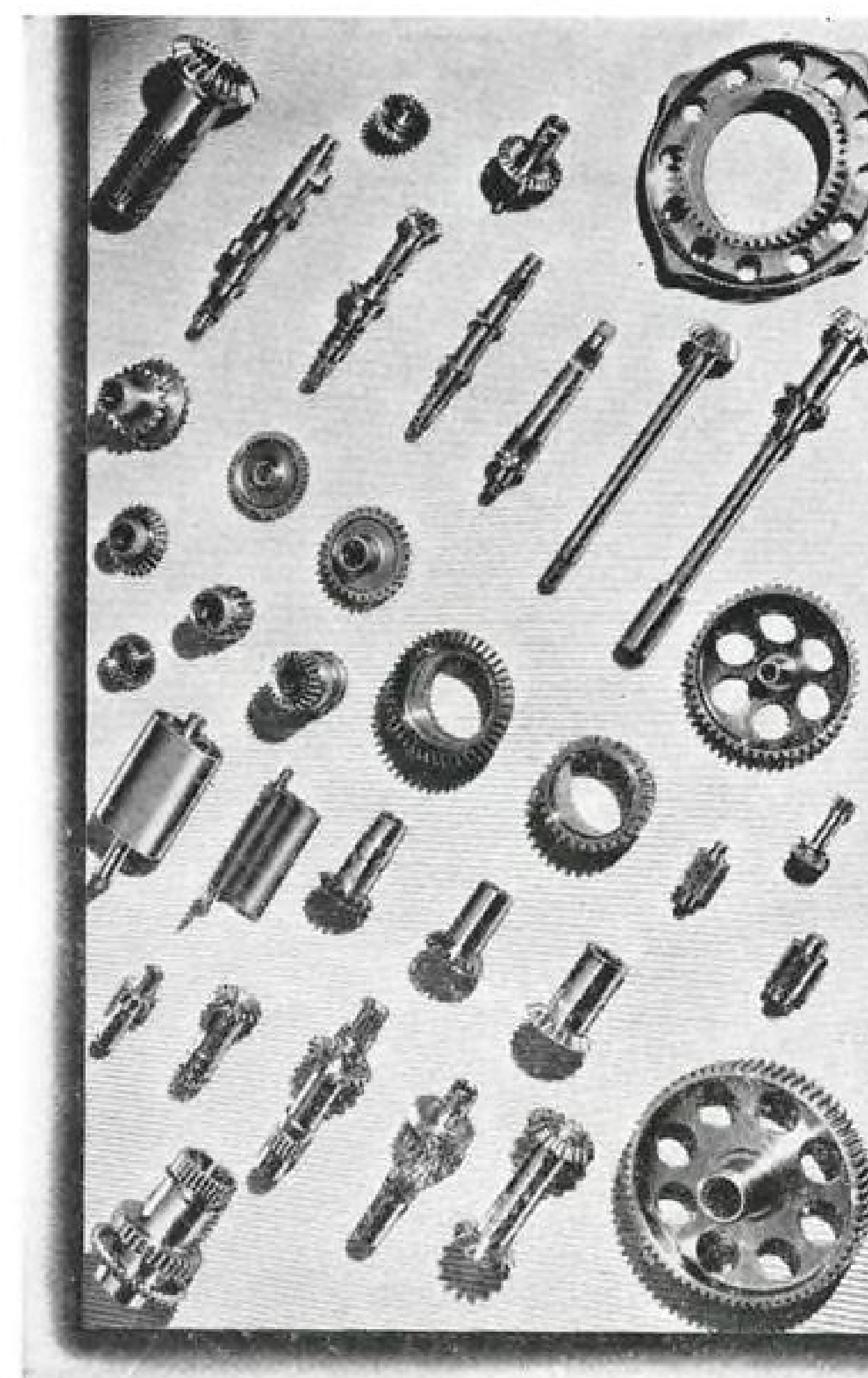
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# LETTERS

## Give B-36s to Navy!

I am an aerodynamicist—computing room supervisor, sub-sonic wind tunnel—at a major airframe company, and am also a Naval Reserve officer. I witnessed Test Able at Bikini in 1946.

As a result of the recent House Armed Services Committee report, which took the position that "the Air Force knows what's best for the Air Force and the Navy knows what's best for the Navy," I offer the following suggestion to the Joint Weapons System Evaluation Board for the defense of the American people.

Your news report Mar. 6 stated, "The committee emphasized that the role of the Joint Weapons System Evaluation Board is to evaluate weapons 'after' they have been developed, 'not to instruct the services what type of new weapons they will or will not develop.'"

In 1944 the then Army Air Forces tested F-80 jet fighters against stripped down B-29s at 30,000 to 35,000 ft. The tests proved the F-80s were ineffective against high altitude bombers. As a result of these tests atom bombs were dropped on Hiroshima and Nagasaki by unescorted B-29s at 30,000 ft. (AVIATION WEEK Mar. 21, 1949).

The results of these tests combined with Air Force and Navy bickering over unification has created a complex situation:

1. The Air Force concentrated on B-36 bombers because they believed the B-36s were invulnerable at high altitude. They also built high speed jet fighters, F-80s, F-84s, and F-86s, which are ineffective against high altitude bombers.

2. The Navy realizing that their offensive long range striking arm, the carrier task force, was being challenged by high altitude intercontinental bombers, had to produce jet fighters capable of shooting down B-36s. With "necessity, the mother of invention," on their side they did design and produce them—the Cutlass and the Banshee.

Now if a war should start within the next year, what might happen under our past and present system of unification:

1. The B-36s would attack Russia and many of them would be shot down. Why? Because necessity, the mother of invention, has been working for the Russians too; for, like our Navy, the Russians have known about the B-36 for several years and undoubtedly have concentrated on designing jet fighters to combat it.

2. The superior Navy jet fighters would be aboard aircraft carriers. The carriers would attack Russia; the Russians' land-based bombers would retaliate and drop atom bombs on or near the carriers—no one could accuse the Russians of killing women and children by atom-bombing aircraft carriers—which would destroy their usefulness. This was proven at Bikini in 1946. All the Navy jet fighters would be destroyed or forced to crash land in the ocean or land in Russia or Russian-held territory.

3. The Russians would drop bombs on the United States from high altitude bomb-

ers which our present Air Force jet fighters are unable to shoot down.

4. Russia's submarines would attack our coastal cities because the Navy hasn't any effective long range anti-submarine airplanes.

5. The American people would be inadequately defended—the victims of the past five years of squabbles between Air Force and Navy brass hats.

What is the solution to this dilemma in the event of a war in the very near future?

1. Give all the B-36s to the Navy to use for anti-submarine warfare. This would deny the Russians an opportunity to prove the B-36 is not invulnerable. It would also "save face" for the Air Force.

2. Give all the Navy's superior jet fighters to the Air Force—rather than have them sunk—so they could shoot down the Russian bombers.

3. Put all the inferior Air Force jet fighters aboard the aircraft carriers and order the carriers to bomb the Russians. The carriers could then make one suicidal attack against the Soviet Union without seriously weakening our defensive Air Force.

This switch would at least enable the U. S. to defend itself against submarines and bombers and to engage in one retaliatory attack against the enemy until it could destroy Marxism with Marxism's own weapon—political, economic, sociological, psychological, and religious propaganda.

LEROY F. IVERSON  
5856½ West 87th St.  
Los Angeles 45, Cal.

## Natl. Flight System

With considerable interest I read your correspondence in January, under Letters, in reference to National Flight System.

This organization is still a bona fide Boston dealer of the program and has had correspondence with its director, Robert F. Gunnell, since August, 1947.

All dealers realized, upon signing a "Dealer Membership Agreement," that the program was entirely a "sales and advertising" promotion deal. It was the full responsibility of the franchise holder to sell the product with the aid of the flight operators.

In my opinion, the National Flight System program has merit, is still a splendid idea, can be sold nationally and locally by a sales organization, and could be a terrific boon toward civilian business for the flight operator if he wished to promote it and cooperate fully in its development. It is a talked-of "package of flight education" that has been lacking, and it could be sold inexpensively in certain sections of the country.

We here in Boston have picked up valuable experience and information from this enterprise, and we have no argument with NFS even though our private flying sales program has diminished in 1950.

I feel that "A Fixed Base Operator," who signed the letter in AVIATION WEEK, can convert his \$500 investment into a terrific sales program with a little initiative; in place

of defeatism. It is my sincere belief that this type of program will assist Greater Boston in its promotion of private flying in the civilian status.

LOUIS F. MUSCO, President and Treasurer  
Aviation Training School  
673 Boylston St.  
Boston 16, Mass.

## Air Power Yearbook

I have been reading the Inventory of Air Power issue of AVIATION WEEK and am impressed with the job that has been done in covering this broad subject. It constitutes a very valuable reference and, at least within those fields with which I am acquainted, appears to be most accurate.

The article on the functioning of the ANDB and its relations with the Research & Development Board and other coordinating agencies is the most complete and accurate, as well as readable, treatment of the subject which I have yet seen.

The staff of AVIATION WEEK is to be congratulated on the fine job that they have done in this issue.

HECTOR R. SKIFTER, President  
Airborne Instruments Laboratory  
Mineola, N. Y.

The Feb. 27 issue featuring the annual Inventory of Air Power . . . is a very comprehensive report and I find many very informative and useful features. Congratulations. . .

DON RICHARDS, Executive Secretary  
Aviation Distributors & Mfrs. Assn.  
505 Arch Street  
Philadelphia, Pa.

(The two letters above are typical of mail that has praised Yearbook Editor Kroger and the AVIATION WEEK staff who produced the Yearbook. Single copies are still available at \$1 each.—Ed.)

## 'Tiffany or Woolworth'

Your editorial, "Tiffany or Woolworth," Feb. 7 was a ten-strike. The Airline Schedule Display Service is Mr. Woolworth of the Pacific Northwest in which there are over 50 cities with airline facilities.

We contend that a city worthy of an airline stop is worth giving every assistance to its representatives in developing traffic.

What does Mr. Tiffany of the airlines do about this? He mails out his publicity material apparently oblivious of display arrangements or the lack thereof. These "travel dollars" are a total loss, for the material is either piled on desks or counters or tucked away in drawers. What's the good of publicity the public never sees?

Mr. Tiffany runs expensive display ads in the metropolitan newspapers and slick magazines and lets it go at that. Mr. Woolworth displays his merchandise in all his stores, including the small cities, and he gets the business.

Mr. Tiffany likes to take only the cream from the top of the bottle. Mr. Woolworth says there's just as much value in the skimmed milk, and a lot more of it.

MALCOLM K. SMYTHE, President  
Airline Schedule Display Service  
107 Garfield St.  
Seattle, Wash.

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## Behind the scenes on the B-47

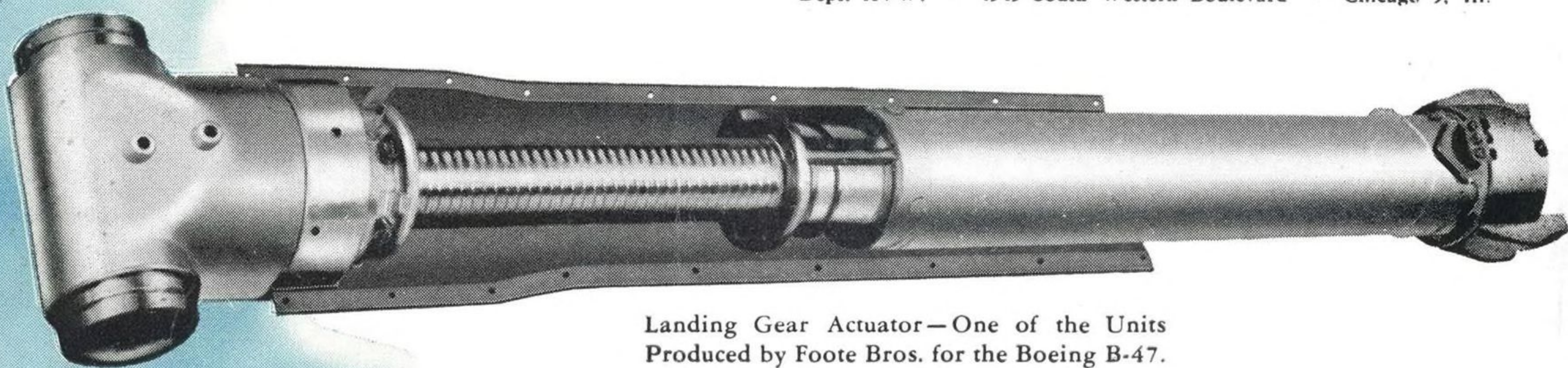
Here is the Boeing B-47—the sleek jet-propelled bomber that eats up distance at a rate of more than 10 miles per minute.

Operating such a swift air giant demands a range of controls that must represent the last word in quality.

Boeing looks to Foote Bros. for the production of actuators and power units which are aiding in the amazing performance of this master of the skies.

On many of America's leading aircraft and aircraft engines, you will find equipment manufactured by Foote Bros.—chosen because of the years of experience of this company in producing gears and actuators light in weight, achieving new extremes in accuracy, capable of traveling at high speed, designed to fit a confined space envelope.

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