

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

MAR. 27, 1950



## THE PANTHER... U. S. Navy's Jet Fighter

Here is a plane with a heritage. This new turbo-jet PANTHER succeeds such famous Grumman predecessors as the Wildcat, Hellcat and Bearcat. Impressive speed and formidable fire-power are achieved in the PANTHER without sacrifice of traditional Grumman ruggedness and stability.

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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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A J-47's OIL

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The increasing reliance on Feather-Weight Oil Coolers is due to Clifford's patented method of brazing aluminum in thin sections and to the accurate performance ratings predicted by the Clifford wind tunnel laboratory, largest and most modern in the aeronautical heat exchanger industry. Inquiries about Feather-Weight All-Aluminum Oil Coolers will be handled promptly.

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**ROCKET MOTOR**  
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Designed and made in any size to meet your requirements.

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# Aviation Week

Volume 52

March 27, 1950

Number 13

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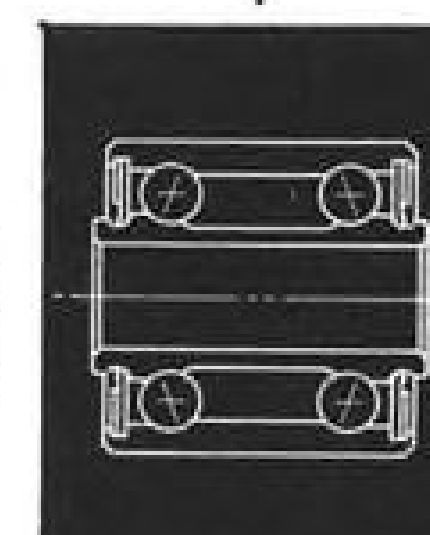
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AVIATION WEEK, March 27, 1950

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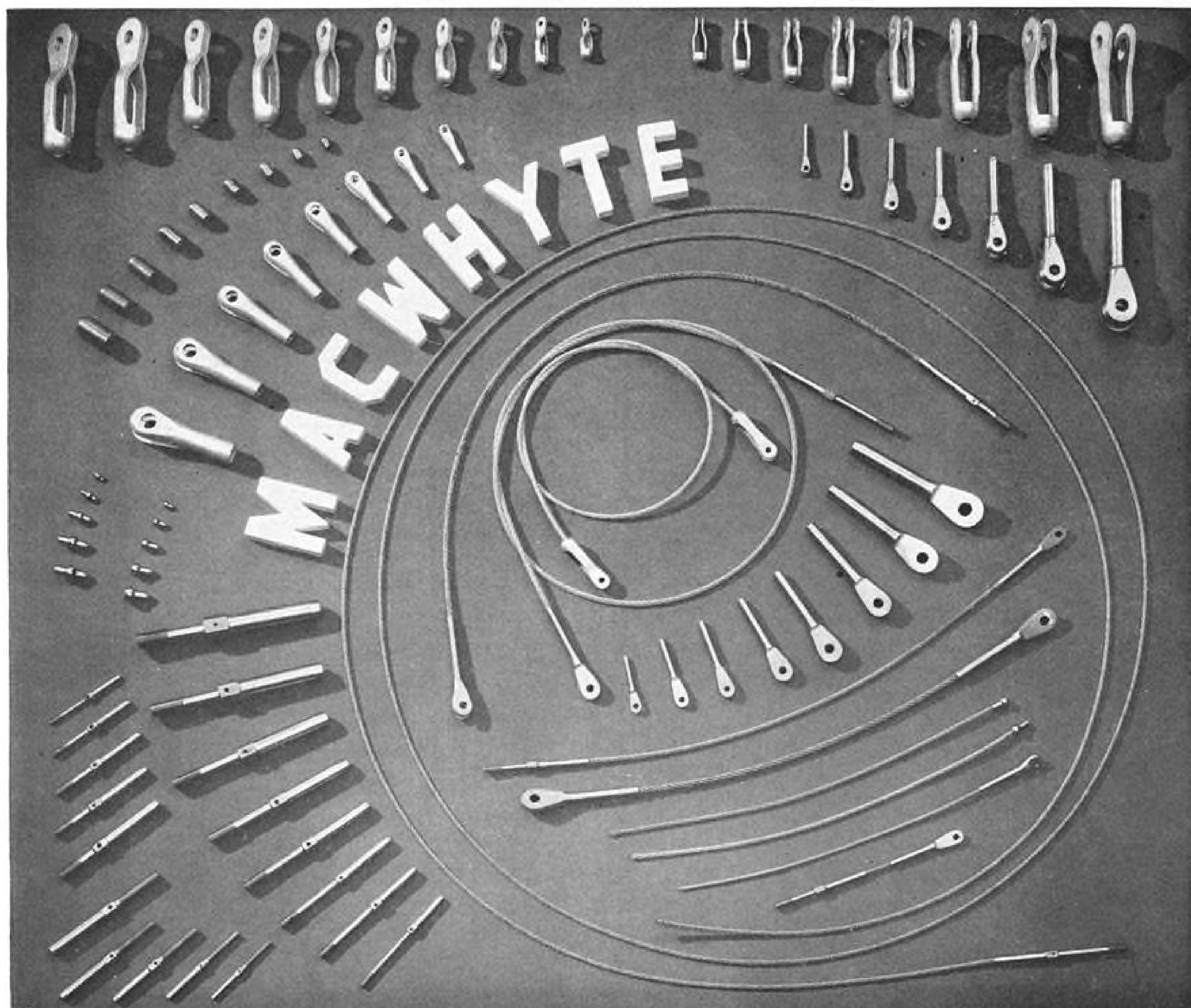
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## WHO'S WHERE

### Changes

► **New Appointments**—Raymond J. Fencel has been named service manager of Continental Motors aircraft engine division, succeeding A. Vandenberg who recently resigned. F. Kent Bradford is new asst. manager of Fairchild Aircraft's sales and service dept. Dr. Milton Ure Clauser, chief of mechanical and equipment section for El Segundo plant of Douglas Aircraft has been appointed professor of aero engineering and head of school of aeronautics at Purdue University.



### Travel Log

Secretary of Defense Louis Johnson sits on a knoll high atop Vieques Island six miles from Puerto Rico and contemplates tribulations of total war as simulated by 80,000 officers and men, various fleet and USAF combat units during Operation Portrex. Lt. Gen. W. H. H. Morris, Jr., commander of defense forces in the giant maneuver, supplies a running commentary.

Six Boeing engineers from Seattle, and two USA officers are slated to complete a B-47 Stratojet indoctrination tour of major Strategic Air Command bases in this country by Mar. 31. Representing Boeing are: Lysle M. Wood, chief engineer; W. H. Cook, aerodynamics asst. project engineer; George S. Schairer, aerodynamics and power plant staff engineer; Kenneth Holtby, aerodynamicist; and Herbert Clayman and Henry Richmond, service engineers. With them are Capt. J. H. Schaffer, AMC B-47 project officer, and Maj. Guy M. Townsend, chief of AMC bombardment flight test section.

### Honors and Elections

Jerome Lederer, Flight Safety Foundation president, has been reappointed a member of the committee on operating problems of NACA.

## INDUSTRY OBSERVER

► USAF order grounding all Republic F-84E Thunderjet fighters will be withdrawn this week as fast as corrective repairs and flight tests are completed. Engine trouble was traced to No. 2 bearing lubrication system in the Allison J-35-17 engine and fix kits have been shipped to F-84E base installations for the repairs.

► Piasecki's H-21 helicopter has a flyaway price of \$200,829, the USAF disclosed last week, and is designed for a capability of picking up six litter patients while hovering at its objective for 30 min., and returning to a home base 250 miles distant.

► Canadair is completing a "VIP" version of the North Star DC-4M for use by Canadian Prime Minister St. Laurent and other Canadian officials. Powerplants will be Pratt & Whitney R-2800s instead of Rolls-Royce Merlins. Plane will be used by the RCAF for high-altitude and long-range crew training when not hauling top brass around and will carry accommodation for a double crew.

► Watch for off-the-shelf purchases by Navy of some helicopters for anti-submarine warfare, preliminary to the design competition for new and larger models still definitely planned. Most likely candidates are Sikorsky H-19 and Piasecki HRP-2, with the Sikorsky model probably standing the better chance due to earlier possible delivery.

► Swedish reports assert the swept-wing Flying Barrel J-29 jet fighter is the fastest fighter craft in production "in the world" and that it has attained speed of 953 mph. Approximately 500 of the planes have been completed at the underground Linköping works.

► Goodyear Aircraft Corp., with three non-rigid airships available for sky advertisement leasing, proposes a program to make airships available to an advertiser for 145 guaranteed flying hr. a month for six months from May 1 to Nov. 1, with advertisers' signs displayed on the ships in the daytime and incandescent blinking signs at night.

► High-speed taxi tests of the Northrop XB-49 Flying Wing resulted in the plane nosing over, catching fire and burning at Edwards AFB. Flight crew escaped. Tests called for taxiing the plane faster than 100 mph. and raising the nose wheel. Shortly after it was lowered again it shimmied violently and collapsed as the tire failed.

► Pratt & Whitney's PT-2 turboprop is due to make its first flights in April in the nose of a B-17 flying test bed. PT-2 is expected to be competitive in power with the double-unit Allison T-40, rated at 5500 shaft hp.

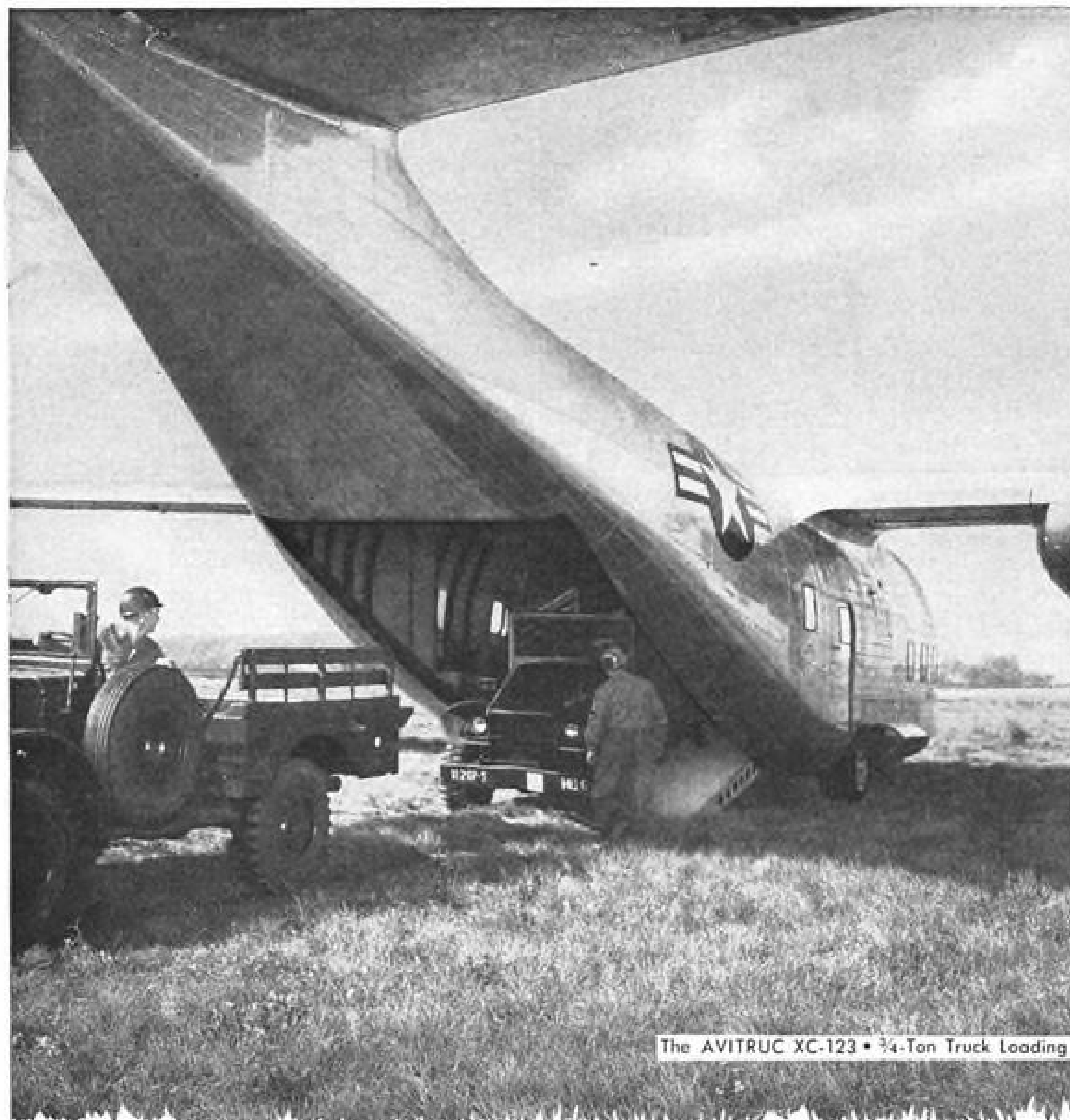
► CAA plans to rent 100 hr. flying time for 10 inspectors in the Boeing Stratocruiser, Lockheed Constellation and Convair-Liner for flight proficiency and familiarization. CAA also proposes to rent a Curtiss-Wright Dehmel flight simulator trainer for \$80,000 for a year's time, for training its agents in four-engine procedures.

► Assistant Air Force Secretary Harold Stuart is conferring with aircraft manufacturers and airline operators in an effort to get a closer standardization on airline transport requirements which can in turn be standardized more completely with military transport requirements.

► Westinghouse Electric Corp., Gas Turbine division expects to assemble its first J-34 turbojet engine at its newly-opened Kansas City plant this month, and to be producing parts and assemblies at Kansas City by May. Ultimate goal, to produce about 100 engines a month, is expected to be realized in a year. Plant is the war-built factory previously occupied by Pratt & Whitney. It is expected to be the most complete self-contained jet engine plant in the country, when machine tool installations are all accomplished.

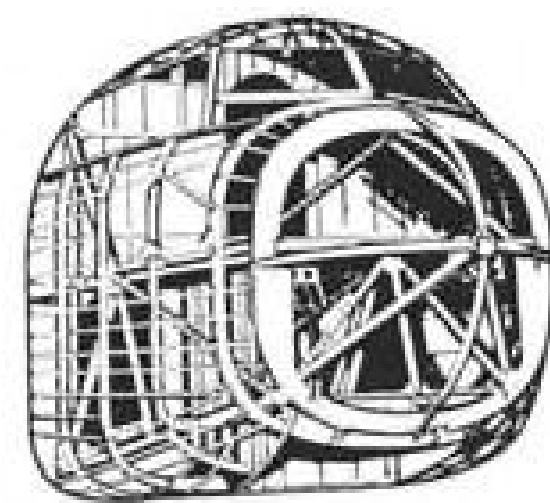
► Continental Motors disclosed in the recent annual report of the corporation that it has been working on a ram-jet engine development for at least a year.





The AVITRUC XC-123 • 74-Ton Truck Loading

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CHASE planes are designed and built to withstand severe landing shocks on short or unprepared fields, providing maximum safety to cargo and crew.

Examples of this ruggedness are the nose section of welded steel tube construction, and sturdy bulkhead between the flight and the cargo decks.



**CHASE AIRCRAFT CO., Inc.**  
WEST TRENTON, NEW JERSEY



## AVIATION CALENDAR

- Mar. 27-28—American Society for Testing Materials, Committee D-14, spring meeting, 1916 Race St., Philadelphia.
- Mar. 28-31—National Plastics Exposition, sponsored by Society of the Plastics Industry, Navy Pier, Chicago.
- Mar. 30-31—Sixth annual helicopter forum, sponsored by the American Helicopter Society and the Institute of the Aeronautical Sciences, Ben Franklin Hotel, Philadelphia.
- Mar. 31—Greater New York Safety Council conference on air travel safety, Hotel Statler, New York, N. Y.
- Apr. 4-6—Engineering and Maintenance conference, Air Transport Assn., Hotel Continental, Kansas City.
- Apr. 4-8—National Production Exposition, sponsored by the Chicago Technical Societies Council, Stevens Hotel, Chicago.
- Apr. 6—120th National Aircraft Standards Committee western division meeting, Aircraft Industries Assn. offices, Los Angeles, Calif.
- Apr. 10-12—Annual convention, American Society of Lubrication Engineers, Hotel Statler, Detroit.
- 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. 17-19—1950 aeronautic meeting, Society of Automotive Engineers, Hotel Statler, New York City.
- Apr. 24-26—Airport Operators Council, third annual meeting, Hotel Carter, Cleveland.
- Apr. 26—Stainless steel valve clinic, sponsored by Cooper Alloy Foundry Co., Hotel Statler, Buffalo.
- 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 5-6—Midwestern conference on fluid dynamics and the national meeting of the American Physical Society, fluid dynamics division, University of Illinois, Urbana.
- May 18-20—Annual Meeting of Women's National Aeronautical Assn., Tulsa, Okla.
- May 19-20—Seventh annual personal aircraft meeting, sponsored by Institute of Aeronautical Sciences, Lassen Hotel, Wichita, Kans.
- May 23-24—40th National Aircraft Standards Committee steering committee meeting, Washington, D. C.
- May 25-26—8th meeting of council for military aircraft standards, Navy Dept., Washington, D. C.
- May 25-27—Spring meeting, Society for Experimental Stress Analysis, Hotel Statler, Cleveland.
- May 27-30—Wright Memorial Glider Meet, South Dayton Airport, Dayton.
- June 3-4—Air fair and industrial exposition, Shawnee, Okla.

## PICTURE CREDITS

13—Boeing Airplane Co.; 17—Convair; 30—Pratt & Whitney; 34, 35—McGraw-Hill World News; 47—PAA.

AVIATION WEEK, March 27, 1950

## NEWS DIGEST

### DOMESTIC

Republic Aviation Corp. has notified the government of its intention to exercise its option to purchase all leased buildings and land not now owned by the company at Farmingdale, L. I. It is believed Republic will take title early this summer. Buildings alone comprise over 1 million sq. ft. of floor space.

Exports for February of personal and executive aircraft of 5000 lb. and less (airframe weight) reported by nine companies to AIA totaled 21 valued at \$256,246 compared with 22 planes valued at \$124,129 reported by the same makers for January. Companies were: Aeronca, Beech, Bellanca, Cessna, Engineering & Research, Piper, Ryan, Taylorcraft, and TEMCO.

Airliners trailed ships in number of passengers carried out of N. Y. during February for the first month since September. Ships carried 19,001 passengers compared with 18,450 who went by plane.

An AF copter crashed and burned in Texas after it had flown into a flock of birds. Reportedly the main rotor blade broke. Crew of two were killed.

Severance pay details worked out between American Airlines and TWU give two weeks pay to any employee with one year or more of service as of Jan. 1, 1950; then the scale gives one week severance pay for each year of service up to a maximum of eight years. This arrangement substantially follows prediction in AVIATION WEEK, Mar. 20. After 1951, the one-year severance allowance will be discontinued unless renegotiated. There will be no severance in event of a seasonal layoff lasting four months or less, or if layoffs are caused by grounding of a substantial number of the company's planes.

Howard Hughes has retained the newly organized Washington law firm of (Clark) Clifford and (Edward) Miller to represent his interests, including TWA. Clifford until recently was special counsel to President Truman.

U. S. Atlantic Fleet ships and aircraft, which have just completed Operation Portrex, have combined with British, Canadian and Netherlands fleets for joint Operation "Caribex." The maneuver will test joint Allied coordination of anti-submarine technique and evaluate air defense problems while ships refuel under air and submarine attack. Allied air units will simulate air strike against Navy's Guantanamo Bay, Cuba, base during the two-week war game.

Texas Engineering and Manufacturing Co., Dallas, has completed over-

haul and reconditioning of 356th Douglas C-54 transport for USAF. Integral fuel tanks of 128 were resealed. An additional 19 are scheduled for overhaul and reconditioning under Air Force contract for MATS.

Four Boeing B-29 Superforts left Andrews AFB, Maryland, last week bound for Great Britain. Flight is first of an eventual transfer of two groups of B-29s to Great Britain. Planes were flown by U. S. crews who will remain temporarily in England to assist in training RAF personnel in B-29 flight technique.

Howard B. Dean, 53, administrative vice president of Pan American World Airways, died of a heart ailment last week at his summer home in East Hampton, L. I., N. Y. He was a banker before affiliating with PAA in 1943 as a vice president. He was appointed in 1947 as administrative vice president. He also was a vice president and director of Panagra.

### FINANCIAL

Pacific Airmotive Corp. reports a net loss of \$24,961 during year ending Nov. 1949, compared with a loss of \$3,282,439 the previous year. The company reduced its bank loan by \$500,000 on Aug. 31, although payment was not due until Dec. 31. Cash on hand Nov. 30 was \$727,582, an increase of \$279,442 over the balance on hand the same period of the previous year.

Lear, Inc. announces a net profit for year ending Dec. 31 of \$510,496 on sales of \$7,368,000, compared with sales of \$5,326,000 for '48. Dec. 31 backlog was \$7,200,000 compared with \$4,269,000 for the previous period. Backlog at Feb. 27, 1950 was \$8,750,000 and sales for the first two months of this year were \$1,300,000.

### INTERNATIONAL

DH Comet made first London-Rome jet airliner flight in 2 hr. 2 min. during a speed and fuel consumption test run. Pilot John Cunningham was disappointed in his speed (480-490 mph. average).

IATA Clearing House reports January turnover of international airline traffic transactions totaled \$11,600,000 compared with \$11,918,000 for Jan. 1949. Late filing of claims rather than traffic decrease was given for slight falling off of monthly total.

FAMA (Argentine Airlines) planned to start scheduled DC-6 service between Buenos Aires and New York last week. Traffic stops are at Belem and Rio de Janeiro, Brazil.

the new  
**ANG Gear**



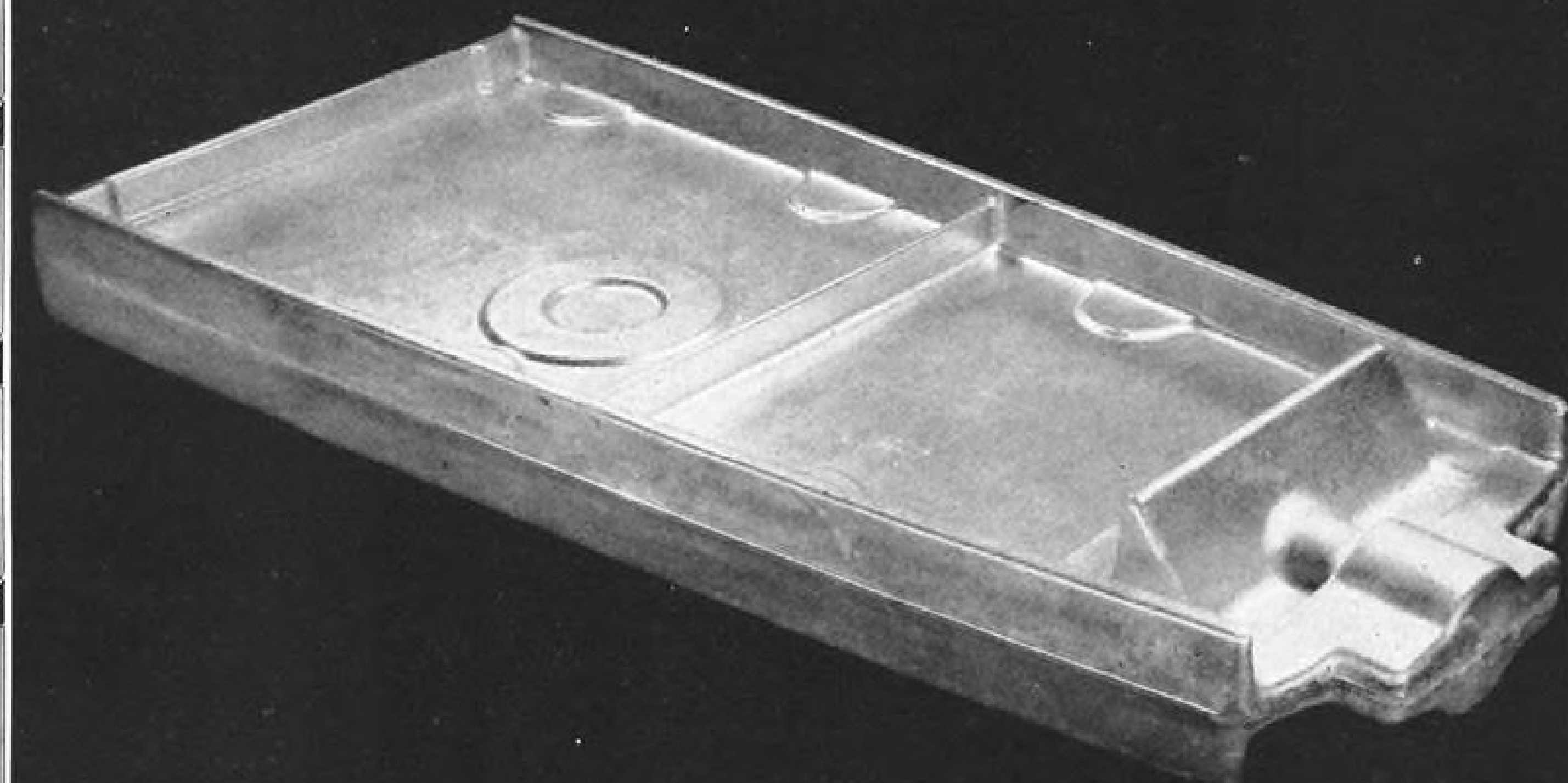
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WORCESTER, MASSACHUSETTS, U. S. A.

HARVEY, ILLINOIS

DETROIT, MICHIGAN

Company	Income <sup>1</sup>	Profit <sup>2</sup>	Income <sup>1</sup>	Profit <sup>2</sup>	Working Capital 1949 Year-end	Backlog 1949 Year-end
Beech Aircraft <sup>5</sup> .....	\$20,651,905	\$922,089	\$24,141,120	\$2,213,626	\$6,249,432	\$13,000,000
Bell Aircraft.....	11,000,000	204,142	15,516,643	347,122(L)	N.A.	N.A.
Boeing Airplane.....	287,012,824	4,411,348	127,304,661	1,715,908	40,000,000	365,804,690
Consolidated Vultee <sup>3</sup> .....	197,316,473	3,713,156	113,345,506	11,978,795(L)	17,507,717	207,000,000
Curtiss-Wright.....	130,424,894	2,750,361	112,888,950	5,313,298	78,123,098	132,700,000
Douglas Aircraft <sup>6</sup> .....	119,423,218	5,516,700	120,087,856	5,829,206	57,767,620	275,499,000
Fairchild E & A.....	N.A.	N.A.	30,850,075	1,552,382	N.A.	N.A.
Grumman Aircraft.....	59,965,277	3,191,520	41,207,124	2,393,311	N.A.	154,000,000 <sup>4</sup>
Lockheed Aircraft.....	118,627,066	5,490,670	126,508,810	6,239,380	28,741,000	229,746,000
Martin.....	53,425,943	5,131,500	73,587,908	16,710,762(L)	11,085,131	71,655,000
North American <sup>6</sup> .....	124,734,509	7,306,409	94,782,739	6,779,561	42,867,287	228,000,000
Piasecki.....	5,022,441	105,946	3,660,665	65,657	526,976	10,200,000
Republic Aviation.....	47,722,195	876,632	50,078,863	2,196,475	7,429,869	36,983,000
Ryan Aeronautical <sup>6</sup> .....	15,014,564	358,052	7,966,474	356,603	3,404,397	6,809,019
United Aircraft.....	227,085,032	10,093,182	209,125,736	9,423,718	79,609,993	310,000,000
TOTALS.....	\$1,417,426,341	\$50,071,707	\$1,151,053,130	\$15,042,446	\$373,312,520	\$2,041,396,709

<sup>1</sup> Sales and other income.

<sup>2</sup> After taxes.

<sup>3</sup> Fiscal year ending Nov. 30, 1949.

N.A. Not available.

<sup>4</sup> As of Oct. 30, 1949.

<sup>5</sup> Fiscal year ending Sept. 30, 1949.

<sup>6</sup> Fiscal year ending Oct. 31, 1949.

Source: Manufacturers' reports, McDonnell reports for year ending June 30, and Northrop for year ending July 31.

## Big Year Assured for Plane Makers

**Backlogs and better facilities add up to best business outlook since war ended.**

By William Kroger

The one-and-a-half-billion dollar aircraft manufacturing industry is taking off on its biggest postwar year.

Any cutbacks and ceilings on military expenditures—such as bruited about Washington can't stop it.

Gross income and profits will be up in 1950.

Deliveries will be of larger units. That means higher revenue. And efficient production methods will squeeze more profit out of every income dollar.

Political clamor for a slow-down on government expenditures probably will get louder before it dies. But it is expected to die after the fall election. Even if procurement cutbacks are announced, they will not materially affect industry results much before mid-1951, leading manufacturers predict in their 1949 annual reports.

► **Why It Looks Good**—Favorable outlook for the industry is based on a backlog in excess of \$2 billion, and engineering and tooling activity last year that set up the plants for better output this year. Fact that manufacturers such as Robert Gross, of Lockheed, and Donald Douglas believe this year will be better than last has this significance:

• Every company made a profit in 1949

for the first time since the war, it is disclosed in AVIATION WEEK's compilation of annual reports from most of the prime aircraft and engine contractors. Aggregate profit more than tripled over 1948.

• **Postwar high** in deliveries was attained in 1949 by several companies.

The optimism expressed by the manufacturers reporting isn't just for stockholder consumption. Operational facts make it justified.

### TRANSPORT BOOM

Surprisingly, there's a mild boom in commercial transport business. There isn't the industry-wide commercial backlog this year that there was a year ago, but on the other hand, there wasn't supposed to be. The transport business was supposed to be marking time until the advent of turbine power. Instead, Douglas, Lockheed and Martin are booking sizeable new business and Boeing and Convair think prospects are bright.

Douglas has orders for 32 DC-6 types for \$30 million. Its commercial backlog has risen slightly over the 1948 year-end figure. Lockheed has orders for 41 Constellations for \$48,090,000. Its commercial backlog jumped from only \$14,529,000 at the end of 1948. The Connie

production line will be busy for another year on what Lockheed says is 48 percent of the industry's total commercial backlog.

Martin's business on 4-0-4 transports for Eastern Air Lines and TWA is much newer (AVIATION WEEK, Mar. 13), but it pinpoints the trend.

The commercial transport outlook is dimmer for Boeing and Convair. Both have completed deliveries on their airline orders. But both are hopeful that they can generate new business for turboprop models of their transports, and both will be in production for some time on military versions.

► **Jet Transports**—Boeing, Martin, Convair and Douglas say they are ready to convert their existing transports—the Stratocruiser, 2-0-2, Convair-Liner and DC-6—to turboprop power. Pure jet power is a different story. Douglas and Lockheed are studying and waiting—but for different reasons.

Douglas indicates that the power engineers are moving too fast for any manufacturer to firm up an airframe design. "In one model alone," Donald Douglas tells his stockholders, "within a period of four months thrust-power increases of more than 100 percent have been recorded. Under such circumstances, obviously it is unsound . . . to fix . . . design of any airplane to fit a power unit which may become obsolete almost immediately."

So Douglas will wait, but ready "to move ahead rapidly in this field."



## Comparative Backlogs

Company	1948	Year-End Backlog 1949
Beech Aircraft	\$16,000,000	\$13,000,000
Bell Aircraft	30,000,000	N. A.
Boeing Airplane	445,741,075	365,804,690
Consolidated Vultee	156,000,000	207,000,000
Curtiss-Wright	127,000,000	132,700,000
Douglas Aircraft	232,989,000	275,499,000
Fairchild E&A	84,200,000	N. A.
Grumman Aircraft	107,000,000	154,000,000
Lockheed Aircraft	195,901,000	229,746,000
Martin	88,097,141	71,655,000
North American	380,000,000	228,000,000
Piasecki	N. A.	10,200,000
Republic Aviation	52,000,000	36,983,000
(As of 3/1/49)		
Ryan Aeronautical	11,700,000	6,809,019
United Aircraft	335,000,000	310,000,000
<b>TOTALS</b>	<b>\$2,261,628,216</b>	<b>\$2,041,396,709</b>
N. A.: Not Available.		

Lockheed has a different reason for holding back on jet transports. "The cost of developing airplanes has multiplied many times," President Gross reports. "Added to this are the lengthy and costly process of certification by CAA and the fact that corporation taxes have risen sharply the last ten years . . .

"We have taken the position that modern air transport is an essential part of our national defense and that participation in development of new transports is a proper function of the armed forces . . ."

## MISSILE HEDGE

Next to atomic weapons, guided missile development is under the thickest security blanket. This year, the manufacturers give a clearer idea than ever before of how deeply they're in the missile program.

Most manufacturers are in one phase or another of guided missile work. They can't tell much about what they are doing, but woven into their comments is a new strand of the aviation industrial fabric: electronics.

Terms and phrases strange to aircraft manufacturing are the tip-off: aerophysics, nuclear reactor technology, telemetering, guidance systems. But the aircraft manufacturers have shown enough adaptability to get along in the new field:

- **Convair** has missile contracts with both Air Force and Navy and is involved in development of both frames and internal components. Convair's MX-774 Air Force missile already has been tested.

- **Curtiss-Wright** is working on power units for guided missiles.

- **Douglas** is devoting more than 50 per-

cent of the engineering effort at the Santa Monica plant to guided missiles. Company is the prime contractor on two guided missile projects and proudly boasts that its "bumper"-WAC missile has "carried the Douglas insignia to a record altitude of 250 miles and a record speed of 5000 miles per hour."

- **Martin** is in production on two types of missiles for the Navy, the huge Viking research rocket, two of which have been fired, and the KDM-1 ramjet-powered Gorgon IV, used as a target drone. Company has 300 engineers working on design and testing of fire control radar systems, missile guidance systems, telemetering devices and antennas for airborne uses. Reflecting the change that has come over "aircraft manufacturing," more than 25 percent of these engineers hold doctor or master of science degrees.

- **North American** now has 900 employees in the aerophysics section, as against 775 a year ago, who ply their trade with such facilities as a supersonic wind tunnel (the industry's largest) and a rocket engine test center.

- **Ryan** has completed one contract for an air-to-air missile, the Firebird, for the Air Force, and is continuing guided missile work for the Air Force and Navy.

## EFFICIENCY

Manufacturers are making more money with fewer employees. More and better machines is one reason. Another is better housekeeping. Spurring this development in many cases is the government incentive contract which provides that the company and government split any saving over the target price.

An example of how it goes is found at

Lockheed. F-80 jet fighters now are being delivered at one-sixteenth the cost of the first experimental models, and five-eighths the cost of the planes of the first production order.

It will take only one-third as many man-hours to produce the 200th Constellation this summer as it did to produce the 100th about three years ago. At Douglas, production economies enabled the company to slice 10 percent off its spare parts prices.

► **Machines and Men**—One of the main reasons for the Lockheed performance is the \$5 million it has put into new facilities and equipment—and what the money has bought: Such items as a 200-ton metal-stretching press; \$231,000 worth of portable and standard tools; 20-ton Ceco stamp hammer; 8000-ton triple-action hydraulic press to be installed late this year; a \$466,000 new building for the new machinery.

Other companies, notably Curtiss-Wright and Martin tightened up production efficiency with new men or men in new places. Management reorganizations accounted for much of the improved showings (page 39).

► **Spotty Record**—There were no losses among the major companies in 1949, but some showed declines in sales and profits. In one case (Bell) this was due to a strike; the sharp upturn at Boeing, however, was due to uninterrupted production following a strike in 1948.

The total backlog of companies reporting was down over the 1948 year-end figure. One logical reason was the good production record. Here's the rundown on the individual companies recently issuing annual reports:

## BOEING

Like many another manufacturer, Boeing reported production reaching a postwar peak. By last week all but one of its 55 Stratocruisers had been delivered, 47 last year. In addition, "substantial" deliveries of B-50 bombers and C-97 Stratofreighters were made. Early in the year, Boeing-Wichita cleaned up its order for YL-15 Scout liaison planes.

Most of the planes delivered in 1949 rolled out of the Seattle plant. In the years immediately ahead, that situation may change. The B-47, says Boeing, looks now as if it will be the company's principal production item. It will be produced at Wichita.

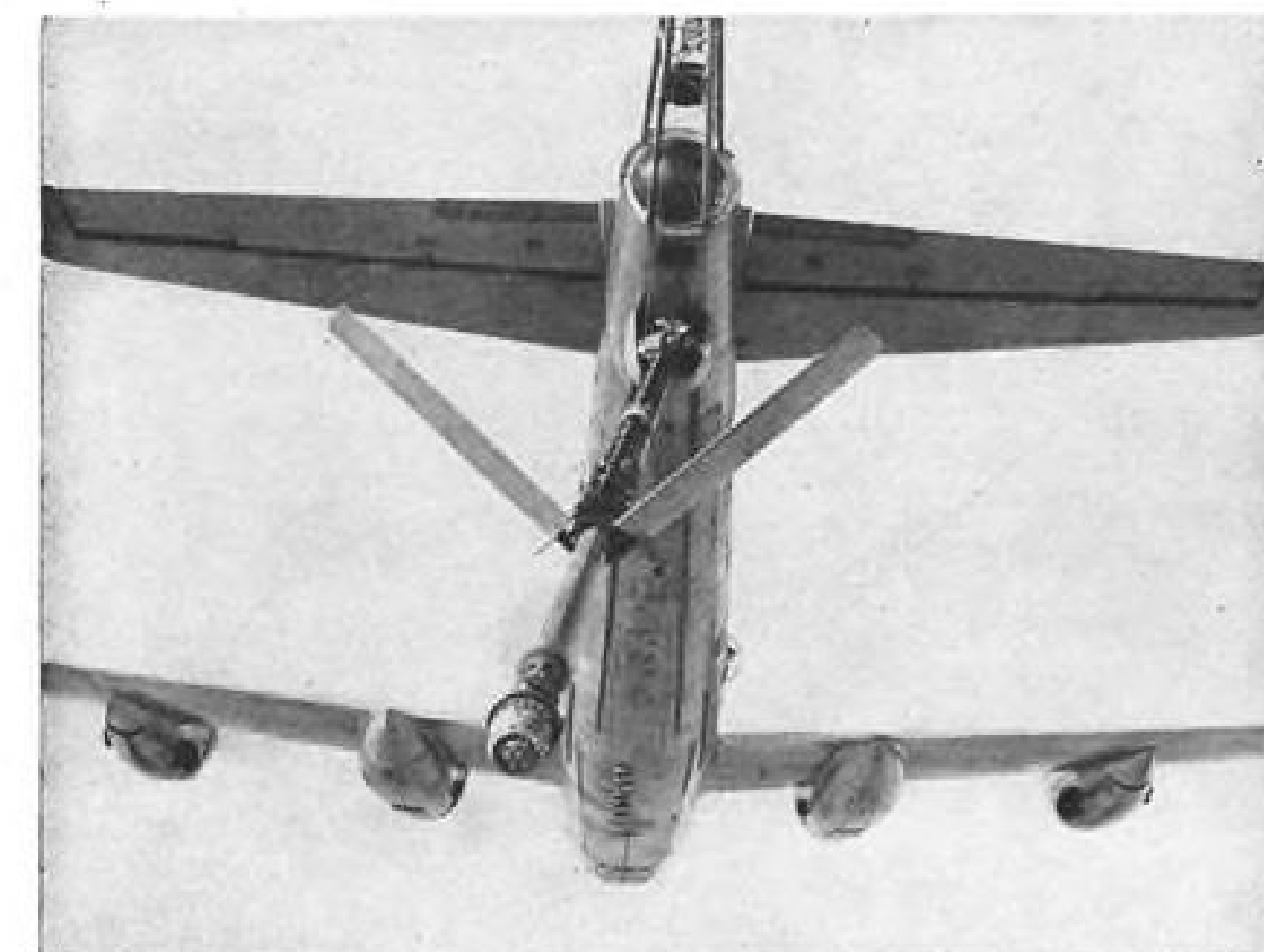
But for the rest of this year, and into 1951, C-97 production will continue at Seattle. As the last of the present order moves down the line, Boeing hopes right behind it will be a turboprop version.

► **Always in Seattle**—Boeing President William M. Allen indicated that Seattle will always be the company's home and headquarters. The facility that last year brought in the industry's biggest sales

## In the Air with Boeing's Flying Boom



**STEP-BY-STEP PICTURES**, just released, show details of new Boeing Flying Boom aerial refueling system in actual mid-air operation. Above photo, taken from side sighting blister of B-29 tanker, shows B-50D taking on fuel load through telescopic boom.



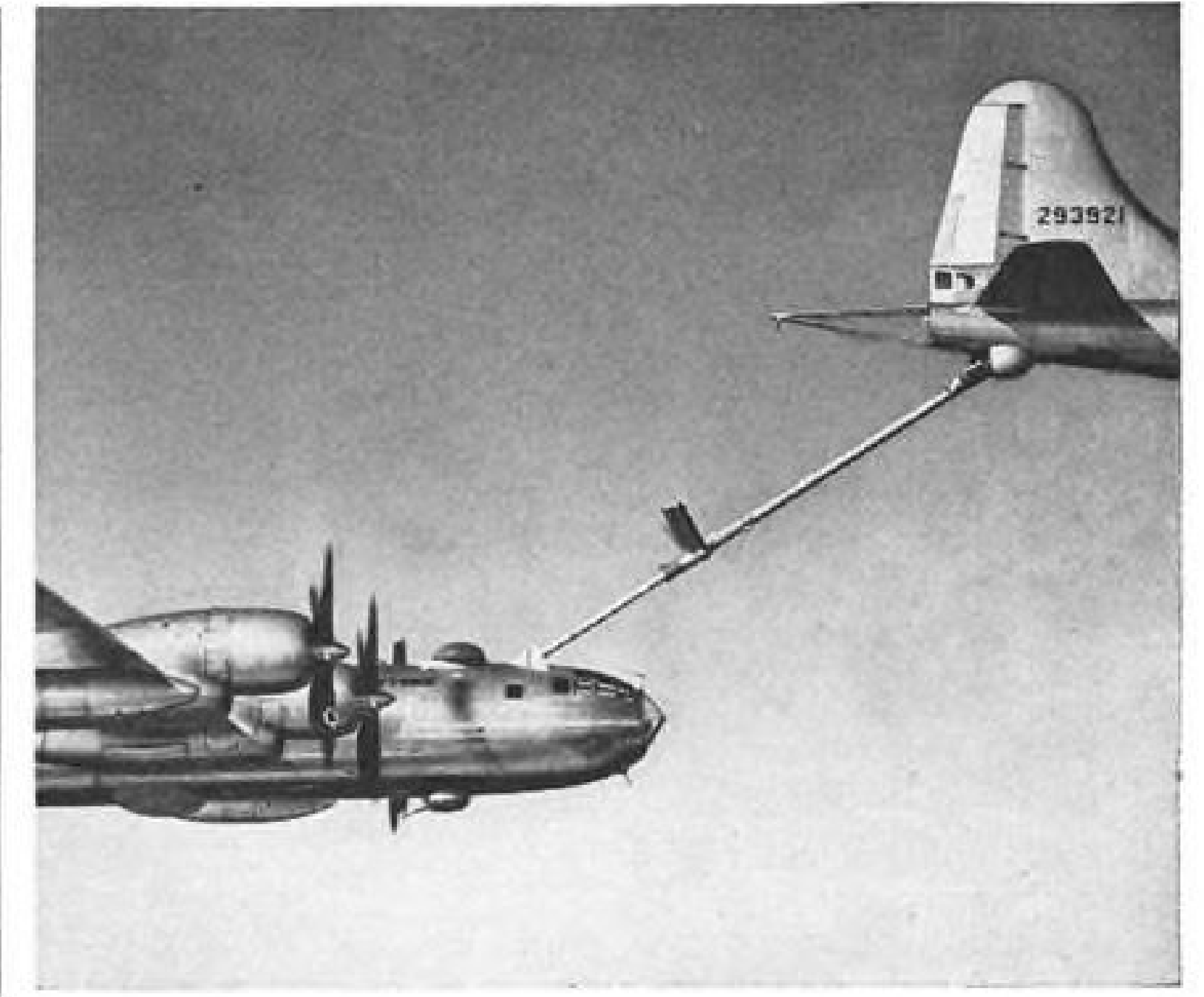
**FROM THE NOSE** of a B-50, the B-29 tanker looks like this as it lowers the boom to refuel the Superfortress. End of the pipe fits special receptacle on top of the bomber's fuselage. Fuel is pumped by the tanker at high speed into the bomber's tanks.

and backlog (see table) will be the center of Boeing basic engineering and research work.

At Seattle Boeing is developing the flying boom refueling system, the XB-52 bomber, small gas turbines for industrial use, and guided missiles.

## CONVAIR

Consolidated Vultee was one of the three companies to show a loss in 1948. Last year it turned up with a spanking \$3 million-plus profit, free and clear because previous years' losses carried forward, left no tax liability. And there is



**V-SHAPED "RUDDEVATOR"** control, below midway point in boom, stand out sharply in this side view of operation. Their leading edges carry B. F. Goodrich anti-icing strips containing heated wires. Slip-way doors retract during normal flight.



**STOWED AWAY**, the Boeing-developed Flying Boom refueling pipe is shown in a close-up as it is inspected by a flight test crew. Support rigging, holding boom in place, also can be seen in side and rear views of tanker in flight. Note anti-icing strips.

still left about \$8 million of prior years' losses to apply against tax liability for this and subsequent years.

When Floyd B. Odum assumed control of Convair, he made no secret of his desire to pitch the company's future on military business. Growth of Convair's military backlog indicates at least temporary success. In 1949, Convair:

- **Sold** \$167 million to the Air Force; \$6 million to the Navy; \$24 million to commercial customers.

- **Got contracts** for 75 more B-36 types and 48 T-29 twin-engine trainers, and is negotiating for more B-36 business.

- **Showed backlog** of \$187 million in Air

Force business; \$20 million in Navy business; and less than \$1 million in commercial business.

Convair sees no trouble in keeping its two plants (Ft. Worth and San Diego) busy. At Ft. Worth is the B-36. At San Diego is the T-29, parts for the B-36 and major assemblies for the B-50, produced under contract with the Boeing company.

## CURTISS-WRIGHT

Real test of the new management at Curtiss-Wright will come this year. Results of the last six months of 1949.



were an improvement over the first part of the year (see page 39). The corporation now has policies on quality control, cost control, budgeting and scheduling "on a scale not before attempted in the aircraft industry." And its production staff reports direct to President Roy T. Hurley, who cut his production eye-teeth in the highly competitive automobile industry.

C-W's report touches on two significant factors: Engineering and research expense in 1949 climbed to \$11,910,865 from \$6,419,078 in 1948, and sales of its engines increased. Revenue from development contracts declined. It appears as if future emphasis will be on research and engineering for immediate production.

## DOUGLAS

Douglas moves into its 30th anniversary year expecting to attain its heaviest production since wartime. It has its first Air Force production order (66 C-124s) since the war. Its employment (18,941) is the highest since the war and is still going up. It expects DC-6 production to step up for the next few months, and continue steady throughout the year.

► **Disappointment**—But the outlook, rosy as it is, has at least one darker spot. Douglas is frankly disappointed in the airline reception of its Super DC-3.

The plane "appears to us and to many careful and conservative students of air transport," says Donald Douglas, "to provide the utmost in proved reliability, world-wide acceptance, economy, and efficiency in operation for the minimum of expenditure." Still, "results from this new development have not yet come up to our original estimates or revised expectations."

The vigorous advertising and demonstration campaign on the Super DC-3 brought in only one order: Three for Capital Airlines.

► **Deliveries**—While dollar value of Douglas sales in 1949 fell slightly below 1948, number of planes delivered increased:

	1949	1948
DC-6 .....	5	46
AD .....	283	218
Misc. ....	1	6
	<u>289</u>	<u>270</u>

Military sales increased greatly, from \$69,695,000 in 1948 to \$101,900,000 in 1949. At the same time, other sales dropped just as sharply: in 1948, \$48,887,000, in 1949, \$15,522,000.

Military work is just as prominent in Douglas backlog. The \$275-million backlog is now 44 percent Air Force, 51 percent Navy, and 5 percent other business, almost the same as a year ago.

► **Production Outlook**—But the gratifying thing to Douglas is that C-124 or-

der. Production on it is expected to hit its stride this summer and keep Santa Monica workers busy for a long time to come.

Douglas also is moving into production on an order for more than 100 F3D Navy jet night fighters. The AD series also is in production.

## LOCKHEED

Lockheed's production outlook is among the most promising.

This summer it runs out of F-80 orders, but its other four production types will carry on with present orders well into 1951. Here's the run-down:

• **Constellation** backlog is 41 with last of current orders due out about February of next year.

• **T-33 and TO-2** (two-seat trainer versions of the F-80 for both Air Force and Navy) production will start to taper off the last half of this year, but continue until the fall of 1951.

• **F-94** is just going into production and it will continue throughout 1951. And Lockheed expects more orders.

• **P2V** will continue on Lockheed lines until near the end of 1951, on the strength of Navy orders for 45 more of the long-range search planes.

On top of all that, Lockheed has its XP-90 penetration fighter up for Air Force evaluation tests next month.

► **Deliveries**—Lockheed last year increased its deliveries, even though its dollar sales declined a bit. It shipped 505 planes, compared to 373 the year before. Air Force got bulk of the total, 443, including 6 Constellations. Navy shipments totaled 52, including one Connie. F-80s accounted for about 450.

All this amounted to 35 percent more planes than in the preceding year. But the fact that most of them were F-80s, at a low price, pulled the total sales down, President Gross says.

## NORTH AMERICAN

North American is moving ahead on a contract for 268 T-28 trainers and expects to be in volume production this summer. Meanwhile, NAA's flight test engineering activity—six planes at that stage—indicates good prospects for new business.

Already, North American has orders for 43 B-45 models and 55 AJ-1s. Initial deliveries on the AJ order were part of last year's shipment of 339 planes (AVIATION WEEK, Feb. 6).

## UNITED AIRCRAFT

Possessor of the industry's biggest 1949 profit, United Aircraft Corp. thinks it is due in large part to a bit of sound forecasting five years ago.

Frederick B. Rentschler, board chairman, says:

"Our judgment of five years ago re-

quires no revision today. As we had anticipated, piston engines still power all operational commercial transports as well as all production types of heavy military bombers. In the five years immediately before us, medium and perhaps heavy bombers powered by jet turbines will become operational. It is also likely that jet turbine-powered commercial transports will be put into limited scheduled operation, although we anticipate that piston-engine transports will continue to dominate this field through this second five year period."

► **P&W Outlook**—Total of 1401 J-42 Turbo-Wasps and J-48s have been ordered to date, of which 265 are J-48s. Initial flight tests of two Air Force prototype fighters powered by the J-48, North American F-93 and another (unofficially identified as Lockheed F-94B), "indicate Air Force interest."

Other types of gas turbine powerplants of P&W's own basic design, still classified, include both propeller-turbine and turbojets.

Pratt & Whitney at year's end reached its highest monthly peacetime total of production of aircraft engine horsepower. The R-4360 Wasp Major 3500 hp. engine continues the most important engine of its type in military and commercial aviation, says United. Order for 356 Wasp Majors of advanced and more powerful design (compound version) was received from the Air Force late in 1949. In the same month, the 4000th Wasp Major was delivered, for installation in a Consolidated B-36.

About 75 percent of all airline transports were P&W engines.

► **New Fields for Ham Standard**—Hamilton Standard recently eliminated the word "propellers" from its division name, in anticipation of diversification. Propeller and parts production exceeded that in 1948. In United Aircraft's research wind tunnel, Ham Standard says, it obtained first confirmation of the supersonic propeller concept. But associated vibrational and structural problems remain unsolved.

► **Dallas Deliveries**—Chance Vought at Dallas delivered in 1949 22 of an order of 30 F6U-1s. First of a limited order of F7U-1 Cutlasses was completed in the first quarter of 1950.

Production of the F4U-5N Corsair night fighter continued on schedule. Progress on several pilotless aircraft projects was reported excellent.

► **Sikorsky Record**—Sikorsky had a pilot order for five H-19s, and an initial order from the Army for S52-2 helicopters. It delivered the 200th unit of the S-51 to the Navy in November.

Initial tests in the world's largest privately-owned jet engine laboratory, Willgoos Turbine Laboratory, were conducted early in 1950, and the complete unit is to be in operation by mid-year.



# Modified B-25 Pushed as Trainer

North American claims B-25-J would cost AF one-fifth what it pays for new navigation trainers.

By Alexander McSurely

Backlog of approximately 1400 North American B-25-J twin-engine bombers in usable condition can be called upon if the Air Force buys the proposal of North American Aviation to modify the plane in four versions: as a trainer for pilots, navigators, or radar bombing and as a 10-place personnel transport.

Estimates are that the modification would cost USAF something less than \$100,000 per plane, as compared to around five times that amount for the only new twin-engine trainer the USAF has ordered since the end of World War II—the navigation trainer version of the Convair-Liner.

North American made its pitch for the trainer business last week after months of preliminary discussion, by conducting a demonstration with a prototype modified version of the B-25-J at Washington National Airport for USAF and Navy personnel.

► **Longer Fuselage**—Inspection of the modified plane shows major apparent structural change is lengthened fuselage—from 52 ft. 11 in. to 55 ft. 10½ in. This is accomplished by replacing the original nose section with one approximately 3 ft. longer and about 15 in. wider. Aft of the nose section, fuselage is unchanged except for new windows and a tail cone. Wing and empennage are unchanged, and the demonstration plane used the same Wright R-2600 engines (1700 hp. each) originally specified for the plane.

North American quotes data on the modification for use of six basic powerplants, and a seventh variation of one of the six. These include the Wright R-2600-13 at 1700 hp. (sea level). The Wright R-1820 at 1475 hp. (S.L.), and the following Pratt & Whitney engines: R-2000 at 1450 hp. (S.L.); R-2800-CA-3

at 2400 hp. (wet) (S.L.) and 2100 hp. (dry) at 3000 ft.; R-2800-CA-5 at 2400 hp. (wet) (S.L.) and 2300 hp. (dry) at 600 ft.; R-2180-EL at 1800 hp. (wet) at 2500 ft. and 1650 hp. (dry) at 3000 ft.; R-1830 at 1200 hp. at 4900 ft. (All hp. ratings quoted for takeoff.)

► **Nacelle Changes**—Modernization of power plant installations includes: Removing individual exhaust stacks and replacing with collector ring and single outboard stack; automatic shutoff at firewall for fuel, oil and hydraulic fluid controlled by propeller feathering switch.

Noise level in the cabin has been reduced to around 120 decibels, said to be below that in a DC-3 transport. This has been accomplished by careful soundproofing of the fuselage, using a mica coating on the skin plus a Fiberglas insulation layer, and a layer of balsa wood in the floor. This noise reduction is a major engineering change since the combat B-25 was recognized as one of the noisiest airplanes in World War II.

► **Seating Arrangement**—As a personnel transport, the plane has six seats forward of the wing and four seats (two in tandem and two side by side) in a rear compartment.

Narrow passageway at left of center section connects the two compartments. A bunk with storage space underneath occupies the right side of center section. Under center section floor is a baggage compartment fitted into the former bomb-bay opening. An elevator door closing flush with the bottom of the fuselage can be lowered from the bomb-bay opening by a modified electric bomb hoist, for baggage loading. Door is stabilized with guide tubes at each corner and beefed up to serve as a platform for the luggage.

► **Over 300 Mph.**—Using its original R-2600 engines, the plane has a top

speed of over 300 mph, and service ceiling of 28,500 ft. Top speed of 272 mph. was quoted for the combat version B-25-J, indicating that the new version has been cleaned up considerably aerodynamically in spite of the widening of the nose and the somewhat bulbous plastic nose cap for radio antennas and equipment.

In pilot trainer version the plane seats pilot, co-pilot, instructor and a third student.

► **Radar Bomber**—In a radar-bombing trainer version there is provision for instructor and four students plus pilot and co-pilot. All student stations are completely equipped for radar bombing. Bomb-bay racks would hold nine 100-lb. practice bombs or eight 100-lb. cluster bombs while wing racks support eight 100-lb. practice bombs. At master student station, a radar control box and scope image recording cameras are located, while radar indicators and other instruments are located at three other student stations in aft fuselage.

Navigation trainer version uses same seating arrangement, with student stations equipped for four types of navigation, dead reckoning, celestial, loran and radar, and with additional navigational equipment at the master student station.

► **T-6 Program**—Use of the B-25 in unmodified state for training purposes, and success of North American in its modernization program for the single-engine Texan T-6 trainer, are factors in the campaign North American is conducting for the B-25 trainer modification.

In addition to 720 T-6s which North American has modified or is modifying for USAF, the manufacturer has modernized nearly 200 for foreign nations, running the planes through on an assembly-line basis. Presumably much of the economy in a B-25 modernization program would result from a large enough order to permit a similar assembly line program.

In favor of the modification program is the B-25's World War II record as a dependable, easy-to-fly plane and stable bombing platform.



# Temporary Truce on Air Budget

House group tentatively approves President's 1951 AF and Navy aviation budgets, but hits fund impounding.

Temporary truce between Congress and the Administration over strength of the Nation's air power resulted last week when House Appropriations Committee tentatively approved the President's proposed \$5.2-billion Air Force and \$1.6-billion Naval aviation budgets for the 1951 fiscal year essentially intact.

Slashing \$43,962,000 from administrative and operational outlays, the committee approved a \$5,190,904,000 USAF budget (\$4,580,615,000 cash and \$610,289,000 contract authorization). The Budget Bureau has recommended \$5,234,866,000 (\$4,624,577,000 cash and \$610,289,000 contract authorization). The committee approved \$1,632,862,000 for Naval aviation, making a slight increase (for housing) over the \$1,632,292,000 proposed by the Budget Bureau.

This is the program which the funds would implement:

- **Strength.** Air Force would operate 48 groups (including four obsolescent groups) and 13 separate squadrons, approximately the current year's numerical strength. The Navy would sustain 48 air combat units (9 carrier groups, 12 Marine air squadrons, 20 patrol squadrons, 7 anti-sub warfare squadrons), compared with 75 for the current year (14 carrier groups, 23 Marine squadrons, 30 patrol, and 8 anti-sub squadrons).
- **Procurement.** USAF would procure 1383 aircraft, as against 1250 for the current year; the Navy would procure 817, predominantly jet fighters, compared with 798 procured during the current year.
- **Research and development.** USAF would have \$205 million available, compared with \$210 million during the current year; the Navy would have \$74 million, compared with \$77 million this year.

Developments indicated, however, that the fighting spirit against the Truman-Johnson defense economy program is still strong in Congress:

House Appropriations Committee, in its accompanying report, lashed out against the Administration's reduction in USAF strength from the 58 groups provided for by Congress for this year to 48 groups. "There is no warrant or justification for the thwarting of a major policy of Congress by impounding of funds. If this principle of thwarting the will of Congress by the impounding of funds should be accepted as correct, then Congress would be totally incapable of carrying out its constitutional mandate of providing for the defense of the nation," the committee said.

► **No Executive Cutbacks**—Legislation barring executive cutbacks (over five percent) in defense appropriations until the Secretary of Defense first consults with the House and Senate Appropriations Committees was introduced by Chairman Carl Vinson (D., Ga.) of the House Armed Services Committee. It has the unanimous backing of Vinson's group. Rep. George Mahon (D., Tex.), chairman of the Appropriations Subcommittee of the Armed Services, commented: "All other secretaries have voluntarily consulted with our committee."

Congressmen expressed apprehension over military reports of the country's diminishing air strength. Maj. Gen. F. H. Smith reported that the reduced procurement program now would lead to a tapering off of USAF's striking force to about 34 modern groups in 1955-56. Vice Adm. John H. Cassady testified that at the present procurement level, the Navy's present combatant strength of 6233 operating aircraft (4389 regular, 1844 reserve) would be weakened to 3000 in ten years.

Following are details on 1951 fiscal year funds for USAF approved by the House Committee:

- **Procurement,** \$2,310,289,000 (\$1,700,000,000 cash and \$610,289,000 contract authorization)—with a \$726,151,000 carry-over from this year, the total fund availability will be \$3,036,440,000. Of this, \$1,525,000,000 will go to liquidate existing contracts, and the remaining \$1,511,440,000 will be applied as follows: Aircraft construction, \$1,365,106,708; guided missiles, \$17,000,000; electronics, \$115,000,000; industrial mobilization, \$13,974,392; pay increases, \$358,900.
- **Research and development,** \$182,611,000—with a carry-over of \$22,461,000, impounded by the President this year, there will be a total availability of \$205,072,000. This will be used: \$32,824,000 for research; \$120,729,000 for development; \$12,450,000 for operational engineering; \$35,580,021 for management and operation; and \$488,979 for pay increases. It includes \$35,900,000 for guided missile projects. Both were approved as recommended by the Budget Bureau.
- **Maintenance and operation,** \$1,010,000,000—a reduction of \$31,662,000 in the Budget Bureau's proposed \$1,041,662,000, which the committee said could be met through efficiency measures. USAF will support 235 installations, compared with 248 which were backed this year.

• **Military personnel,** \$1,245,000,000, a reduction of \$9,375,000 in the Budget Bureau's \$1,254,375,000 recommendation for travel, clothing, and subsistence pay. USAF plans a 416,000 strength over the coming year, a slight cutback from the current 417,000.

• **Administration,** \$55,620,000, a reduction of \$2,925,000 in the Budget Bureau's \$58,545,000 figure.

• **Components.** The House Committee approved the Budget Bureau recommendations, as follows: USAF reserve, \$73,235,000; Reserve Officers Training Corps, \$10,600,000; Air National Guard, \$103,935,000.

• **Real Property Construction.** \$25,000,000—the amount recommended by the Budget Bureau. USAF reported that with this allocation it would have a total availability of \$51,445,000 to move forward with its five programs: the radar fence; the long-range guided missile proving ground, in Florida; the Air Engineering Development Center; Alaska housing; and miscellaneous. USAF reported that all but \$1,000,000 of the \$30,000,000 appropriated by Congress for AEDC this year was frozen by the President, and that only \$600,000 has been obligated to date.

The House Committee approved the \$1,095,496,000 (\$620,000,000 cash and \$475,496,000 contract authorization) recommended by the Budget Bureau for Naval aircraft procurement.

With a \$124,797,000 carry-over, the Navy would have a total availability of \$1,220,293,000. Of this, \$530,000,000 would be used to liquidate current contracts, leaving \$690,293,000 for obligation, as follows:

- **Piloted aircraft procurement,** \$633,627,855. (Navy disclosed it contemplates procurement of four \$4,000,000 lighter-than-aircraft.)
- **Pilotless Aircraft,** \$13,000,000.
- **Modernization,** \$26,650,000. \$18,600,000 will be used to equip aircraft for anti-sub warfare, including radar, sonobuoy receivers, magnetic detectors.
- **Technical equipment** for service training, \$1,700,000 (\$518,000 for engines; \$980,000 for electronic equipment; \$193,000 for armament).
- **Ordnance** for new aircraft, \$15,247,000, salary increases, \$68,145.

The \$537,366,000 approved by the House Committee for naval aircraft and facilities was slightly more than the \$536,796,000 recommended by the Budget Bureau.

It includes:

- **Research and development,** \$74,775,685—allocated \$24,753,565 for piloted aircraft; \$12,366,300 for guided missiles; \$14,156,198 for power plants; \$13,098,246 for electronics; \$10,401,367 for supporting programs.
- **Industrial mobilization,** \$4,064,491.

• **Flight operations,** \$62,467,000. This would support 5900 operating aircraft in the regular Navy, 4399 combatant and 1511 logistic support aircraft. This compares with 5598 operating combatant planes this year.

• **Aircraft overhaul,** \$153,264,225.

• **Station operations,** \$101,766,598 to maintain 50 stations, 35 continental and 15 extra-continental. This compares with the current 55—38 continental and 17 extra-continental.

• **Alteration and replacement of facilities,** \$14,266,000.

• **Supporting equipment and services,** \$26,820,231.

• **Naval Reserve.** Flight operations, \$20,573,300; aircraft overhaul, \$43,705,998; and for station operations, \$9,067,367.

• **Administration,** \$3,417,158.

## Potent Punch

Rocket-armed B-36 may revolutionize bomber-fighter tactics.

USAF will test an all-rocket-armed B-36 late this summer which Air Force sources predict will revolutionize present bomber-fighter offense-defense tactics.

Missile, armament and bomber design experts are completing modification plans at USAF headquarters for transmission to Wright Field where actual modification will be made. Plan is to install six turrets of twin rocket launchers—one forward, two top-side,

one each port and starboard, and one in tail.

Present armament consists of 16 20mm. cannon in 8 turrets which are operated by a GE central fire control system.

Tests will directly affect long-considered plan of USAF to replace conventional machine guns with rockets on its fighters assigned to interceptor missions. Conventional .50 caliber weapon is already obsolescent in view of sonic-speed rate of closure of present-day fighters.

► **Rocket Missiles on Bombers**—If tests are successful—and ground development testing has indicated that airborne tests will be—conventional machine guns on the big bomber are scheduled for early replacement by rocket supersonic missiles having a five-mile range and later utilization of a missile with a 30-mile range.

Indications are that the B-36 rocket weapons test will be made using the Hughes missile, MX-904, the only major development in the air-to-air field scheduled for test this year. The Hughes rocket has an estimated gross weight of 75 pounds, including a 10-lb. war-head. The new rocket has a speed of Mach 2.5.

► **Greater Accuracy Needed**—Prime difficulty in missile development is in attaining pin-point accuracy. As a result USAF is concentrating on semi-active radar homing devices. The electronic brain guides the missile to an attacking craft regardless of evasive action taken by the enemy.

Rocket defensive weapons could make the giant B-36 an almost impregnable aerial fortress in that ability of an interceptor to come within range

of the bomber would be negligible. Plan is feasible due to ability of B-36 to carry heavier, longer-range rocket missiles than an attacking interceptor. Rockets will be launched, according to missile experts, at maximum radar sighting or an enemy, track the interceptor at supersonic speed, and exploded within lethal range by means of a proximity fuse.

Despite difficulties in absolute guidance accuracy, radar guidance mechanisms are already far in advance of missile engines and fuels. "Brains" for missiles have been developed and are in test which can guide a rocket with a Mach 2.0 speed with simulated range tests up to 2000 miles. Eventual hope of USAF is to reach an electronic control capacity in the 5000 miles range by 1955.

## AF in Quandary Over Fairchild Successor

General Muir S. Fairchild, 55, Vice-Chief of Staff, USAF, died of a heart attack at his quarters in Washington last week leaving a vacancy in Headquarters Command which will be difficult to fill.

General Fairchild was promoted to four-star rank March 27, 1948, when he was appointed Vice-Chief. When USAF's Air University was opened at Maxwell AFB in 1946, Fairchild was named commanding general of that installation. He remained at that command until advanced to Vice-Chief two years ago.

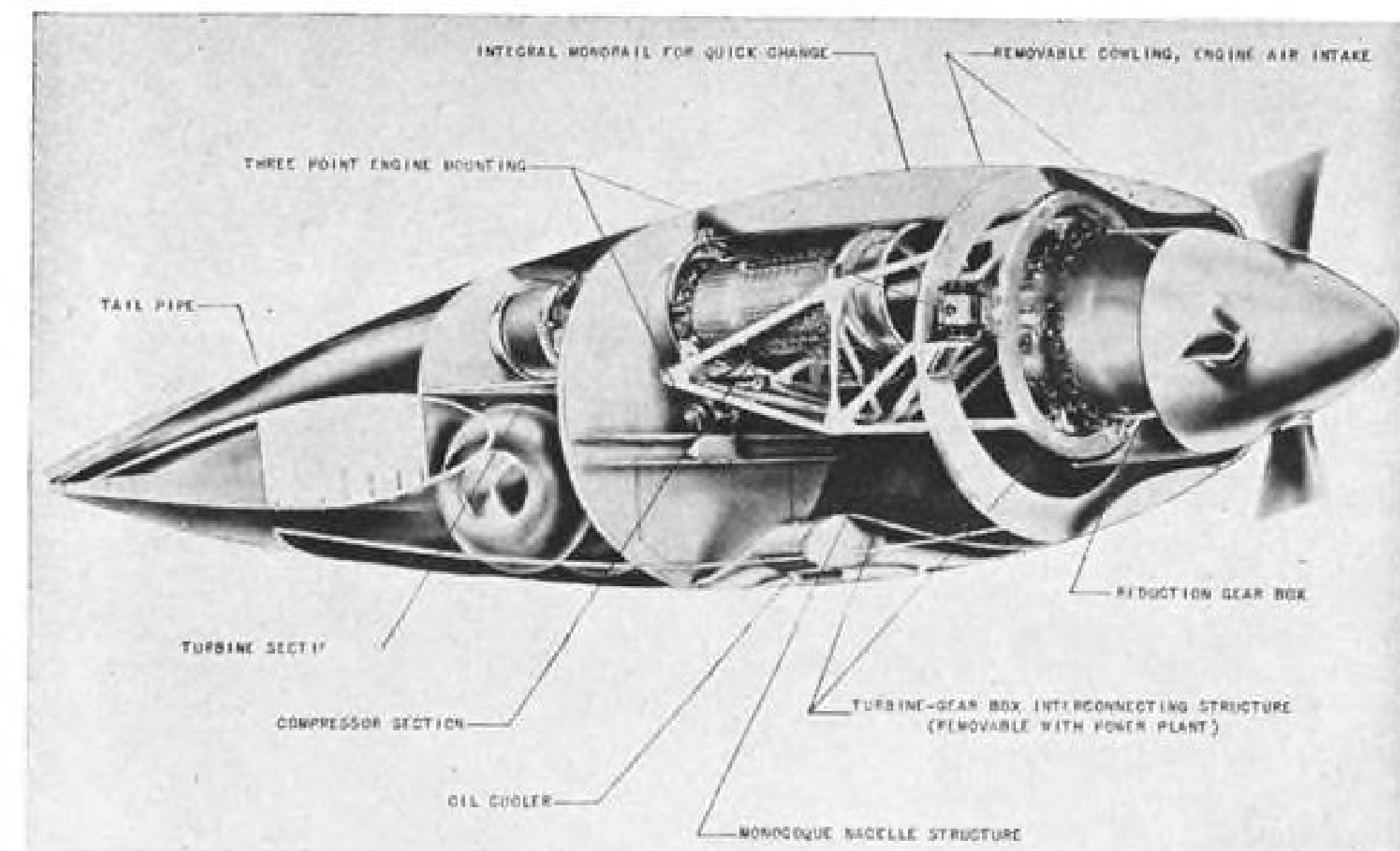
He had organized and directed the university to be what he termed a progressive prewar school instead of a place to hold a post-mortem on World War II.

His death leaves Air Force in a quandary as to who might fill the vital second-in-command executive post. While some observers lean towards Lt. Gen. Lauris Norstad as likely successor, most informed sources believe his youth and lack of top administrative experience will preclude his nomination to that position.

Ranking officer in the Air Force, General Joseph T. McNarney, is now serving as special assistant to Defense Secretary Johnson. Prediction is that McNarney would be a doubtful candidate because post would be a step-down in command hierarchy.

Most likely candidate is Lt. Gen. Nathan F. Twining, due to be replaced in Alaska in June by General Norstad. Actually there are seven generals eligible for the post. These are Lt. Gens. John K. Cannon, Geo. E. Stratmeyer, Ennis C. Whitehead, Kenneth B. Wolfe, Idwal Edwards (now acting Vice-Chief of Staff), Twining and Norstad.

Nomination to the post will not be made for at least 10 days.



### TURBO-LINER NACELLE

Cutaway sketch shows installation of the Allison T-38 turboprop engine rated at 2750 hp. as it will appear in the Convair-Liner which General Motors has purchased as a flying test bed, dubbed the "Turbo-Liner."

Advantages of the installation in permitting cleaner nacelle and resultant decreased drag, are expected to give additional speed gains for the airplane above that resulting from the gain in power.



## SALES & SERVICE

### Insurance Plan for Fixed-Basers

Arrangements by Americo with NATA and AOPA are expected to cover 2000 operators, 10,000 planes.

Arrangements under which aviation insurance coverage will be provided to members of two aviation groups, the fixed-base operators who are members of National Aviation Trades Assn. and the members of Aircraft Owners and Pilots Assn. are being finalized by the American Mercury Insurance Co. (Americo), Washington, D. C.

G. C. Whalen, Americo president, foresees a potential of covering approximately 2000 operators in NATA and coverage on approximately 10,000 planes in AOPA.

Coverage of the NATA members according to a plan completed by Americo, NATA, and National Insurance Underwriters, St. Louis (AVIATION WEEK Jan. 16) is expected to be split between NIU and Americo on a geographical basis. Americo will handle East and West Coast states, and NIU will have the middle section of the U. S. More specifically, Americo will cover Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, West Virginia, California, Washington, Oregon, Arizona, Nevada, Idaho, Utah and District of Columbia; NIU takes the rest of the country.

► **Experience Rating**—Operators' coverage will be on an individual experience plan subject to individual inspection of the airport operation, for final determination of the rate quoted. Whalen expects to write insurance on an hourly basis for larger operators, if business warrants it.

Typical of the type of business Americo expects to write in the operators' field, was the company's trial experience with 100 operators in the calendar year of 1949, with an average premium paid of \$1400. Loss ratio for these operators was "satisfactory" for the company, Whalen said.

► **Reinsurance**—Coverage will include fire, theft, windstorm and liability. Whalen expects to reinsure to protect his company against liability or property loss above \$5000 on any one claim and over \$15,000 maximum loss on a catastrophe such as a major fire, tornado, etc.

A four-page inspection report form

which is used in examining an operation to determine how it shall be rated, classifies such items as aircraft, maintenance practices, flight supervision, charter operations, pilots and instructors employed, aircraft rental practices, physical hazards, fire protection, construction of buildings, airport layout, including fencing and spectator control, fueling facilities, rescue equipment, employee morale, reputation and experience of management, caliber of bookkeeping and records, whether operation will continue after GI flight training program is finished, etc.

► **AOPA Contract**—AOPA's contract with Americo provides that the insurance company will provide "the broadest coverage obtainable at a substantial discount from normal rates." Whalen stated that his company "intends to maintain" its rate differential below normal rates in the event that other companies adopt his Jan. 1, 1950, published rates.

Typical of Americo rate "indications" for AOPA members are:

• **Aircraft hull.** Rate of \$3.70 per \$100 of insured value for ground coverage only on a basis of 50-59 percent of the manufacturer's list price, for a plane with list price under \$4000.

• **Aircraft liability.** \$12 premium for \$5000-\$10,000 coverage for bodily injury liability excluding passengers; \$15 premium for \$5000 limit property damage liability; \$28 premium for \$5000 passenger bodily injury liability (1 seat); \$5 premium for \$500 medical payment liability for pilot, and \$4 premium for similar liability for each passenger.

For aircraft over \$15 thousand value and for multi-engine aircraft, owners are asked to complete application forms and submit them for rate quotations.

► **Non-Owners**—Liability insurance for non-aircraft owners, for planes which they may fly but do not own, will be provided for bodily injury liability, property damage and passenger liability, at rates 75 percent of those quoted for planes owned.

Americo is a new insurance company, but its president has been active in aviation insurance for many years, and operates his own Beech Bonanza.

His new relationship with AOPA, follows a previous contract arrangement with the pilots and owners group under

which Lloyds of London was the insuring agency in an arrangement made by Whalen.

### BRIEFING FOR DEALERS AND DISTRIBUTORS

► **AIRPORTS RATED**—Of the nation's 6200 civil fields, only 11.5 percent are rated "above average" or "superior" by AOPA members in the recently completed 1949 rating period. California, ranking second in number of airports, had the largest number of rated airports. Rating system is based entirely on reports received from members during the year.

► **COPTER UTILITY**—In only four minutes, a Murrayair, Ltd., pilot and copter placed 2000 ft. of guide cable during a rural power line installation by Hawaiian Electric Co., Honolulu. Operation is said to take a six-man ground crew about two hours.

► **AIR MARKER AID**—Worth of air markers can be attested to by two Air National Guard fighter pilots who were unable to get into Logan Airport, Boston, because of snow and only had 15 min. gas supply left. They spotted a community marker which guided them to a 2500-ft. landing area at Revere, Mass.

► **MUST READING**—Approaching spring good flying weather also means extreme atmosphere instability making for frequent thunderstorms and tornadoes, and pilots and operators would be advised to brush up on their weather knowledge. Good material on these unfavorable weather phenomena is found in CAA Bulletin No. 25 titled "Meteorology for Pilots," written by B. C. Haynes, U. S. Weather Bureau.

► **NEW FLOTTORP PROP**—A controllable-pitch prop in 65-85-hp. range selling for as low as \$249.50 is being produced and marketed by Flottorp Mfg. Co., Grand Rapids, Mich. Of Beech-Roby design, the new prop has plastic-coated blades and stainless steel leading edges.

► **WIN A PRIZE**—Aeromatic Propeller Div., Koppers Co., has opened a jingle contest for its dealers and distributors. They are being asked to submit ideas on upping Aeromatic sales and to complete the following jingle:

There was a young pilot named Hugh,  
Who bought a plane—made of bamboo,  
How his girl did snicker,  
At a plane made of wicker,

.....!

First prize is a year's subscription to Esquire, second prize a year's subscription to Look, and five prizes of a year's subscription to Coronet.

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# Stretch-wrap formed in just *ONE-TWO-THREE*



## INTER DUCT NACELLE SKIN

Formerly made of 24 SQ, now formed two at a time of 24 ST on a Hufford. Eliminated excessive breakage, heat treatment, refrigeration and straightening of parts.

## INTER SCOOP DUCT SKIN

Hufford process reduced breakage from 35% to 1% besides eliminating crown roll.

## FUSELAGE FRAME

Formerly made of two "Z" sections welded together, this 1/2 hard stainless steel frame is now stretch-wrap formed in one operation from a brake formed hat section.

## TAIL PIPE SHELL FAIRING

Formerly required 3 operations to complete this part—20 minutes stretching plus two operations on a drop hammer. Part is now stretch-wrap formed on a Hufford in 45 seconds.

## PILOT'S CANOPY FILLET

One hour's time employing both drop hammer and power hammer for completion of this part was reduced to three minutes on a Hufford stretch-wrap forming machine.

## THE HUFFORD STRETCH-WRAP FORMING PROCESS

It is quick, accurate, efficient. Both sheets and extrusions are handled with equal ease—usually on the same machine. The process uniformly stresses the material, raises yield and often ultimate strength of the finished part.

Stretch-wrap forming saves time and needless expense by eliminating many second operations such as straightening, planishing, heat treating, refrigerating, crown rolls and drop hammer work.

It allows for greater versatility of tooling—enables formation of oddly shaped parts—even permits forming two parts of suitable design simultaneously.

With Hufford, there's less wastage of stock—breakage is almost nil. Costs are further lowered by overall time savers—machines are quick to set up—no fussing with experimental die locations; machines operate at high production rates, almost totally eliminate need for hand labor, thus reduce fitting and assembly man-hours.

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## AERONAUTICAL ENGINEERING

### What Is Actual Value of Service Testing?

Students of question say that one way to find out is use of probabilities methods of evaluation.

"What does service testing prove?" That is currently one of the most hotly debated questions in aviation. The answers range all the way from "everything" to "nothing," with the preponderance of technical opinion on the latter.

Data as are available are of such a random nature as to be largely inadmissible in the debate. Yet many of the costly conclusions now gaining support are based entirely on such data. If such a debate could be confined to the realm of harmless speculation, its heat could be contained; unfortunately, however, its outcome has vital economic consequences to all concerned and these have attained such proportions as to demand an immediate answer.

► **Military Practice**—The first question to be answered is: "What has been the experience to date on the usefulness of aircraft service testing?" Methods used by the military services vary widely from those used in civil aviation.

Service testing is a large and separate branch of the aircraft procurement function in the Air Force. The Air Force normally places an initial order with the manufacturer for a service test quantity of aircraft, usually 13, built and flown wholly for service test purposes. This test program will accumulate about 25,000 hours of flight time on the group, will require more than a year, and will cost about \$5 million.

Assuredly, on the basis of these figures, this approach to the problem is infeasible for the commercial aircraft, both as to the expenditure and as to the time involved.

► **Manufacturer, Airline**—On the commercial side, the aircraft manufacturer accumulates 300-500 hours of flight time on his prototype at his own expense. This flying is basically in the interest of performance, stability and control determination, but the fact that it is an accumulation of flight time on the airplane makes it inseparable from service testing.

The regional office of the Civil Aeronautics Administration then subjects the airplane to 75-150 hours of flight time to determine if its performance, stability and control meet airworthiness requirements.

The airplane is then subjected to the currently required 150-hour CAA "accelerated service test," but all flight time to this stage of the program has been financed by the manufacturer.

The plane then is turned over to the purchasing airline, which is required to operate it on a 100-hour proving run over each route it is planned to operate the plane. This testing is supervised by the Air Carrier Operations Division of the CAA.

In addition to this required flight time, the manufacturer will usually have flown the airplane an additional 100 hours on demonstration flights for other customers, tests of changes and modifications developed by the ensuing program, sales tours, etc.

Thus, a new transport airplane has received 800 to 1000 hours of service testing by the time the first airline passenger steps aboard.

► **How Opinions Differ**—And yet what has this 1000 hours of testing proved? Three major postwar transport aircraft have been grounded at tremendous cost because of fatal crashes, although each of them had been tested for thousands of flight hours (including time in passenger service) prior to the accident. It is on the basis of this evidence that participants in the debate insist that service testing proves nothing.

The solution proposed immediately following these accidents invariably was: "Subject new aircraft to longer and more rigorous test periods before certifying them for passenger carrying."

But is this the answer? Many engineers say no, and hold that even an unusually high number of test hours does not insure against a sudden failure in the next hour. All agree that service testing is required, none agree that even an huge accumulation of time is absolute proof of safety.

The solution to the problem, obviously, is to determine the true limitations of service testing and thus place its value in accurate perspective.

► **Question Posed**—In the case of commercial aircraft, its value must be determined in economic terms, by definition. That this concept treads dangerously close to placing a dollars-and-cents value on human life is unavoidable,

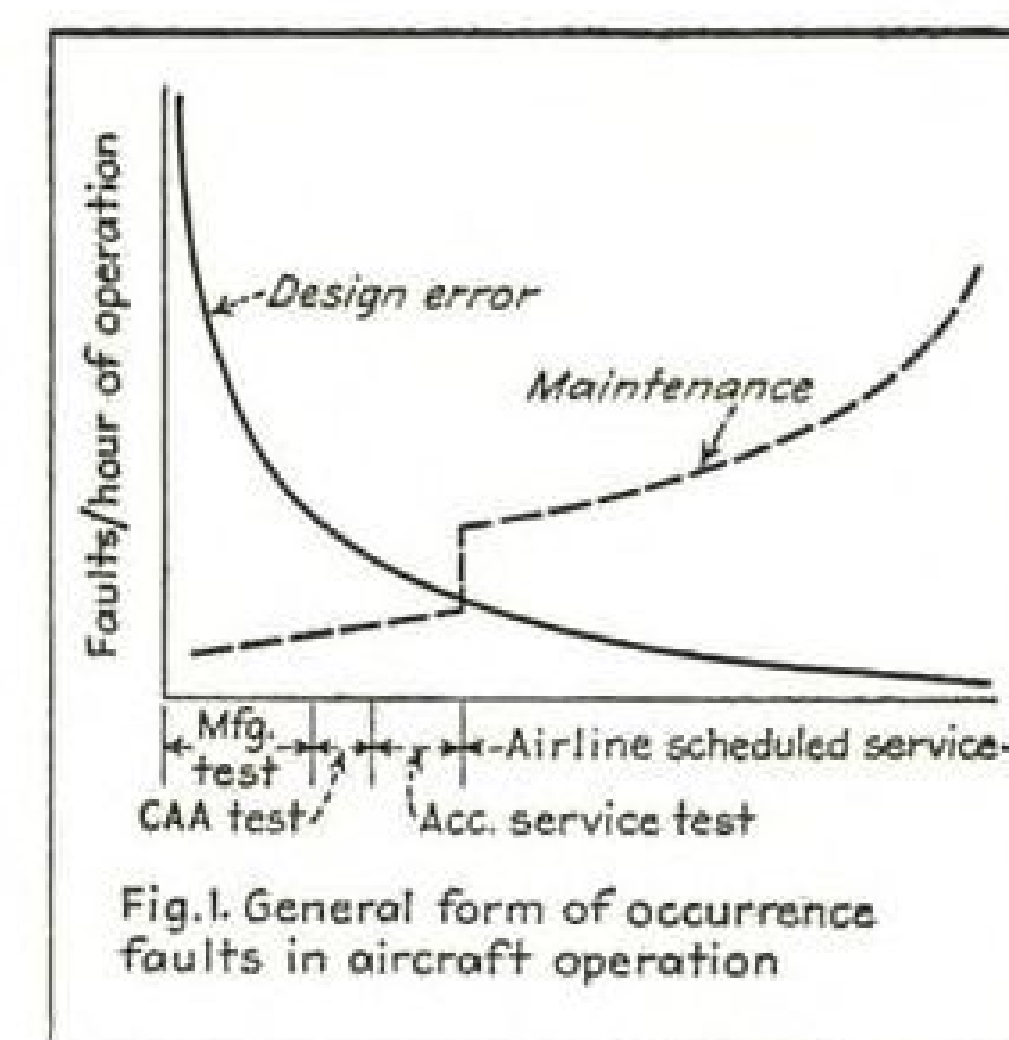


Fig. 1. General form of occurrence faults in aircraft operation

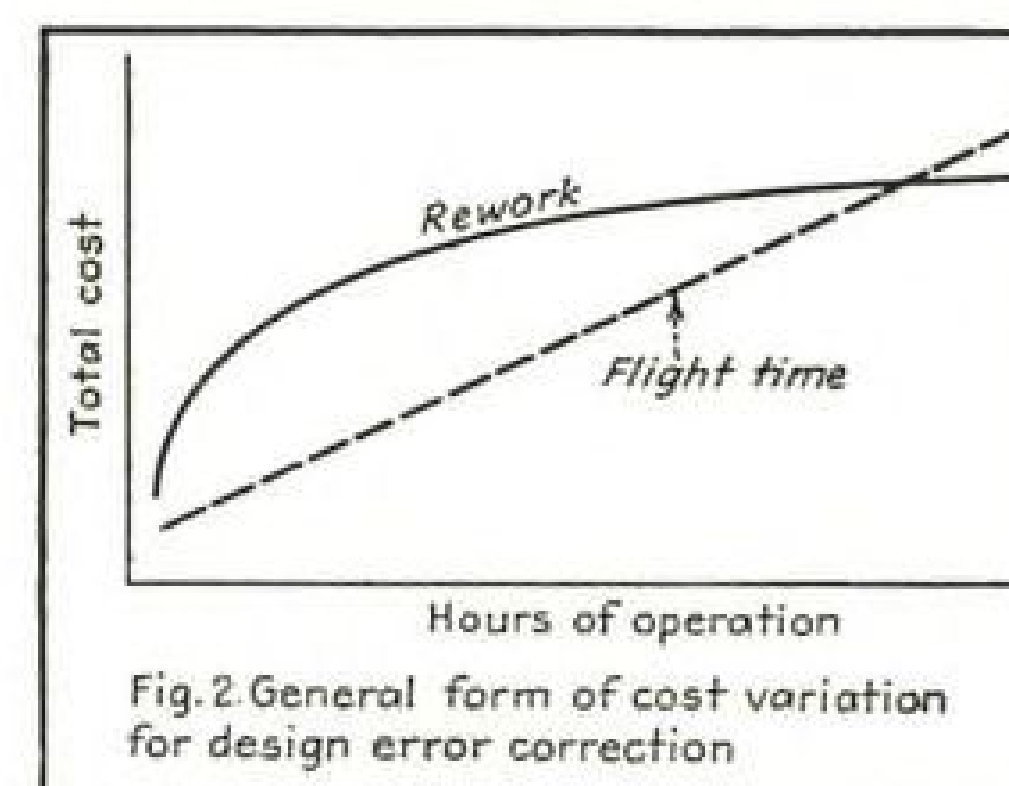


Fig. 2. General form of cost variation for design error correction

for the moral obligation involved does not admit to selection of any rational units. The question, then, can be rephrased: "At what point in aircraft service testing does its cost begin to outweigh its results?"

If that point can be determined with reasonable accuracy, then the optimum number of service test hours will be conveniently defined.

► **Faults**—We will first define, by the word "fault," all of the things that can go wrong, ranging from a simple "blown" fuse to complete destruction of the airplane in a crash. This definition obviously excludes the pilot's judgment, in which major errors completely invalidate all technically derived conclusions.

Broadly, there are two types of aircraft faults—design errors; and malfunctions of equipment, generally defined under the term "maintenance".

► **Curve Representation**—Fig. 1 presents the general form curve for the variation of these two types of fault with hours of airplane operation. No accuracy whatever is claimed for the curves shown; they are intended to show only the general relationship.



No claim is made as to the relative positions of the two curves; each may be lower or higher, depending upon the airplane in question.

It is the sense of Fig. 1 that faults due to design error and faults due to maintenance follow opposite trends.

► **Design Errors**—It is seen that design errors are manifest immediately upon beginning of flight test and, as these are progressively corrected, diminish rapidly until they approach zero. It follows that the greatest number of these are detected during the manufacturer's initial flight test of the airplane, the second greatest number during the CAA flight test, the third greatest by the accelerated service test and fourth greatest by the airline proving run test. After its entry into passenger service, the airplane develops a decreasing number of design errors until virtually none are uncovered.

This curve does not purport to reflect the relative consequence of various errors, since this is manifestly impossible. None can say whether mislocation of a fuel tank vent forward of a heater air intake involves more serious consequence than use of a stepped wedge fitting between outer wing panel and center section. The ordinate is simply the faults developed per unit time.

► **Costs Considered**—Turning now to Fig. 2, we attempt to express the relationship in Fig. 1 in economic terms by breaking down the cost of faults into its two components—cost of operating the airplane during the test and the cost of correcting the design errors.

It is seen that the most rapid expenditure for correcting design errors is at the initial stage of flight testing. This follows from the more frequent occurrence of design errors in the initial flight test stage, as shown in Fig. 1, and, in addition, the general experience that the major, hence the most costly, errors are discovered first. The curve of flight time cost to develop these errors, is, of course, assumed a straight line. It will be remembered that the ordinate in Fig. 2 is total cost and not a rate.

This figure indicates that at some flight time the cost of merely flying the airplane in an attempt to discover design errors equals and then exceeds the cost of correcting the error. This chart is not only useful for determining this point but permits some arbitrary percentage of errors to be computed.

For example, the number of flight hours required to detect 90 percent, 75 percent or 50 percent of expected engineering errors can be determined readily by a horizontal line located at the desired percentage point on the ordinate and its intersection with the curved line.

► **Maintenance Factor**—Fig. 3 is a pres-

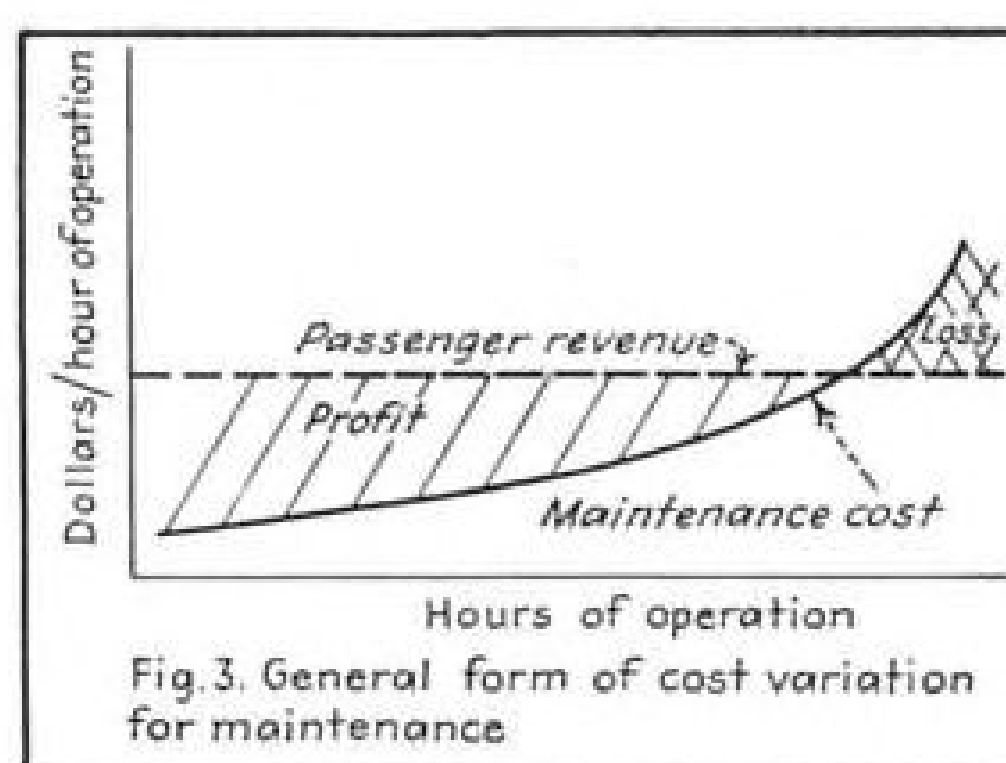


Fig. 3. General form of cost variation for maintenance

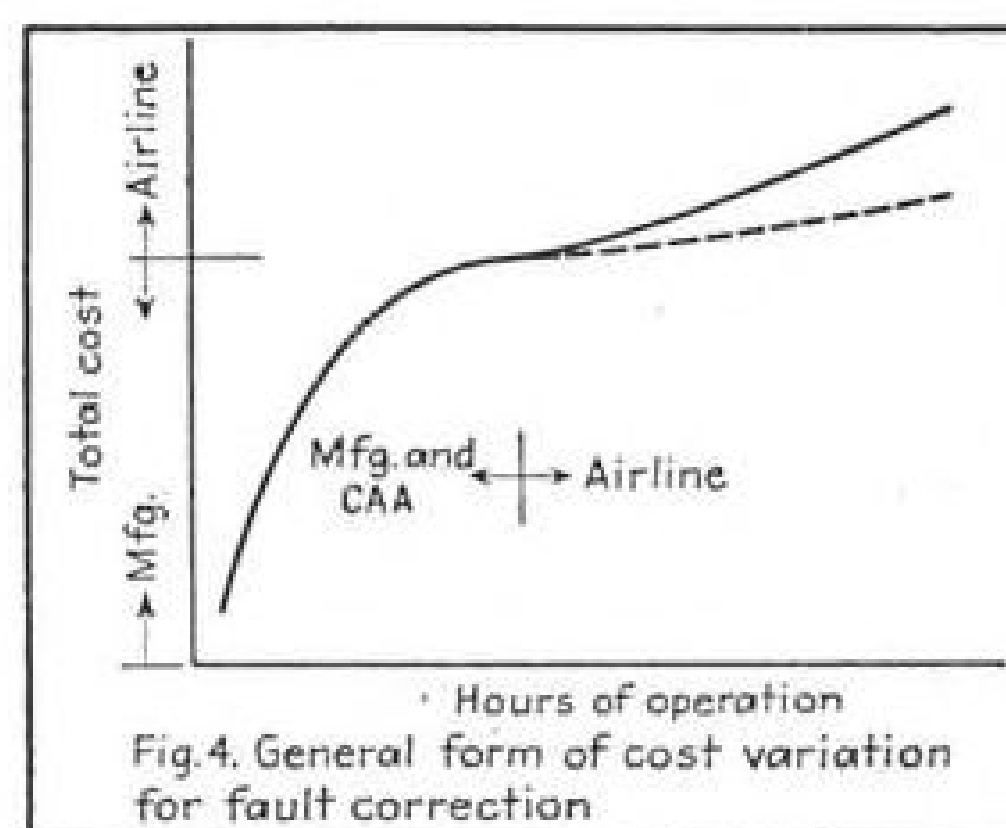


Fig. 4. General form of cost variation for fault correction

entation of the maintenance side of the picture. The abscissa, again, is hours of operation and the ordinate is rate in dollars. The dashed horizontal line represents the idealized revenue per unit, such as passenger-miles, airplane miles, airplane hours, etc.

The two plots intersect at some number of hours of operation at which the cost of maintenance just equals the revenue from operation of the airplane. The area between the two curves to the left of this intersection indicates profit, that to the right indicates loss. Obviously, at the time these two curves intersect, operation of the airplane will no longer be profitable.

It is the purpose of Fig. 3 to show that maintenance difficulties are inherently an economic function and that when they approach operating revenue the airplane is automatically retired because of economic considerations alone and without necessity for regulation.

This study, then, would tend to eliminate maintenance difficulties as a logical target for service test and remove the problem of their discovery from consideration as a service test function. This does not mean that their discovery is not an important function of service tests but indicates that they need not be subject to service test regulation by the government, since they are automatically handled by airline economic considerations.

► **Total Cost**—Total cost required to develop and eliminate faults in a new transport plane is shown in Fig. 4, a plot of the combined cost of flight time, the correction of design errors and maintenance.

This figure shows that the cost climbs precipitously in the early stages of testing, levels out for a period of flight hours, then begins to climb again. The level portion is that area in operations when design errors have been reduced to the level of maintenance, so that the latter becomes of more important economic concern than the former. To the right of this point maintenance causes the curve to climb upwards until the airplane is retired.

This figure can also be interpreted to show that the rate of expenditure for fault discovery and correction drops to a minimum at the point indicated by the level portion of the curve.

► **Cost Divisions**—Fig. 4 also is used to indicate the respective regions of responsibility of the manufacturer and the CAA on the one hand, and the air carrier on the other. It would appear that it was the responsibility of the first group to reduce the cost of developing and correcting design errors to the level of daily maintenance costs and that at this point their joint responsibility ends, both economically and from safety considerations.

The graph can also indicate the limit to which the manufacturer can reasonably be expected to go in absorbing the cost of fault discovery and correction. It is clear that the carrier's expenses do not start until the level part occurs.

Furthermore, the manufacturer's costs have been pure out-of-pocket expenses, whereas that flying to the right of the level portion of the curve is that done by the airline in carrying revenue passengers. The dotted line indicates the maintenance cost minus flight time costs, which are not chargeable to fault discovery, since the airplane is being flown in regular operation.

► **Analysis Possible**—It is the purpose of the foregoing to indicate that there exists methods for the rational analysis of the service test problem and that the various considerations, particularly those dealing with the manufacturer's responsibility, can be delineated.

It further indicates that the results to be expected from a given quantity of service test time can be predicted with reasonable accuracy. Generally, it is not necessary to know whether or not all of the "bugs" have been worked out of an airplane or to determine the amount of service testing required to accomplish that end.

All that is required is a means of determining what percentage of "bugs" a certain amount of service testing can reasonably be expected to work out.

It remains now to develop data by which the ordinates and abscissae of the accompanying charts can be expressed in numerical, and therefore useful, form. Jerome Lederer, aeronautical engineer and director of Flight Safety

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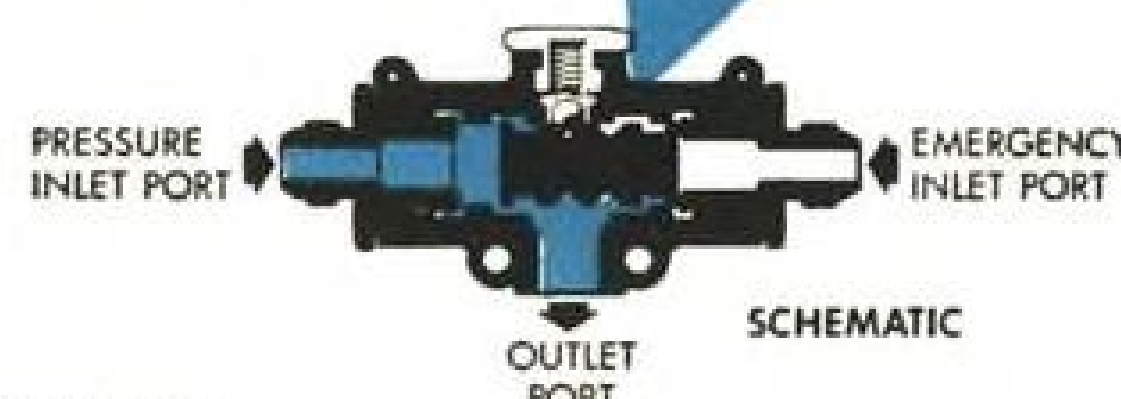
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## Poisson's Distribution

Each of the probabilities of the various faults to be considered are multiplied together to obtain an overall probability of occurrence. The mean of this distribution,  $m$ , is then inserted in the following function:

$$(e^{-m}) \left( 1 + m + \frac{m^2}{2!} + \frac{m^3}{3!} + \frac{m^n}{n!} \right)$$

The results obtained from this computation give Poisson's exponential series.

Foundation, has suggested that there are dependable means of accomplishing this job.

It is his opinion that aircraft "bugs" occur as random events and not within the laws of probability. If the latter is true, the problem would be greatly simplified and the familiar binomial distribution of "bugs" could be used to predict the frequency of their occurrence.

► **Poisson's Distribution**—Lederer suggests, however, that use can be made of Poisson's exponential function for solution of the problem (see box). This is simply a special form of the binomial distribution to include a prescribed random distribution. This function is widely used in solving problems relating to the occurrence of random events.

It is currently being used in England in studying the incidence of air traffic at airports. It is also being used in the U. S. in studies of industrial accidents to determine insurance rates. Ivar C. Peterson, head of the AIA technical service, has suggested that data available from the Daily Mechanical Defects Reports of the airlines to the CAA can be used to determine the probabilities inserted in Poisson's formula.

The processing of these data is a simple computing job, but what is required is a study of the applicability of these methods to the problem.

Several manufacturers plainly have stated that they cannot afford further extensions of service test time as is strongly desired by the CAA. Because of the absence of these required data, the CAA, the Air Line Pilots Assn. and some airlines strongly urge additional service test time requirements in the conviction that this is the only reliable path uncovering a greater proportion of "bugs" in a new plane.

It is believed by many engineers that the availability of probability data combined with considerations of the economics of the problem will provide a more rational approach to the problem of aircraft service testing.



# The Birdmen's Perch

**Famous last words:** "I won't stall out, I've got too much air speed!"



You won't hear a crack like that from Air Force or Navy trained flyers, because they know you *can* stall at high speeds.

But—there are still plenty of lightplane pilots who figure that the phenomenon is restricted to high-speed planes.

Actually, you can hit a high-speed stall in any plane. This maneuver is seldom demonstrated in civilian flying because it's plenty rough on both plane and pilot.

**Always remember:** at a given air speed, you can curve the flight path of a given plane only so sharply. Try to exceed your plane's limitations and—tut-tut, such a promising pilot, too!

## AND NOW...

Leave us have a moment of silence for those embattled pilots who haven't yet

discovered the wonders of Gulfpride Aviation Oil—Series D!

Listen—you can hear the laborings of their tired engines on the way to overhauls.

What a pity some pilots don't know that Gulfpride Aviation Oil—Series D—is the world's finest detergent dispersant oil for horizontally opposed engines. It's the only aviation oil put through Gulf's exclusive Alchlor Process to remove extra carbon and sludge formers.

How sad these same pilots don't realize that Gulfpride Aviation Oil—Series D—could increase their periods between overhauls up to 100%!

Pass the crying towel, Maggie.



## LITTLE KNOWN FACTS DEPT.

Ah—but there's good news at LaGuardia tonight! If the lights burn a little later than usual, if a few scheduled flights fail to materialize, blame it all on A. P. Magner, Asst. Chief Dispatcher for Pan Am.

For his L.K.F. (with proof, mind you), this august personage has earned the most honorable Commission of Perch Pilot (br)—"bottom rung," that is.

Now, A. P., if you'll just forget your

ecstasy for a minute and come down from the chandelier, we'll make with your L.K.F.A.W.K.P. (For youse guys what



can read: Little Known Facts About Well Known Planes.)

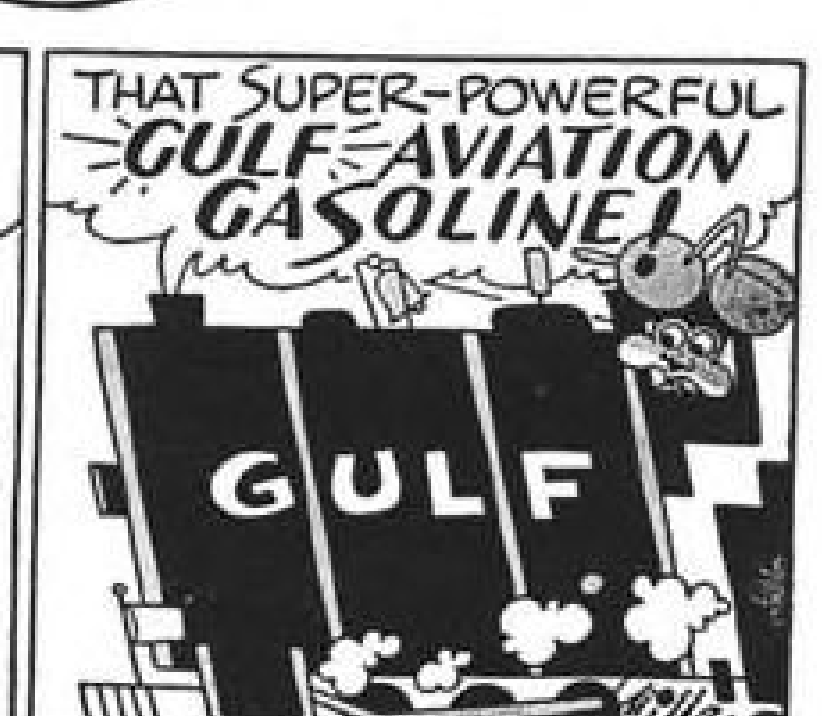
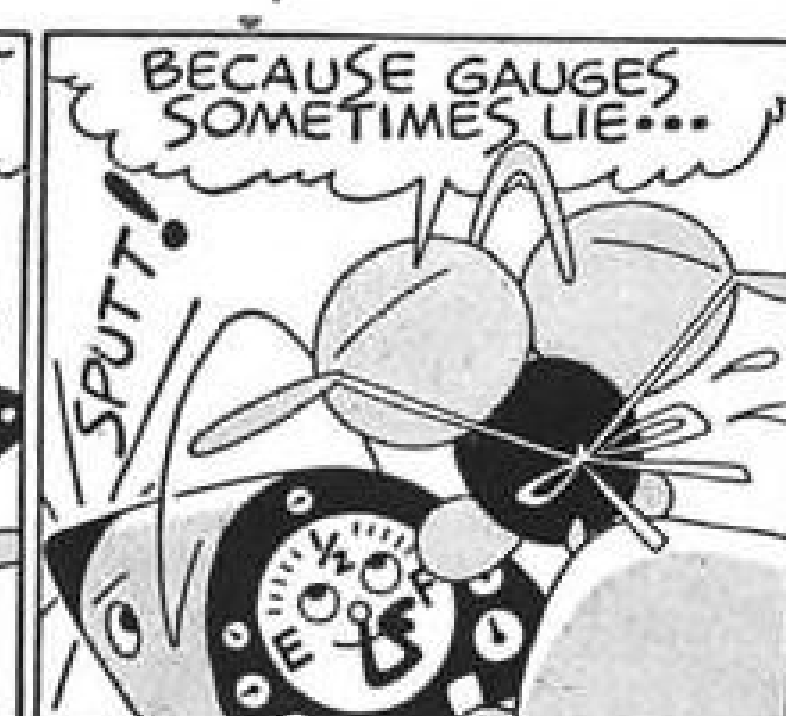
"Due to fuel consumption, the Boeing Stratocruiser loses weight in flight at a rate equal to one adult passenger disembarking every 3 minutes."

Your Commission is en route, A. P., trot out the gilt-edge frame.

Hey, you, the guy weeping in his beer...

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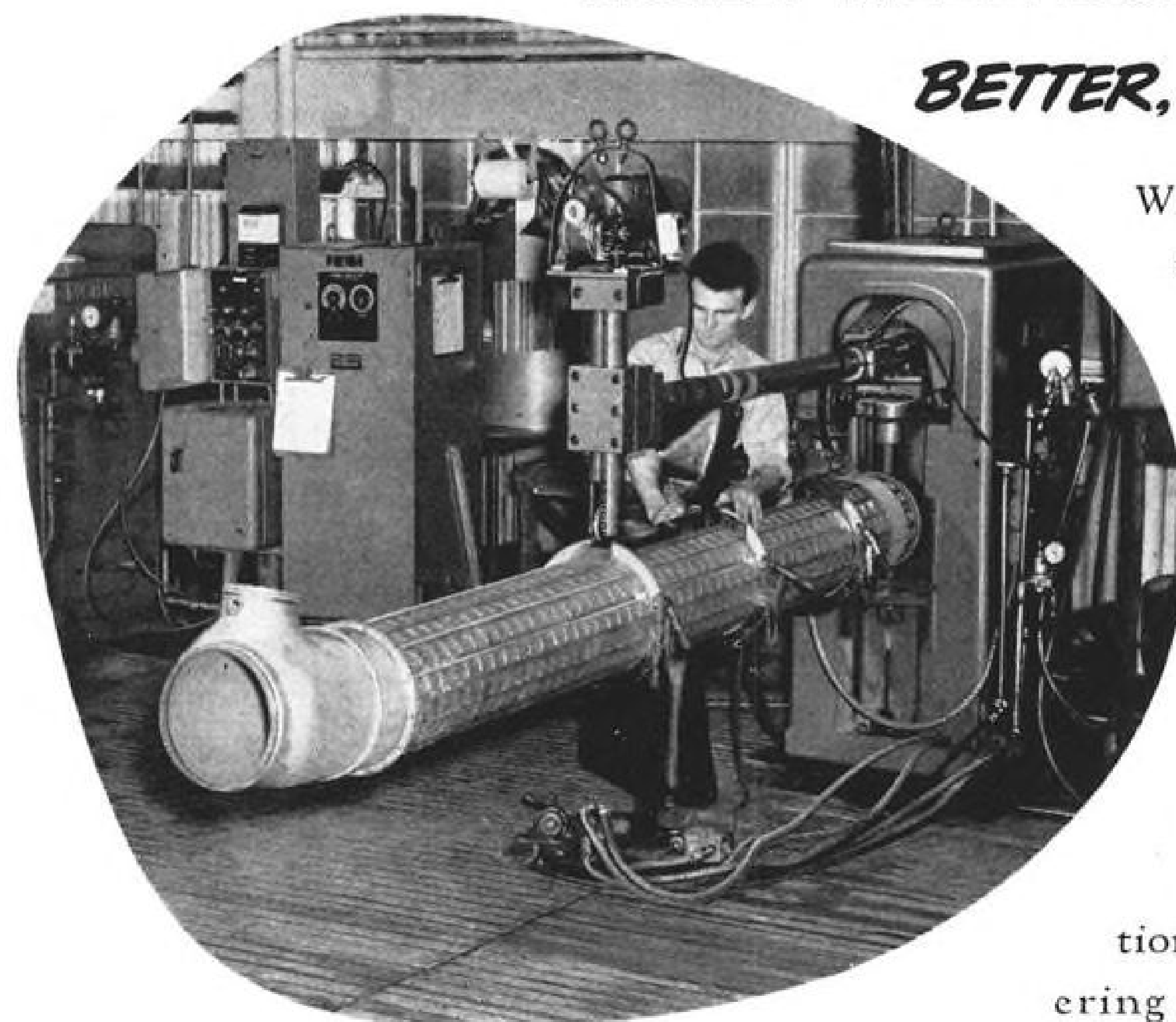
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# ROHR

**ROHR**

Illustration: SEAM WELDER built especially by ROHR to handle tubular assemblies of high temperature alloys up to 120 inches long.

AIRCRAFT CORPORATION

In Chula Vista, California ... 9 miles from San Diego

## Soil Quick-Hardened Into Landing Strip

Recent development of a new chemical process for the stabilization of soil may permit, in the event of war, more rapid advance and better deployment of Air Force groups in combat theaters than was possible in World War II.

With this process, an ocean beach or some soupy, muddy area can be converted into an adequate landing strip in less than a day. Soil containing as much as 30 percent water by weight can be given a tough, rubbery surface suitable for landing operations within five hours after treatment.

► **Soil Locked**—Developed at Massachusetts Institute of Technology under sponsorship of Engineer Research and Development Laboratory, Fort Belvoir, Va., the process uses calcium acrylate, a chemical absorbed by soil particles.

Two other compounds employed are sodium thiosulfate and ammonium persulfate. These last cause the calcium acrylate molecules to lock together, so that, in effect, the soil particles are joined as the "innocent bystanders" in a fast chemical reaction.

► **Strength Data**—Tensile strength of the soil five hours after treatment is from 5-10 psi. If the surface is allowed to dry for a week, this may increase to 500 psi., with accompanying loss in elasticity. But rewetting the soil returns it to elastic and tensile strength conditions that existed five hours after treatment.

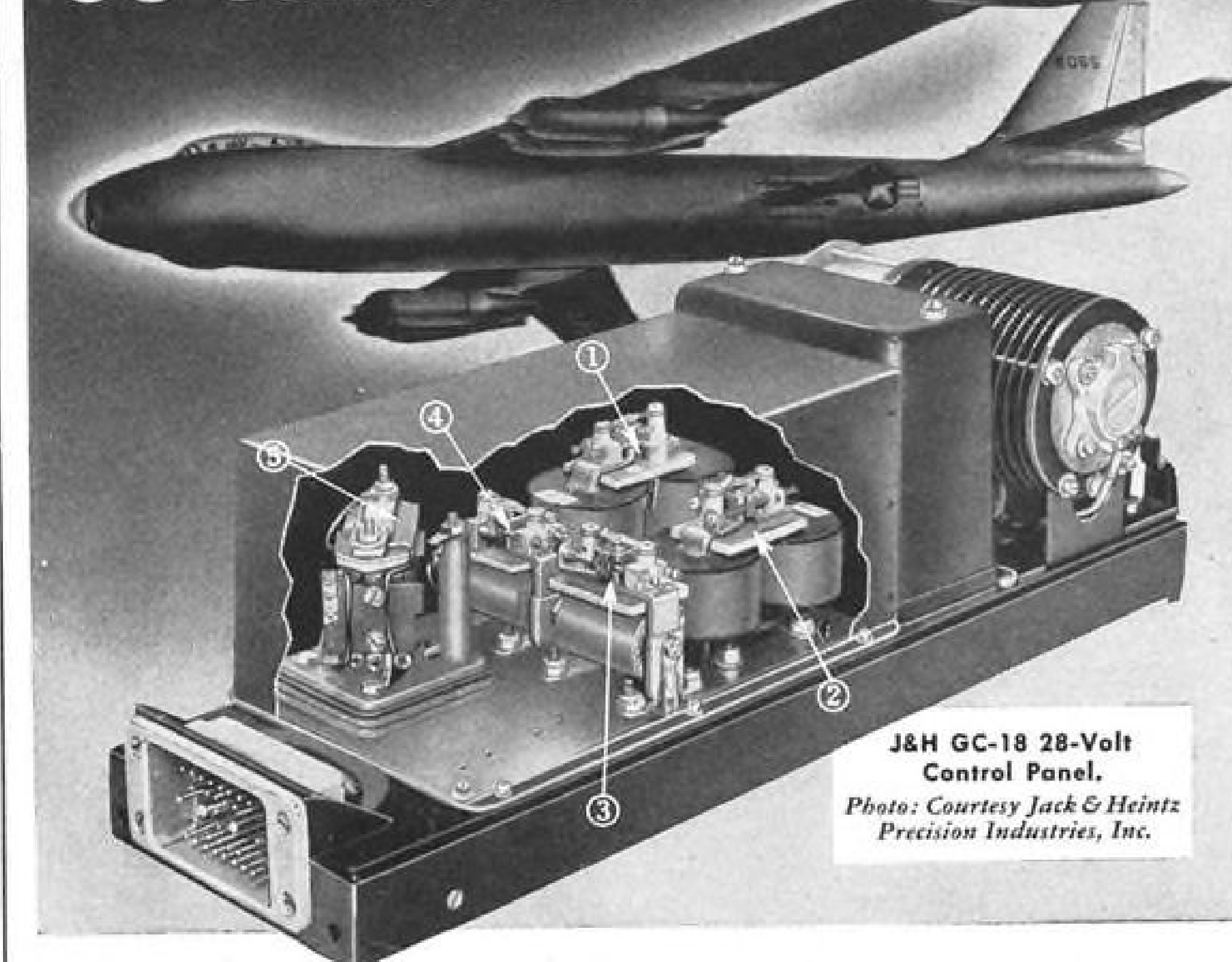
In recent MIT tests, a 3-in.-thick soil block withstood, without noticeable indentation, the weight of a car moving over it 24 hr. after treatment. A 16-lb. steel ball dropped from a height of 7 ft. rebounded about 6 in. without damage to the test section.

► **Cost High**—MIT is optimistic that current tests now being conducted will prove that the process is suitable for use under unusual high and low temperature conditions. Present costs of the chemicals are said to be high, but it is believed that mass production of these products would lower their cost to a reasonable level.

The development project was guided by an MIT steering committee, and administered directly by Professor John B. Wilbur, head of the MIT's civil engineering department.

Besides Wilbur, other members of the steering committee were: Dr. Harold C. Weber, professor of chemical engineering and chairman of the committee; Dr. Ernst A. Hauser, also professor of chemical engineering, in charge of all chemical work on the project; Dr. T. William Lambe, assistant professor of soil mechanics and executive officer of the project; Donald W. Taylor, associ-

## 36 HARTMAN RELAYS PROTECT BOEING'S B-47 BOMBER



J&H GC-18 28-Volt Control Panel.  
Photo: Courtesy Jack & Heintz Precision Industries, Inc.

Mindful of the lightweight efficiency and trouble-free performance of Hartman reverse current cutouts and other d-c devices in military and civil aircraft, Jack & Heintz called on Hartman to supply vital

relays for the J&H GC-18 control panel installed in the Stratojet.

Each of the aircraft's six generators is protected and regulated by an individual GC-18 control panel equipped with five Hartman relays:

- (1) **Differential-Voltage and Reverse-Current Relay**—Connects generator to bus when generator voltage exceeds battery voltage; disconnects generator from bus upon reversal of current.
- (2) **Ground Fault Relay**—Senses ground fault; when fault exceeds set value, relay de-energizes generator.
- (3) **Overvoltage Selector Relay**—Senses load current to detect generator producing overvoltage and automatically sets its overvoltage relay to trip at lower voltage than other five relays.
- (4) **Equalizer Relay**—Disconnects regulator equalizing circuit from equalizer bus to avoid pulling system voltage down when generator is inoperative.
- (5) **Overvoltage Relay**—Senses overvoltage and cuts out generator. Relay has inverse time characteristics to prevent nuisance trips.
- (6) **Contactor and Dropout Relay (Not Shown)**—Located in fuselage near main bus, six of these compact units, each controlled by a GC-18 panel, connect and disconnect generators from bus during both starting and generating conditions.

Typical of Hartman design and manufacture, relays in the B-47 are just a few of the many d-c devices engineered for the aircraft industry. Whenever your problem involves d-c controls, turn it over to Hartman

where it will receive prompt attention ... where it will be analyzed and engineered with an efficiency that comes from nearly half a century of specialization.

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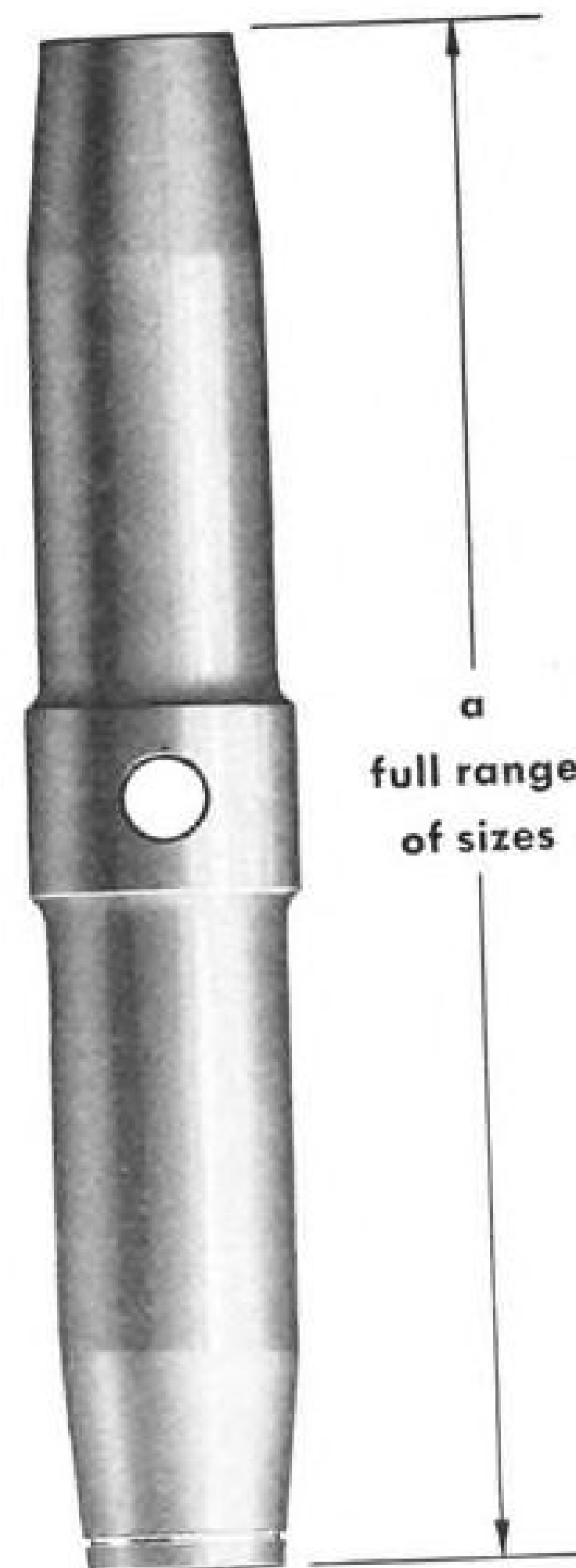
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ate professor of soil mechanics; Alexander J. Bone, associate professor of highway and airport engineering; and Dr. Francis E. Vinal, assistant professor of ceramics.

## Shop Courses Held For Martin Designers

Shop familiarization courses for design engineers and draftsmen have paid off in reduction of basic production costs, according to William P. Gonce, supervisor of change-order in Glenn L. Martin Co.'s engineering department.

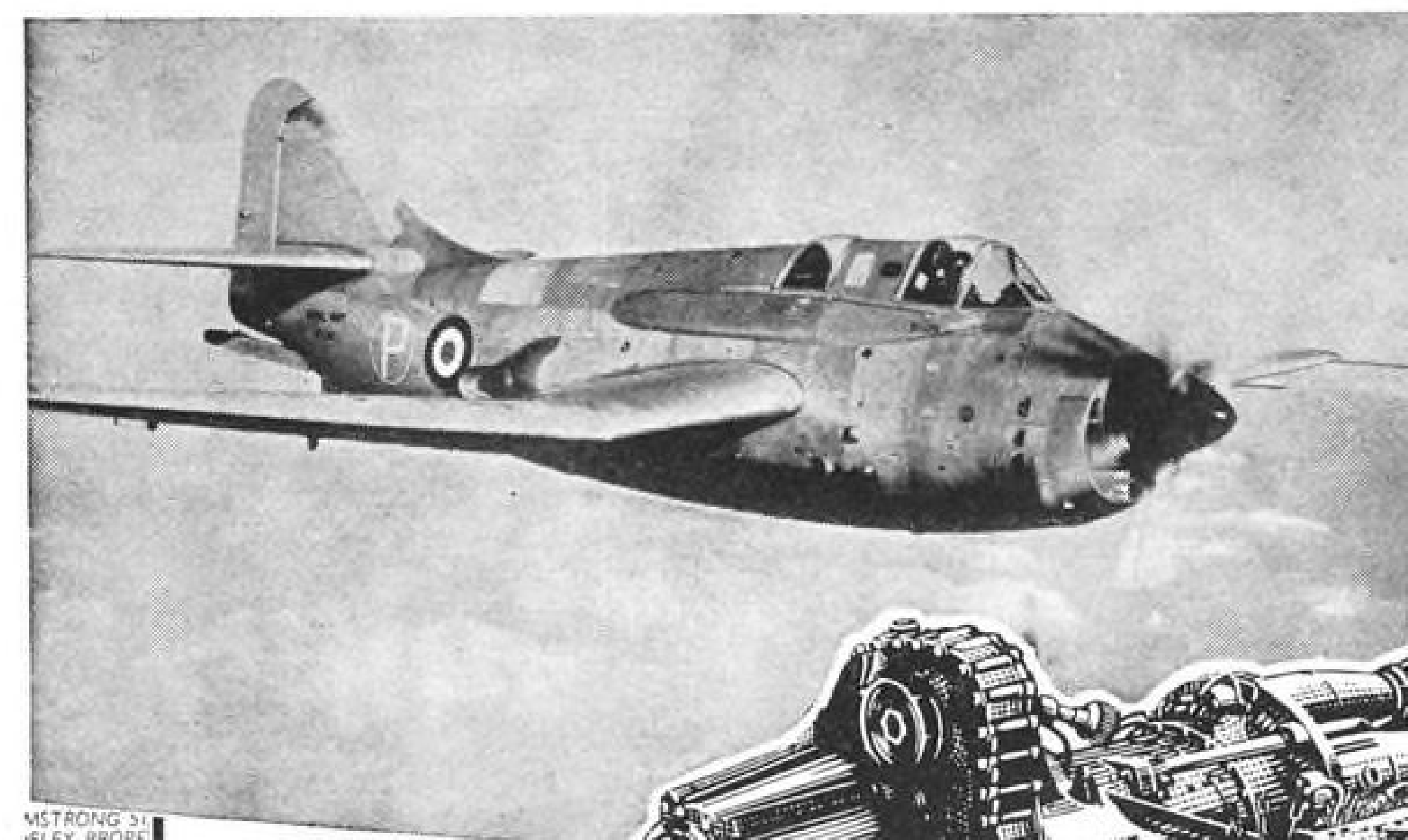
Part of an overall program to promote efficiency and economy, the courses have been stressed because it is estimated that fully 30 percent of the fabricated value of an aircraft is normally under the control of the design engineer.

Growth of the industry has made it impractical for engineers to follow their designs on to the shop floor to observe detail manufacturing sequences. And it is impractical for the tooling specialists to be called upon for advice in more than a small fraction of the daily cases in which the designer's decision affects fabrication costs. For example, on production design of one plane alone, about 300 men are at the drawing boards.

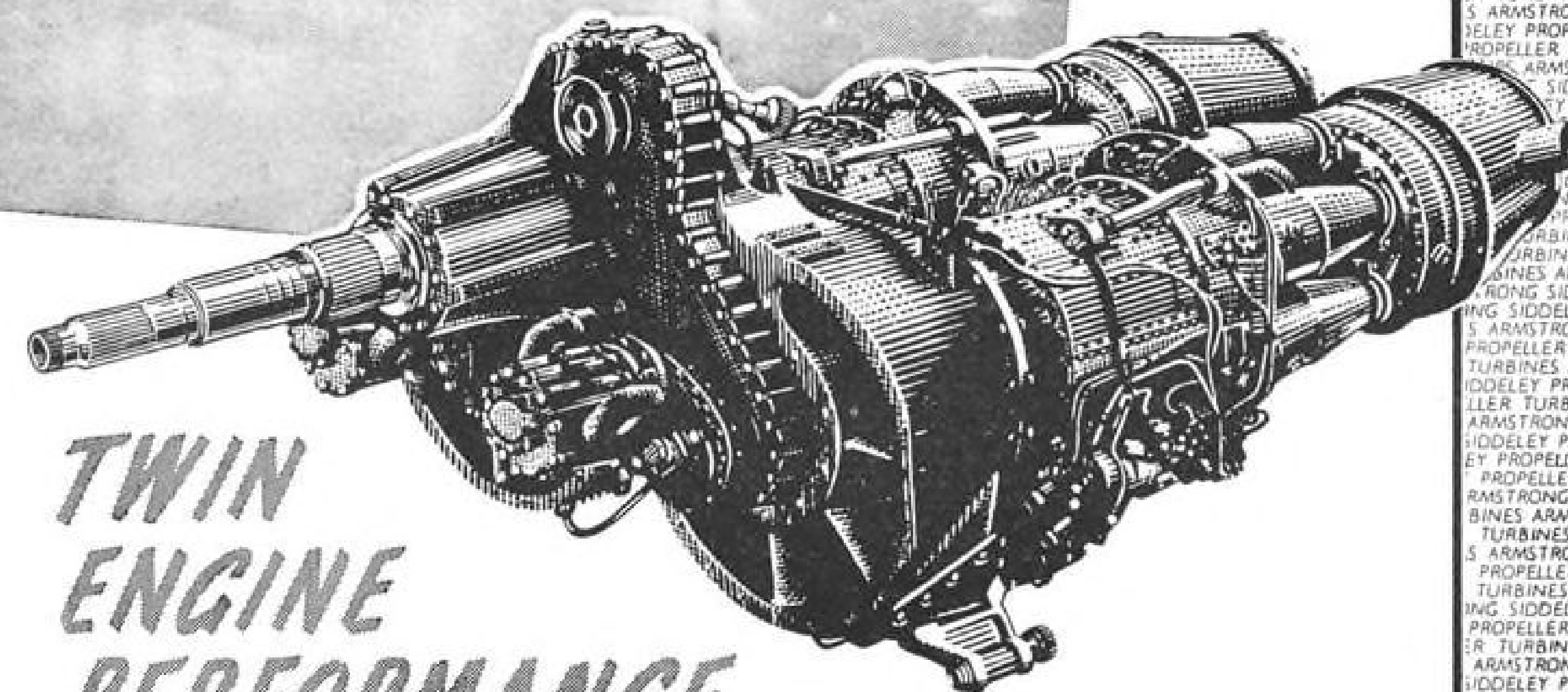
Gonce says: "There is no wholly satisfactory substitute for a refresher system which places shop know-how directly into the design engineer's hands—the man whose decisions, made binding at the initial stage of each airframe's manufacture, dictate precisely what factory processes are to be employed.

"Just such a program of training, one that brings engineering personnel—including supervisors and department heads—in direct contact with the shop and its people, was set up . . . More than a hundred engineers, in groups of 20, have already taken advantage of these shop familiarization courses. Meeting in the evenings, groups first attend a lecture stressing the comparative cost factors involved in forming and fabrication by alternative methods. They then visit the shop—for demonstrations.

"The courses cover the various standard operations in the shop and the nature and purpose of each process involved. Following an operator's demonstration, wherever possible, individuals of the groups themselves participate—often accomplishing turret-lathe, shearing, milling, welding, explosive riveting and even drop hammer operations . . . Various aircraft parts are shown them—uneconomical items being contrasted with equivalent parts made from revised designs. The sessions usually close with questions and answers."



The Double Mamba  
flying in the Fairey 17



## TWIN ENGINE PERFORMANCE

FROM A SINGLE INSTALLATION

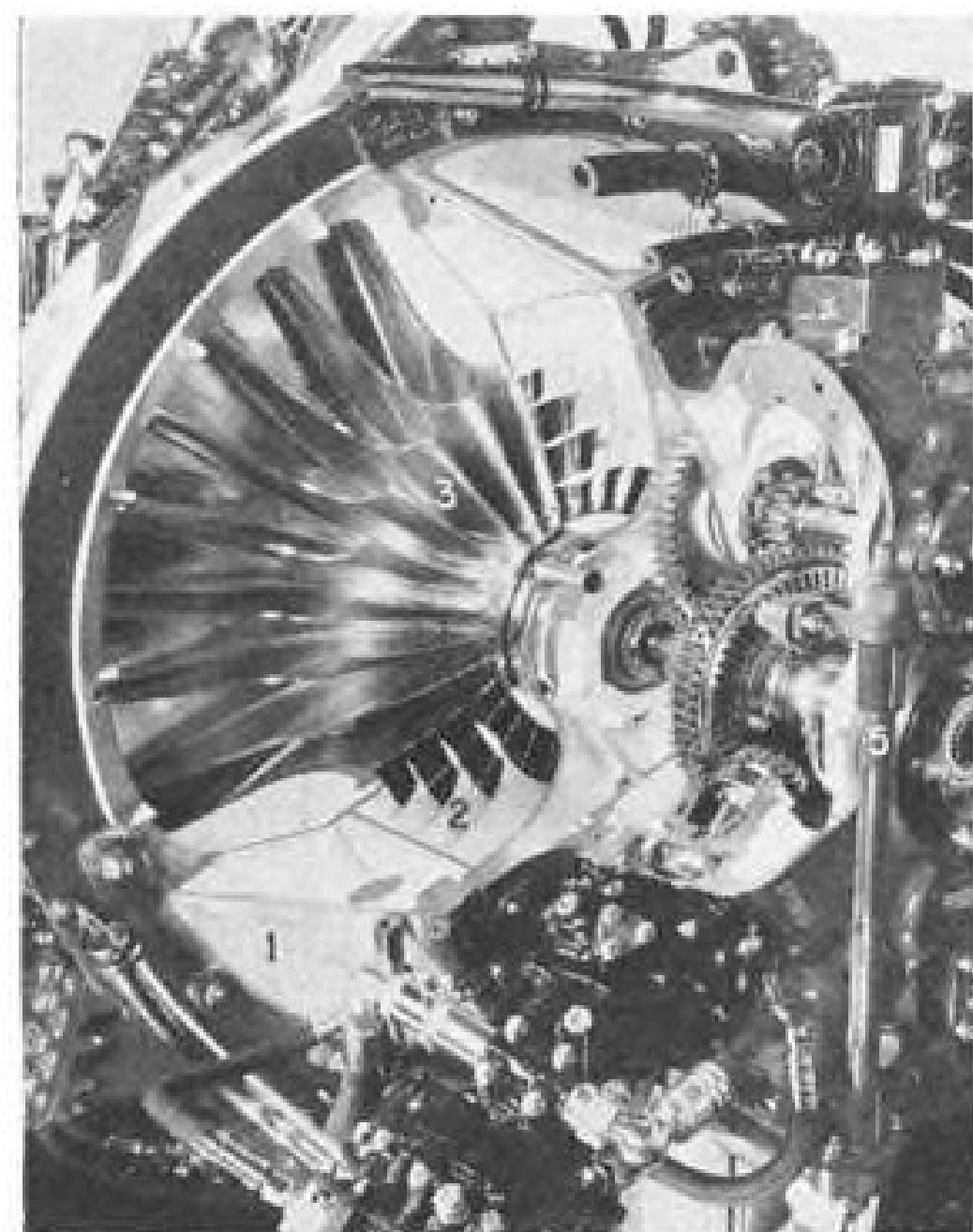
The Double Mamba power unit—first of its kind in the world to fly—gives all the advantages of twin engine performance with a reduction in weight and the frontal area of a single installation. As it is possible to shut down and restart either engine independently, it provides the Fairey 17 anti-submarine aircraft with increased flight endurance and a high reserve of power.

## DOUBLE MAMBA

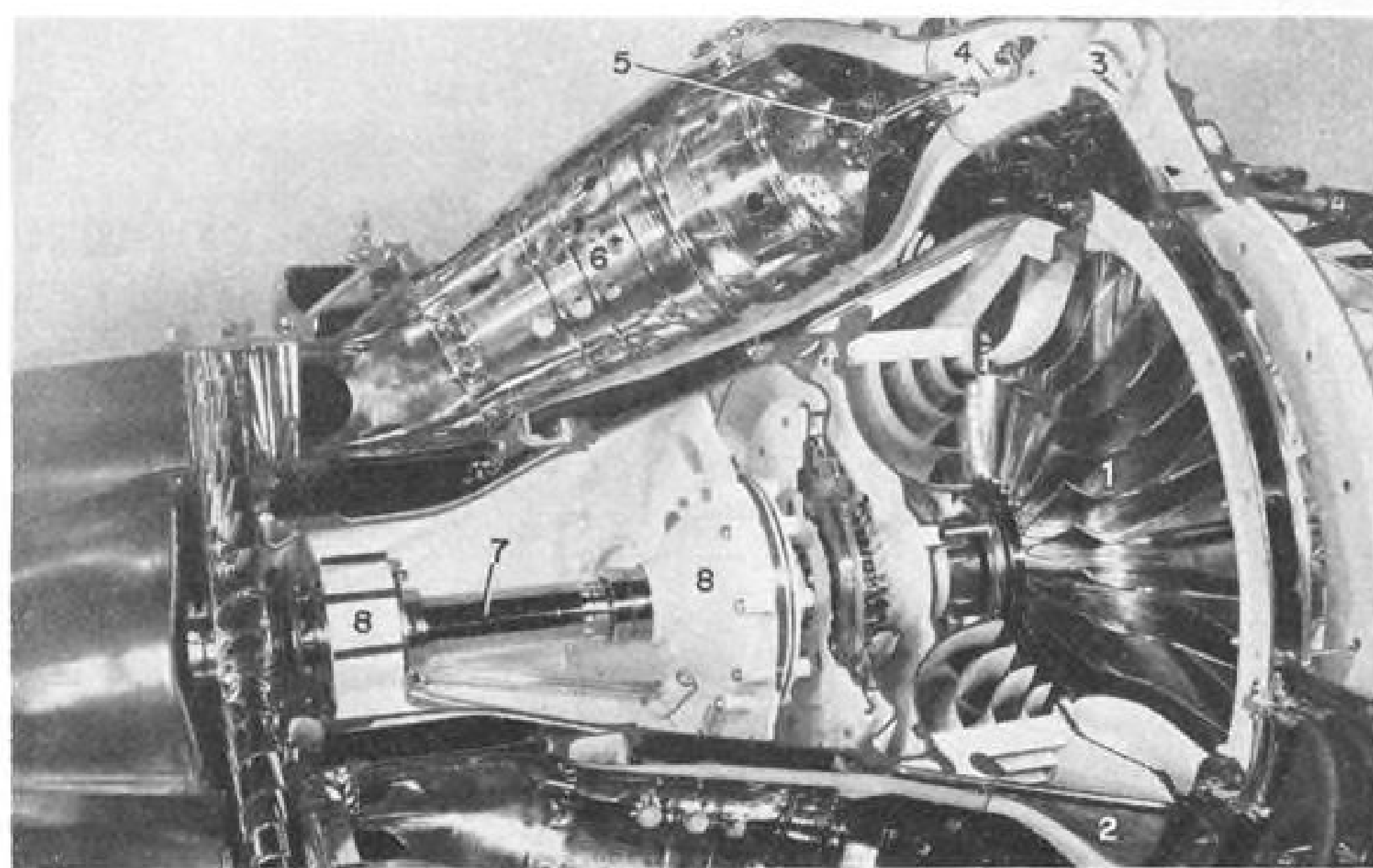
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ARMSTRONG SIDDELEY MOTORS LTD  
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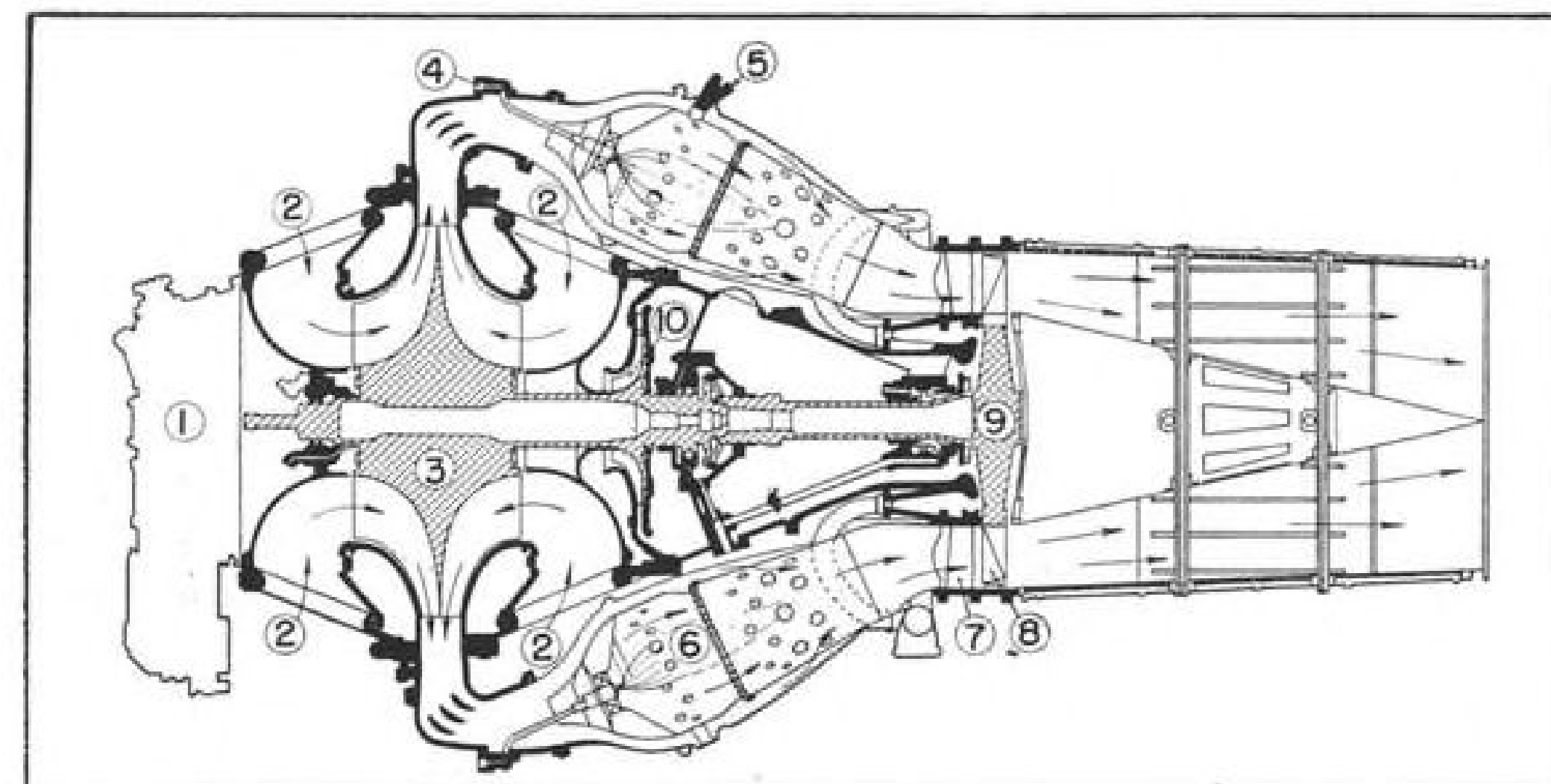


Front end: (1) forward air intake, (2) turning vanes, (3) impeller forward face, (4) accessory drive gears, and (5) oil gage.

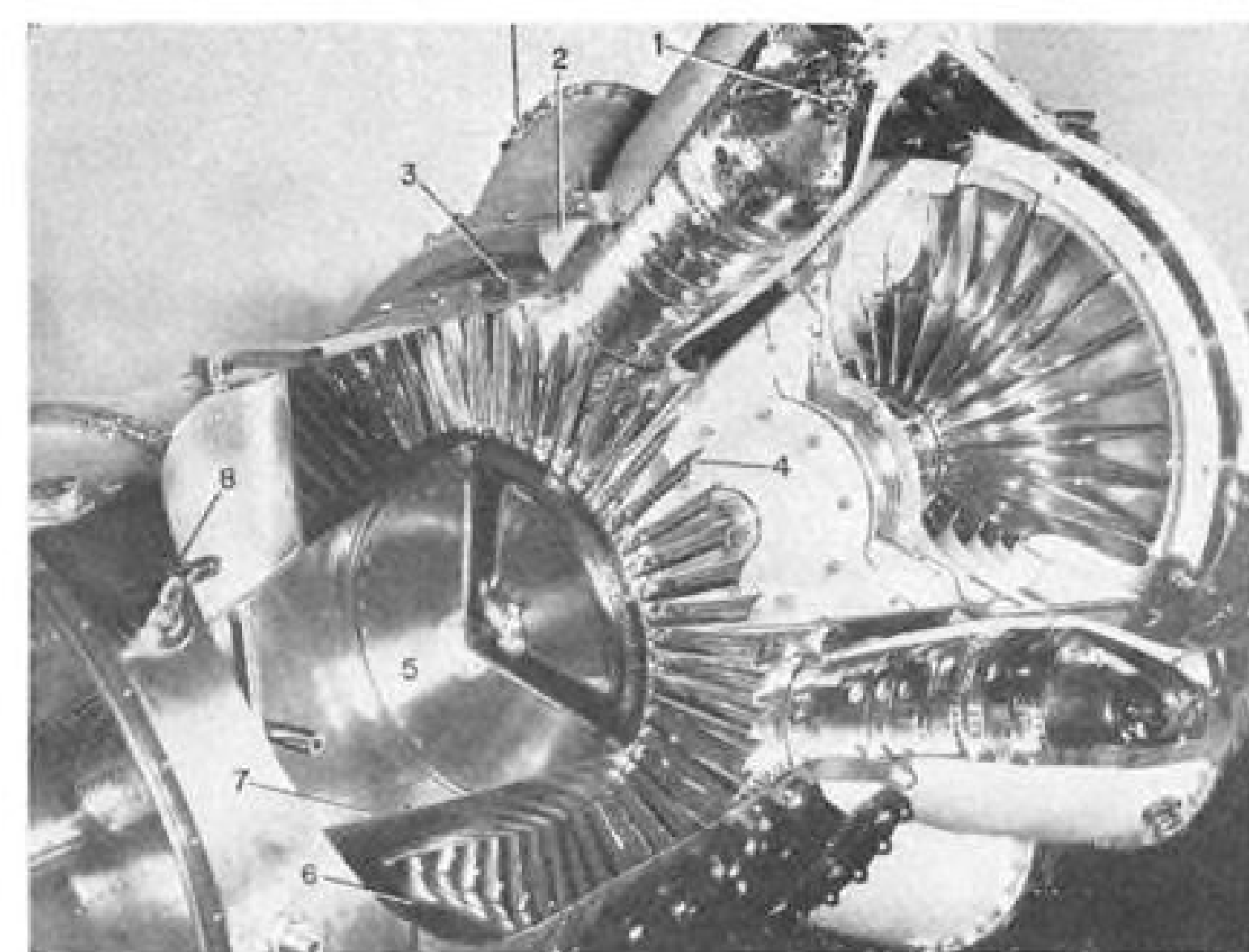


Middle section: (1) Impeller rear face, (2) rear air inlet, (3) turning vanes at end of air duct to combustion chamber, (4) fuel line, (5) fuel nozzle and swirl vanes, (6) combustion chamber Nimonic liner, (7) shaft, turbine-to-compressor, (8) turbine shaft bearings.

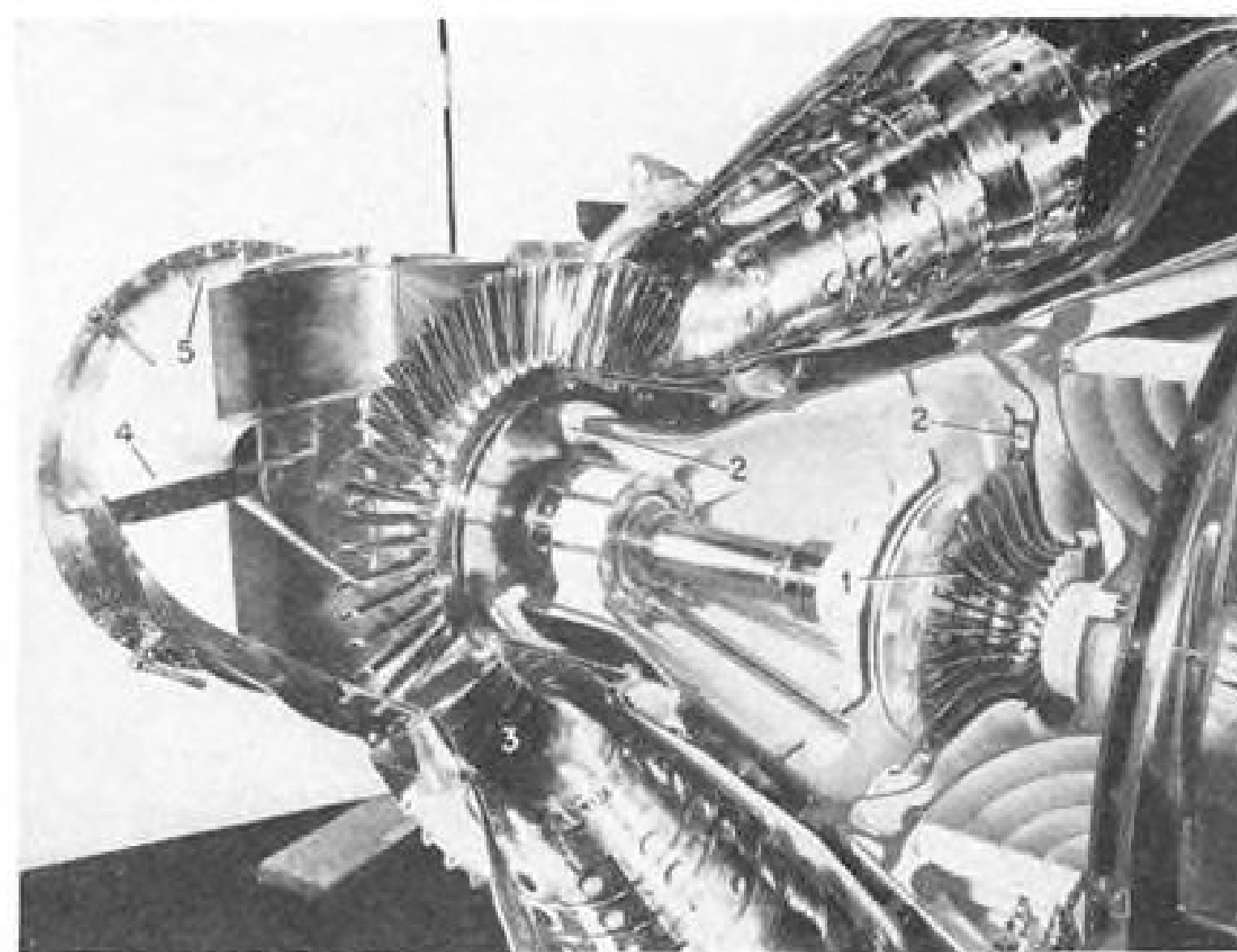
## First Cutaway Views of J-42 Turbo-Wasp



Schematic: (1) accessories, (2) air intake, (3) impeller, (4) fuel supply, (5) igniter, (6) combustion chamber, (7) guide vanes, (8) turbine blades, (9) disk, (10) cooling impeller.



View looking forward: (1) swirl vanes, (2) cooling air manifold, (3) turbine casing, (4) turbine buckets, (5) heat shield, (6) exhaust duct, (7) exhaust cone, (8) thermocouple for tailpipe temperature.



Looking aft: (1) cooling impeller (discharge pressure is 18 psi., providing 3600 lb. air per hour at 12,300 rpm.), (2) cooling air manifold, (3) nozzle vanes, (4) cone support, and (5) tailpipe.

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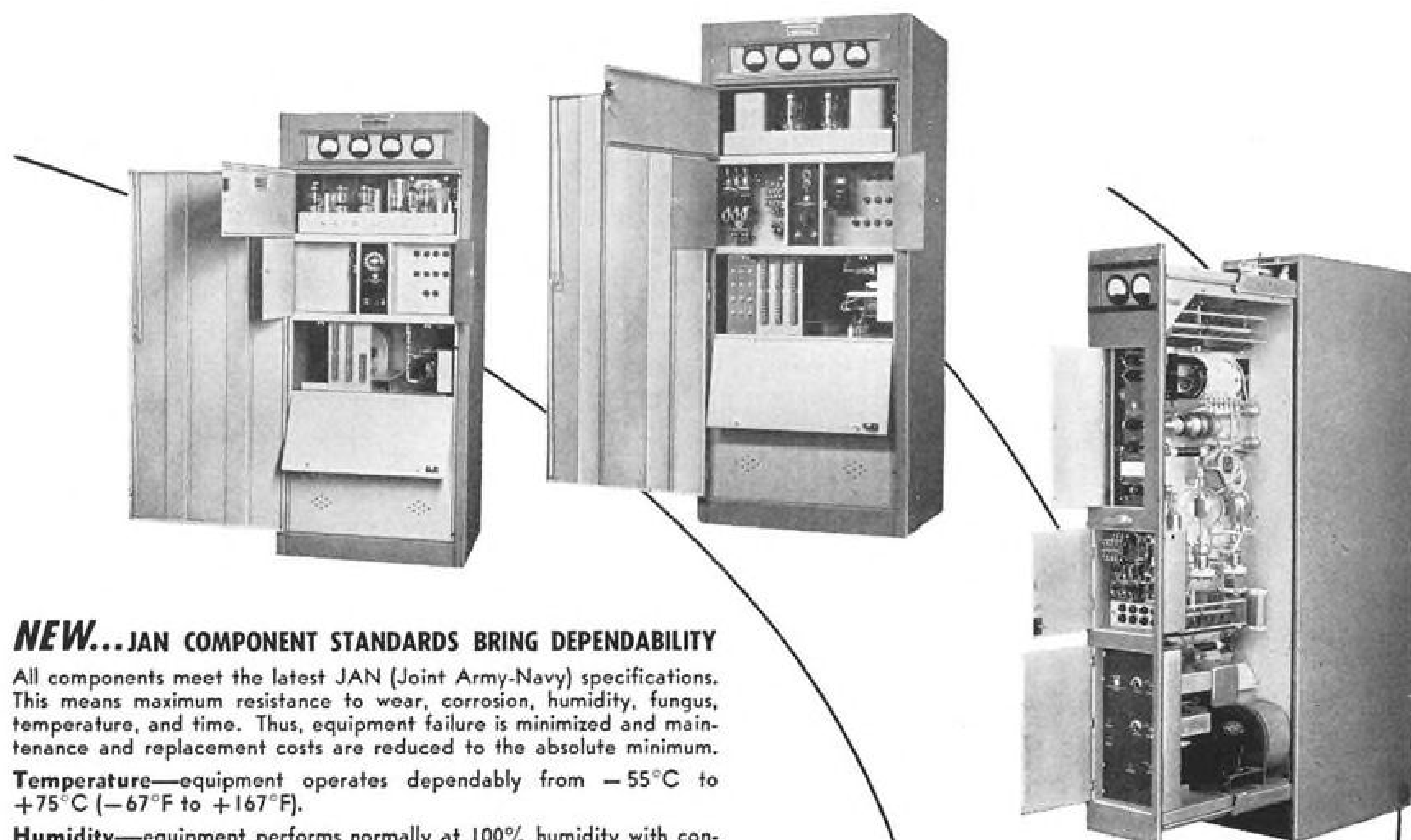
DOUGLAS PARTS SALES DIVISION  
DOUGLAS AIRCRAFT COMPANY, INC., SANTA MONICA, CALIFORNIA

# DEPEND ON DOUGLAS

30<sup>TH</sup> ANNIVERSARY YEAR







#### NEW...JAN COMPONENT STANDARDS BRING DEPENDABILITY

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**Humidity**—equipment performs normally at 100% humidity with condensation.

**Altitude**—equipment operates at full power at altitudes up to 10,000 feet (3,048 meters), and withstands shipping altitudes up to 30,000 feet (9,144 meters).

#### NEW...UNIT CONSTRUCTION PROVIDES OPERATING FLEXIBILITY

A flexible, multifrequency station can be formed from a combination of 96D and 96-200C Transmitters, one or two 50H Modulators and a 36D Rectifier. This provides for either simultaneous transmission on several frequencies or the selection of an individual frequency best suited to your particular communication problem.

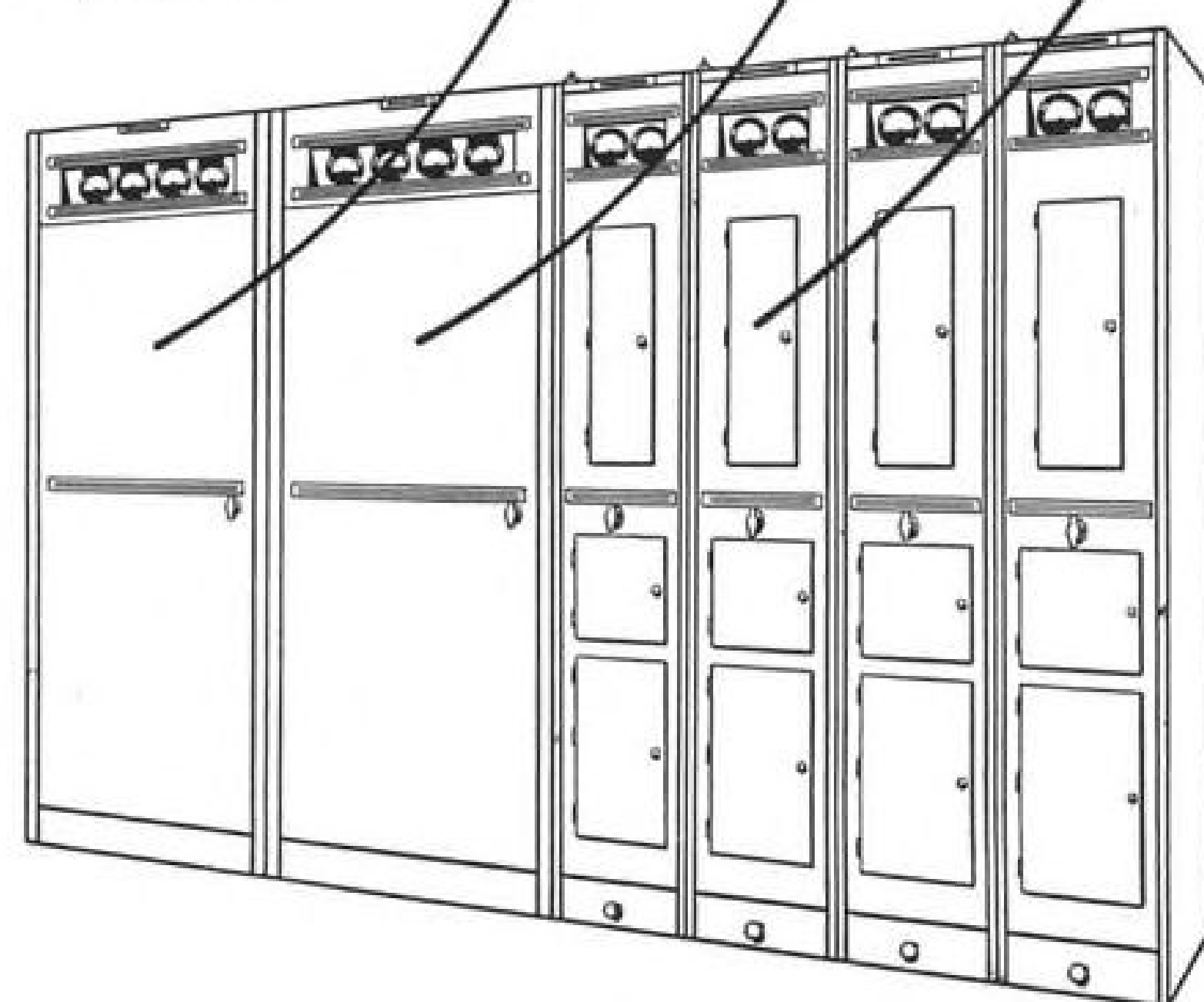
#### NEW...FRONT CONTROLS PROVIDE ADJUSTMENT CONVENIENCE

All controls are located on the front of the transmitter; all R. F. stages and antenna tuning, under and overload and tone-keying adjustments, selection switch for external frequency shift excitation, rotary meter switch, exciter output control.

#### NEW...DRAWER-TYPE CONSTRUCTION Means Easy Maintenance

Ball bearing, drawer-type construction permits the transmitter to be quickly withdrawn from cabinet. All components are instantly accessible... no components are hidden or buried.

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## Extra Blood Builds Altitude Resistance

Experiments at Duke University have revealed that blood transfusions can raise a man's ability to withstand high altitudes.

This finding was disclosed at a recent UNESCO meeting at Lima, Peru, by Dr. Frank G. Hall, Duke physiologist. Hall was chief of the Army Air Force's physiological branch during the war and wrote the first directive for training air crews in the use of oxygen and related equipment at high altitudes.

In tests at Duke, five students who were given an extra pint of blood and then placed in a decompression chamber, were able to withstand 2000 ft. more altitude than usual. Loss of blood worked the opposite way. Four subjects who gave a pint of blood lost up to 2000 ft. altitude resistance. Reason given for this is that in giving away some of their blood, the students cut down the reserve of oxygen normally stored in their bodies.

Tolerance to high altitude was measured by a subject's "interval of useful consciousness." He was considered "usefully conscious" as long as he could remain alert and perform certain tasks while at a simulated altitude of 35,000 ft. Students first were put through the paces while breathing pure oxygen, then tested while inhaling the rarefied air existing at 35,000 ft.

## Radio Station For Measuring Ionosphere

The National Bureau of Standards has set up a new radio propagation field station at Ft. Belvoir, Va., to make continuous studies of radio waves reflected from the upper atmosphere.

Designed for ionospheric and geophysical measurements, it is one of 14 stations operating under NBS's central radio propagation laboratory and part of a world-wide network of more than 50 radio observatories.

Information gathered at the new installation will aid in preparing 90-day predictions of the best frequencies for short wave radio operations; warnings of sudden radio disturbances.

Consisting of four buildings on 10-acre tract near the Potomac River, the station also will be used as a training center in techniques of ionospheric and field intensity measurements.

It is equipped with the latest type intensity recorders, ionospheric recorders and visually-recording magnetographs. Studies already are underway at the new installation to further improve ionospheric measuring techniques.



Artist's conception of Convair-Turboliner

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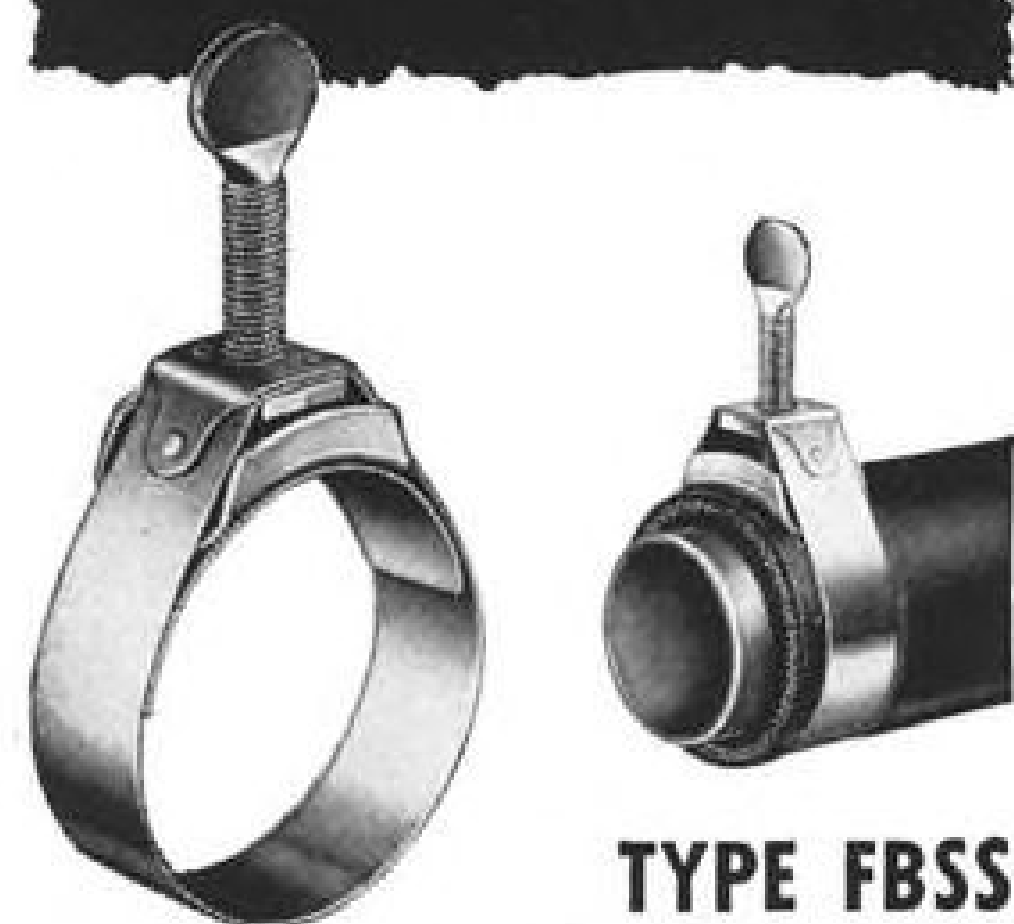
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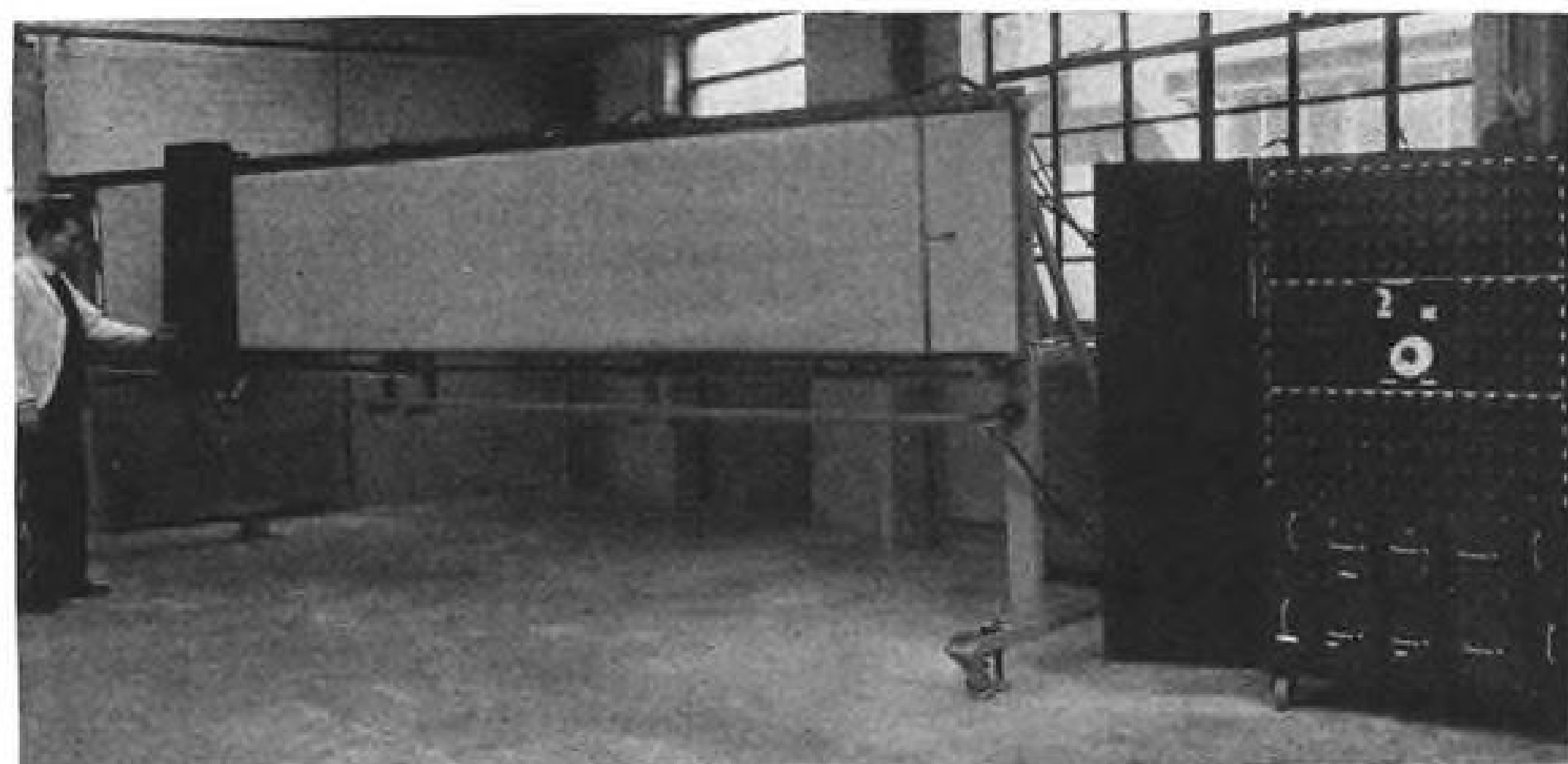
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## AVIONICS



Polygraph strain gage recorder, showing display board, recording carriage and control box.

### Strain Gage Reading At A Glance

(McGraw-Hill World News)

London—An apparatus which automatically accepts and displays in rapid succession readings from any number of strain gages has been constructed by the research department of Airspeed Ltd., Hampshire, England, for testing aircraft structures.

Known as the Polygraph strain gage recorder, the unit gives results in the form of load/strain graphs, each 5 by 3 in., arranged in columns on a board.

► **Carriage**—A stylus, mounted in a carriage traveling horizontally along the board or easel, is connected, via an electronic circuit, to a potentiometer, which balances, in turn, each of the Wheatstone bridge circuits. Behavior of every gage point can thus be individually studied as a test progresses.

Since the number of gages required for a test may vary considerably, the recorder has been made in 100-way units, and additional units can be added, both to the easel and at the control box.

It has been found, as a result of practical experience, that a production version of the machine could be made more compact and its recording speed considerably increased.

► **Advantages**—The applications of the Polygraph Recorder are wide. Not only is the strain at any gage point immediately visible, but the slope of the load/strain curve can be observed and any irregularities detected immediately. The apparatus is thus considered of great value to the designer, who can follow visually the behavior of a test specimen.

For development testing this is a most valuable feature, since it is possible to arrest a test for minor reinforcements before final collapse at or

above the appropriate strength requirement. Thus, time and money can be saved and the maximum amount of information obtained from a single test structure.

► **Paper Setup**—The orthodox method of measuring strains is used in the equipment—that of balancing a Wheatstone bridge with a potentiometer and measuring its deflection. The deflections are, however, instantly recorded on a large sheet of Teledeltos paper, clamped to a long display board.

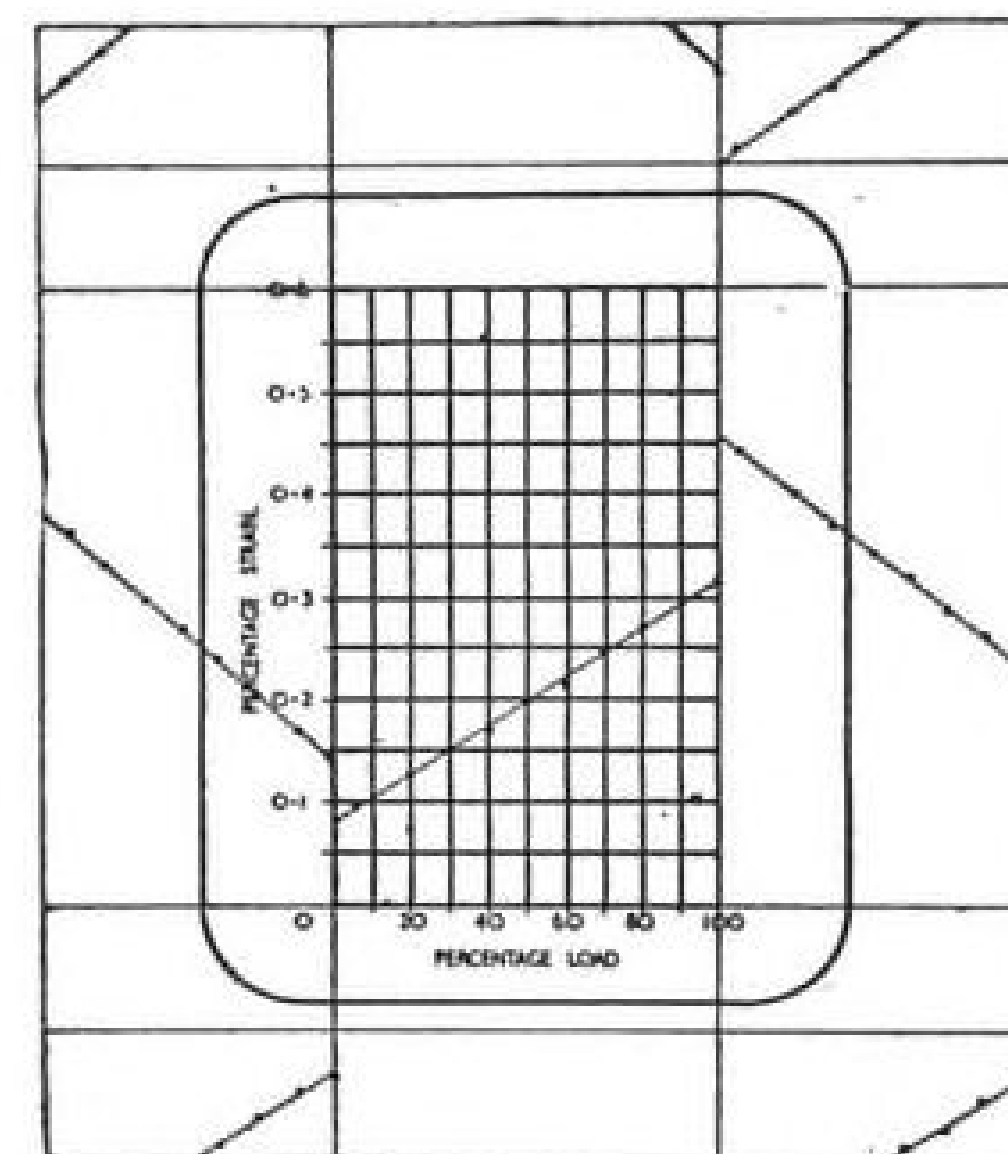
The paper is divided into 40 columns, each 3 in. wide. These are, in turn, subdivided vertically into 5 sections of 5 in., with a space between each. Every strain gage is allotted one of the resulting sections—the horizontal side representing the percentage of the full load, the vertical side the percentage of strain.

The Recorder is designed in 100-way units, and, although the prototype caters only for 200 strain gages, the instrument can be extended by the insertion of further units.

► **Operation**—All the electronic equipment is contained in a single control box. On the panel are mounted the apex balancing potentiometers, one for the initial balancing of every gage circuit. The bridge standards are also housed in this cubicle, with a duplicate potentiometer for manual readings.

Traversing the paper from left to right, at a speed of one inch per second, is a carriage which carries three styluses equally spaced on a continuous chain. This is raked so that, while the carriage is moving, the styluses always trace a vertical path down the paper at the rate of ten inches per second.

When a new column is reached—after the carriage has moved three inches—an-



Typical section of polygram record, showing load/strain graph for one gage, with measuring graticule laid over it. Average curve is drawn through marks made by stylus.

other stylus is ready at top of paper.

► **Potentiometer Action**—The master potentiometer, which revolves continuously, is mounted in the carriage and is geared to the stylus chain so that, during one revolution of the potentiometer, the stylus traverses one graph space.

As the potentiometer balances the bridge a high voltage is passed through the stylus, which burns a spot on the paper. The next gage circuit is then automatically selected, after one revolution of the potentiometer, by means of a telephone unselector switch in the cubicle, the position of which is electrically interlocked to the carriage position.

► **Loading Scale**—To the left of the board is an enlarged loading scale. When the carriage has recorded one complete set of readings, it is returned to the left of the board by a trip, which is moveable so that the travel of the carriage can be altered if all the gages are not being used.

A new loading is then applied to the structure, and the loading scale—which is, in fact, only an enlargement of the horizontal scale of the graph spaces on the paper—is adjusted correspondingly. This controls the position of the vertical path of the stylus.

A series of marks will finally have been plotted in succession for each strain gage. These form curves from which the behavior at all gage-points can be clearly seen as the test progresses.

H. V. Clarke, chief engineer of Airspeed, and research department head, was responsible for the design and development of the recorder. H. Candeland, of the research department developed the electronic details in collaboration with T. S. Parramore, who was responsible for the construction and testing of the equipment.

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# PRODUCTION

## Electric Ovens

Help solar control heat in fabricating stainless steel jet engine parts.

Two rectangular pit General Electric ribbon resistor electric furnaces recently have been installed by Solar Aircraft Co., San Diego, Calif., to provide a carefully controlled annealing cycle during fabrication of stainless steel aft-frames for turbojet engines. These furnaces operate with a protective atmosphere and each is capable of annealing two frames simultaneously.

► **Furnace Makeup**—The furnaces are situated side by side and are so arranged that either one can be charged by lifting the furnace lid with a hoist and depositing it atop the adjacent furnace. The frames are then placed into the furnace by means of the hoist and the cover is replaced.

A converter supplies a protective atmosphere of carbon dioxide, nitrogen carbon monoxide and a small quantity of hydrogen. Adjustment of the air-gas ratio produces a neutral mixture for purging the furnaces at the start and end of each cycle. Ribbon resistors, supported on the furnace casing walls, provide radiant heat to bring the equipment up to the proper temperature. Upon com-

pletion of the heating cycle, integral protective atmosphere circulating cooling systems permit regulated forced cooling. ► **Operation**—The frames are put into the furnaces and removed from them at below 500 F., relieving stress without objectionable oxidation.

During the heat treating cycle, the material is brought up to 1650 F. at the rate of 100 F. per hour and is kept at 1650 F. for three hours. Then power input to the furnace is shut off and the atmosphere gas cooler brings furnace temperature down to 500 F. at the rate of 200 F. per hour.

The heat treating cycle is carefully regulated by special program-type instrument controllers which can be set to give a wide range of predetermined rates in increase and decrease of furnace temperature. Thus, after determining a program of desired type of heat treatment, the instrument controllers automatically repeat this cycle.

## PRODUCTION BRIEFING

► **Goodyear Aircraft Corp.** was awarded a plaque by Capital Airlines for developing cross-wind landing gear. ► **Princeton Paint Laboratories**, Princeton, N. J., has licensed United Chromium, Inc., 51 E. 42 St., New York City, to manufacture and sell aviation

primer No. 10 under the name Uni-chrome Primer A.P. No. 10

► **Pratt & Whitney Aircraft division of United Aircraft Corp.**, will be closed for a general vacation period from Aug. 7 through Aug. 20.

► **Northrop Aircraft, Inc.**, has set up a special weapons department to handle research and development projects outside the field of manned military aircraft.

## AF Bid Information

Air Material Command Procurement Division makes available to AVIATION WEEK the latest bid awards, shown on this page. Requests for further information should be addressed to Contracting Officer, AMC, Wright-Patterson AFB, Dayton, Ohio, attention: MCPSPX72.

### ABSTRACTS

#### For 8,010 masks (50-625):

Reed Products, Inc., Milwaukee, Wisc., on a bid of \$29,957.40.

► **For 702,000 sq. in. plastic sheets (50-677):** Companies sharing: Celanese Corp. of America, N. Y., N. Y., on a bid of \$5398.55, and Monsanto Chemical Co., Plastics division, Springfield, Mass., on a bid of \$411.

#### For cotter pins (50-692):

Companies sharing: American Chain & Cable Co., Inc., American Chain division, York, Pa., on a bid of \$5570.30, and Stronghold Screw Products Inc., Chicago, Ill., on a bid of \$275.

#### For nuts (50-693):

Companies sharing: New Britain Machine Co., Screw Products Div., New Britain, Conn., on a bid of \$331; Elastic Stop Nut Corp. of America, Union, N. J., on a bid of \$1843; Air Associates, Inc., Teterboro, N. J., on a bid of \$2135.55; Nutt-Shel Co., Los Angeles, Calif., on a bid of \$3150; and Standard Pressed Steel Co., Jenkintown, Pa., on a bid of \$382.50.

#### For aircraft bolts (50-723):

Companies sharing: Air Associates, Inc., Teterboro, N. J., on a bid of \$910.80; Aircraft Products Co., Clifton Heights, Pa., on a bid of \$1225, and Cooper Precision Products, Los Angeles, Calif., on a bid of \$1272.35.

#### For 20 sewing machines (50-724):

Singer Sewing Machine Co., N. Y., N. Y., on a bid of \$16,454.80.

#### For element hydraulic gasket (50-727):

Companies sharing: Purolator Products, Inc., Newark, N. J., on a bid of \$12,500, and Skinner Purifiers div., Bendix Aviation Corp., Detroit, Mich., on a bid of \$20,900.

#### For manifold transmitters (50-745):

Kollsman Instrument div., of Square D Co., Elmhurst, N. Y., on a bid of \$32,620.54.

#### For 2,500 work benches (50-580):

Dayton Supply & Tool Co., Dayton, O., on a bid of \$86,175.

#### For aircraft generators (50-450):

Jack & Helntz Precision Industries, Inc., Cleveland, O., on a bid of \$645,333.22.

#### For printer assembly & projection (50-551):

Companies sharing: Moore Instruemnt Co., Hudson, O., on a bid of \$78,775.20, and Elwood Pattern Works, Inc., Indianapolis, Ind., on a bid of \$44,728.75.

#### For pins (50-700):

Companies sharing: Aero Supply Mfg. Co., Inc., Corry, Pa., on a bid of \$686.77; Crocker Mfg. Co., Los Angeles, Calif., on a bid of \$1051.25; National Screw & Mfg. Co., Cleveland, O., on a bid of \$845.55, and Air Associates, Inc., Teterboro, N. J., on a bid of \$81.90.

#### For transmitters (50-720):

Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., on a bid of \$85,305.30.

#### For 2,923 measures (50-732):

Companies sharing: Huffman Mfg. Co., Dayton, O., on a bid of \$7609.75, and Dover Stamping Co., General Cotton & Supply,

Boston, Mass., on a bid of \$209.72.

#### For print dryer (50-631):

Pako Corp., Minneapolis, Minn., on a bid of \$44,708.06.

#### For aircraft nuts (50-688):

Companies sharing: Aircraft Hardware Mfg. Co., Inc., N. Y., N. Y., on a bid of \$210; Air Associates, Inc., Teterboro, N. J., on a bid of \$805; V. L. Graf Co., Romeo, Mich., on a bid of \$1131.50; Sanford Aircraft, Inc., Inglewood, Calif., on a bid of \$1875; Nutt-Shel Co., Los Angeles, Calif., on a bid of \$3150, and Plastic Stop Nut Corp. of America, Union, N. J., on a bid of \$1816.

Companies sharing: Manadnock Mills, San Leandro, Calif., on a bid of \$5636; Dumont Aviation & Supply Co., Long Beach, Calif., on a bid of \$792; Air Associates, Inc., Teterboro, N. J., on a bid of \$793.50; Shakeproof, Inc., Chicago, Ill., on a bid of \$317, and Dzus Fastener Co., Inc., Babylon, N. Y., on a bid of \$2623.70.

#### For photographic equipment (49-2338):

Companies sharing: Hubbell & Miller Co., New Rochelle, N. Y., on a bid of \$1745.12; Burke & James, Inc., Chicago, Ill., on a bid of \$640.29; Peck & Harvey, Chicago, Ill., on a bid of \$1165; Society for Visual Education, Inc., Chicago, Ill., on a bid of \$9237.91; Metal Trims, Inc., Campbell, O., on a bid of \$5254.55; Eastman Kodak Co., Rochester, N. Y., on a bid of \$8510.16; Springfield Tent & Awning Co., Springfield, O., on a bid of \$1406.58; Malone Camera Stores, Inc., Dayton, O., on a bid of \$1828.55; S. G. Adams Co., St. Louis, Mo., on a bid of \$18,643.90; Viewles, Inc., Long Island City, N. Y., on a bid of \$4881.80; Morse Instrument Co., Hudson, O., on a bid of \$5949.40; Consolidated Photo Engravers Equipment Co., Chicago, Ill., on a bid of \$6250; Testrite Instrument Co., Inc., N. Y., N. Y., on a bid of \$883.13; Columbian Enameling & Stamping Co., Inc., Terre Haute, Ind., on a bid of \$1852.25, and Milton Bradley Co., Springfield, Mass., on a bid of \$4769.04.

#### For filter assemblies (50-441):

Companies sharing: Fairchild Camera & Instrument Corp., Jamaica, N. Y., on a bid of \$8864.92; Coogan Co., N. Hollywood, Calif., on a bid of \$1104; G. Feisenthal & Sons, Inc., Chicago, Ill., on a bid of \$597.80; Morse Instrument Co., Hudson, O., on a bid of \$1586, and Buhl Optical Co., Pittsburgh, Pa., on a bid of \$7672.

#### For elbow, etc. (50-584):

Companies sharing: V. L. Graf Co., New Baltimore, Mich., on a bid of \$6573; Aircraft Fitting Co., Cleveland, O., on a bid of \$2979; Ohlson-Empire Div., Long Island City, N. Y., on a bid of \$399; Deutsch Co., Los Angeles, Calif., on a bid of \$5915; Pacific Piston Ring Co., Los Angeles, Calif., on a bid of \$1423; S-K Screw Products, Los Angeles, Calif., on a bid of \$1462.50, and Air Associates Inc., Teterboro, N. J., on a bid of \$531.

#### For photographic equipment (50-614):

Companies sharing: Graflex, Inc., Rochester, N. Y., on a bid of \$16,688.24; Kalart Co., Inc., Plainville, Conn., on a bid of \$273.75, and Hugo Meyer & Co., N. Y., N. Y., on a bid of \$1840.

#### For 30,000 pairs gloves (50-624):

Companies sharing: Illinois Glove Co., Champaign, Ill., on a bid of \$54,800, and Marinette Glove Co., Inc., Marinette, Wisc., on a bid of \$27,200.

#### For cut-out and relays (50-626):

Hartman Electrical Mfg. Co., Mansfield, O., on a bid of \$44,766.40.

#### For hinges (50-637):

E. R. Wagner Mfg. Co., Milwaukee, Wisc., on a bid of \$5670.

#### For fuel pressure gage (50-673):

United States Gauge Div., American Machine & Metals, Inc., Sellersville, Pa., on a bid of \$8498.62.

► **For 1688 aircraft storage batteries (50-696):** Auto-Lite Battery Corp., Toledo, O., on a bid of \$77,242.88.

#### For 16,500 adapters (50-709):

Companies sharing: Aircraft Fitting Co., Cleveland, O., on a bid of \$2040; Deutch Co., Los Angeles, Calif., on a bid of \$329, and Parker Appliance Co., Cleveland, O., on a bid of \$1499.50.

#### For 150 welding kits (50-711):

Air Reduction Sales Co., N. Y., N. Y., on a bid of \$22,050.

#### For 1700 pounds tee head pins (50-741):

William Prym, Inc., Dayville, Conn., on a bid of \$2712.60.

#### For 1000 creepers (50-705):

Hulbert Mfg. Co., Ashtabula, O., on a bid of \$3750.

#### For nylon cloth (50-561):

Companies sharing: Cheney Brothers, Manchester, Conn., on a bid of \$450,600; Western Lace & Line Co., Glendale, Calif., on a bid of \$138,250; P. C. Buser Silk Corp., Paterson, N. J., on a bid of \$6241.50; American Cord & Webbing Co., Inc., New York, N. Y., on a bid of \$104,336; Arbeka Webbing Co., Pawtucket, R. I., on a bid of \$4160; Burlington Mills Corp., Narrow Fabrics Div., Greenboro, N. C., on a bid of \$13,068.50; Century Ribbon Mills, Inc., N. Y., N. Y., on a bid of \$1782, and Phoenix Trimming Co., Chicago, Ill., on a bid of \$46,323.40.

#### For bolts (50-653):

Companies sharing: Aero Supply & Mfg. Co., Corry, Pa., on a bid of \$6761.25; Grand Machining Co., Detroit, on a bid of \$1310; National Lock Co., Rockford, Ill., on a bid of \$2537.25; Rano Machine & Tool Corp., Buffalo, on a bid of \$2220.50; Air Associates, Inc., Teterboro, on a bid of \$99.50, and Standard Pressed Steel Co., Jenkintown, Pa., on a bid of \$1479.70.

#### For 5000 containers assemblies (50-661):

Pollak Engineering & Mfg. Corp., Newark, N. J., on a bid of \$34,850.

#### For stamping machines (50-685):

Whipple Associates, Inc., New York, on a bid of \$40,346.50.

#### For gasoline hose (50-738):

Hewitt Rubber div., Hewitt Robins Inc., Buffalo, on a bid of \$27,842.60.

#### For transmitter manifold (50-786):

Eclipse Pioneer div., Bendix Aviation Corp., Teterboro, on a bid of \$47,645.38.

#### For indicators (50-794):

Eclipse Pioneer div., Bendix Aviation Corp., Teterboro, on a bid of \$51,713.40.

#### For fuel and oil strainers (50-809):

Michigan Wire Cloth Co., Detroit, on a bid of \$5355.91.

#### For spark plug cleaning machine (50-707):

Vapor Blast Manufacturing Co., Milwaukee, on a bid of \$36,630.

#### For oxygen servicing trailer (50-479):

Piper Aircraft Corp., Lock Haven, Pa., on a bid of \$109,967.46.

#### For true airspeed indicators (50-687):

Kollsman Instrument div. of Square D Co., Elmhurst, Long Island, N. Y., on a bid of \$87,523.50, and United States Gauge, div. of American Machine & Metals, Inc., on a bid of \$345.

#### For aircraft bolts (50-689):

Companies sharing: Cooper Precision Products, Los Angeles, on a bid of \$1194; Aero Supply Mfg. Co., Inc., Corry, Pa., on a bid of \$700; National Screw and Mfg. Co., Cleveland, on a bid of \$132.67; Aircraft Hardware Mfg. Co., Inc., New York, on a bid of \$410; Thompson Products, Inc., West Coast plant, Bell, Calif., on a bid of \$1425; Clary Multiplier Corp., Aircraft Hardware, div., Los Angeles, on a bid of \$510, and Briles Mfg., El Segundo, Calif., on a bid of \$94.

#### For 8250 hinges (50-694):

Companies sharing: E. R. Wagner Mfg. Co., Milwaukee, on a bid of \$5220, and Homer D. Bronson Co., Beacon Falls, Conn., on a bid of \$5475.

#### For temperature indicators (50-755):

Lewis Engineering Co., Naugatuck, Conn., on a bid of \$17,626.09.

#### For adapter (50-760):

Companies sharing: Columbus Production Mfg. Co., Columbus, O., on a bid of \$985; Springfield Electric Motor Co., Inc., Springfield, O., on a bid of \$3424; Weatherhead Co., Cleveland, on a bid of \$235, and George W. Gayle and Son, Frankfort, Ky., on a bid of \$1816.

#### For buffer and polisher (50-771):

U. S. Electrical Tool Co., Cincinnati, on a bid of \$29,916.

#### For machine nuts (50-773):

Companies sharing: Anti-Corrosive Metal Products Co., Castleton on Hudson, N. Y., on a bid of \$379.80; Michigan Bolt & Nut Co., Inc., Detroit, on a bid of \$1870.60; Ohlson Empire div., Ohlson International Corp., Long Island City, N. Y., on a bid

of \$165; and Air Associates, Inc., Teterboro, on a bid of \$273.70.

#### For manifold pressure gage (50-789):

United States Gauge div., American Machine & Metals Inc., Sellersville, Pa., on a bid of \$35,603.21.

#### For antenna assembly (50-358):

Bone Engineering Corp., Glendale, Calif., on a bid of \$77,720.

#### For coat aprons (50-506):

Companies sharing: Technicraft Corp., Kansas City, Mo., on a bid of \$16,835.72, and Progressive Coat & Apron Mfg. Co., Philadelphia, on a bid of \$876.12.

#### For ammeter, meter, voltmeter (50-543):

Companies sharing: Cole Instrument Co., Los Angeles, on a bid of \$421.50; Concord Radio Corp., Chicago, on a bid of \$87.40; General Electric Co., Aircraft Fed. & Marine divns., Dayton, on a bid of \$815.75; Federal Mfg. & Engr. Corp., Brooklyn, on a bid of \$462.50; Browning Brothers, Inc., New York, on a bid of \$284.40, and Weston Electrical Instrument Corp., Newark, New Jersey, on a bid of \$579.50.

#### For light assembly (50-764):

Grimes Mfg. Co., Urbana, O., on a bid of \$6647.85.

#### For 5000 parachute assemblies (50-619):

Mead Aviation Equipment Co., Trenton, N. J., on a bid of \$60,600.

#### For indicators (50-680):

Schwien Engineering Co., Los Angeles, on a bid of \$66,337.50.

#### For gasoline hose (50-737):

Companies sharing: United States Rubber Co., New York, on a bid of \$10,250, and Metal Hose & Tubing Co., Dover, N. J., on a bid of \$46,833.55.

#### For clips (50-753):

Associated Co., Inc., Wichita, on a bid of \$20,215.68.

#### For transmitters (50-756):

Eclipse-Pioneer div., Bendix Aviation Corp., Teterboro, on a bid of \$127,493.95.

#### For bushing, nut, elbow, etc. (50-669):

Companies sharing: Paramount Mfg. Co., Inc., Hillsdale, Mich., on a bid of \$254; Pacific Piston Ring Co., Los Angeles, on a bid of \$1806; Raybould Coupling Co., Greenwich, Conn., on a bid of \$315, and Weatherhead Co., Cleveland, on a bid of \$367.50.

#### For fuel tanks (50-239):

Vic Pastushin Industries, Inc., Los Angeles, on a bid of \$355,568.

#### For photographic equipment (50-458):

Companies sharing: Eastman Kodak Co., Rochester, on a bid of \$30,954; Phillip A. Hunt Co., Brooklyn, on a bid of \$520; Duophoto Corp., New York, on a bid of \$110; City Chemical Corp., New York, on a bid of \$650; Standard Products Co., Philadelphia, on a bid of \$1955; Imperial Products Co., Philadelphia, on a bid of \$218; Octagon Process, Inc., Brooklyn, on a bid of \$17,725.95; Chase Chemical Co., Newark, N. J., on a bid of \$2660; Mallinckrodt Chemical Works, St. Louis, on a bid of \$48,960, and Arthur S. Lapine & Co., Chicago, on a bid of \$2270.

#### For installation of motor-generating set (50-562):

Federal Electric Co., Dayton, on a bid of \$3855.

#### For covers (50-660):

Companies sharing: Beaumont & Crandall Inc., Kansas City, Mo., on a bid of \$6842, and Technicraft Corp., Kansas City, Mo., on a bid of \$45,661.44.

#### For rivets (50-762):

Companies sharing: Read & Prince Mfg. Co., Worcester, Mass., on a bid of \$1755; American Rivet & Mfg. Co., Cleveland, on a bid of \$1467.10, and National Screw & Mfg. Co., Cleveland, on a bid of \$1478.55.

#### For indicators (50-776):

Kollsman Instrument div. of Square D Company, Elmhurst, N. Y., on a bid of \$81,822.50.

#### For installation of system-study equipment (50-777):

Heildoerfer-Castellini, Dayton, on a bid of \$15,500.

#### For indicators (50-798):

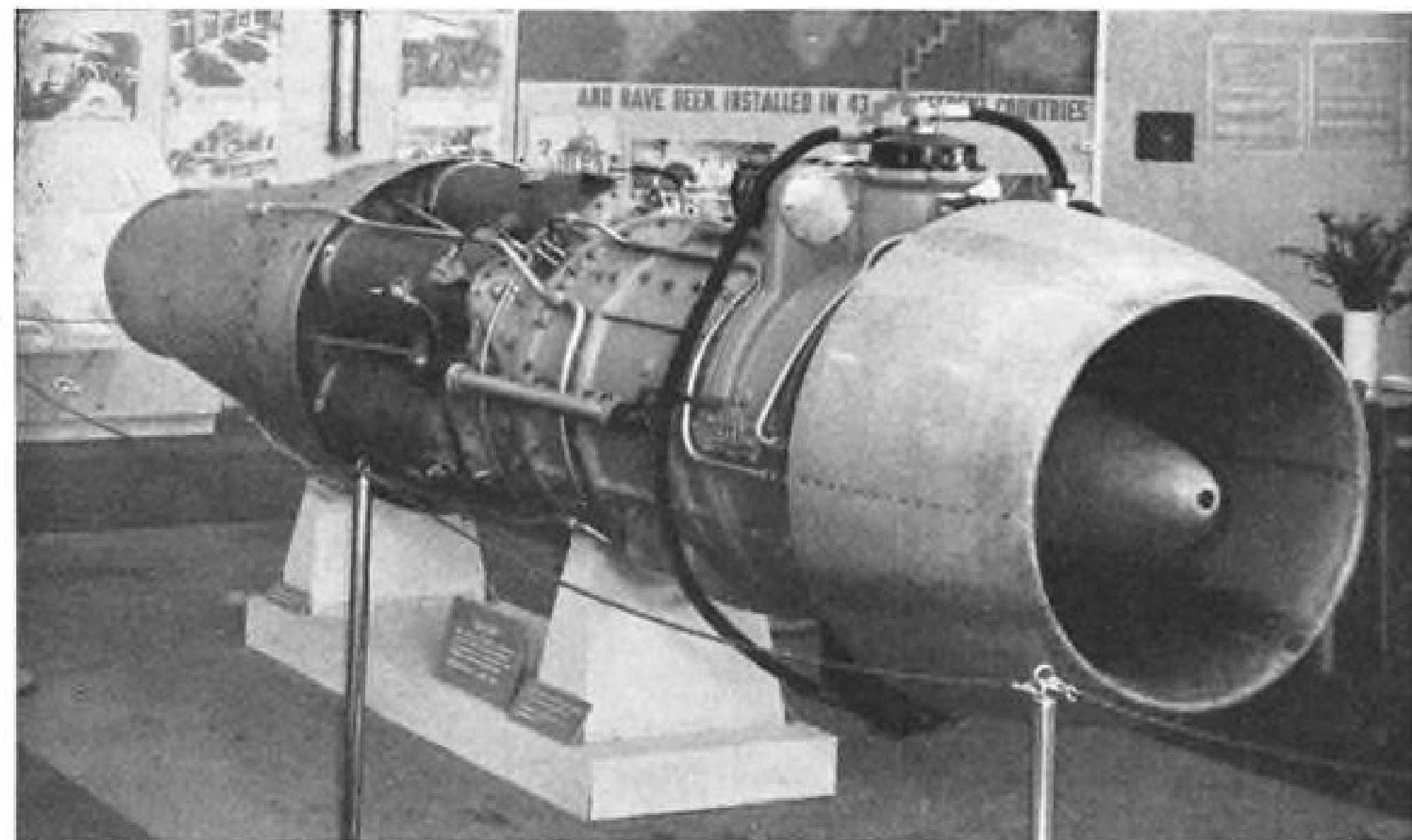
Eclipse-Pioneer div., Bendix Aviation Corp., Teterboro, on a bid of \$51,251.52.

#### For indicators (50-820):

General Electric Co., Schenectady, on a bid of \$4369.30.

#### For storage containers (50-841):

A. and Z. Engineering Co., Covington, Ky., on a bid of \$24,120.



## FIRST SWEDISH TURBOJET REVEALED

First Swedish-designed jet engine, designed by Svenska Turbinfabriks AB Ljungstrom (STAL), Finspong, was exhibited under guard in Stockholm recently. Still classified a military secret, the new engine has axial-flow compressor and six combustion cham-

bers. Called the Skuten, it has a rated thrust of only 3200 lb., and may not be a production type but instead serve in development of future engines of greater output. The manufacturer is a leading Swedish builder of electric and marine turbines.



## EATON VALVE DEVELOPMENT has Contributed to Higher Efficiency and Longer Life for Engines in Every Type of Service



Since the first automotive valves were introduced by this organization in 1911, it has been Eaton's objective to produce valves which would meet the requirements of constantly increasing engine speeds and extreme operating temperatures. Eaton's development of the sodium cooled valve in 1923 represents one of the most important single advancements in the history of aviation. Applying the sodium cooled principle to automotive use, Eaton is contributing thousands of miles of additional life to valves in heavy duty truck and bus service. Equally important advancements have been made in valves for passenger car use—valves which deliver a hundred thousand miles and more of dependable service.

**EATON**  
MANUFACTURING COMPANY  
VALVE DIVISION  
9771 French Road • Detroit 13, Michigan

## FINANCIAL

### How Martin, C-W Have Improved

New managements and new policies have put the two large companies on road to better financial health.

Varying degrees of improvement as a result of new managements are reflected in the annual reports currently being released by the Glenn L. Martin Co. and Curtiss-Wright Corp.

Reversing the previous series of sizeable net losses in 1947 and 1948, Martin disclosed a net profit of \$5,131,500 or \$4.52 per share for 1949. This compares with a net loss of \$16,711,000 for 1948 and the \$19,182,000 for 1947.

In a large measure, the excellent 1949 showing may be attributed to the absorption of all possible inventory write-offs on its commercial transports during 1948 and 1949.

► **Non-Recurring Income**—In fact, \$673,228 previously written-off in past years for this purpose was restored to income for 1949. While proper accounting, this treatment tends to overstate 1949 earnings by the amount restored. Further analysis discloses that a portion of 1949 reported profits are of a non-recurring nature and thus not indicative of normal earning power.

For the first time, the company has officially revealed the profit it realized on the sale of its former Chemicals Division to the U. S. Rubber Co. This profit came to \$748,067 and was included in 1949 earnings. The company also sold apartment facilities it formerly owned at a price "in excess of their net book value." Presumably, this profit is included in the "Miscellaneous" income credits of \$191,591 in the 1949 report.

Further non-recurring profits included a recovery of real property taxes in the amount of \$224,994 and a recovery of funds in a foreign bank amounting to \$87,259. Royalties came to \$119,074 for 1949 and are likely to be of a continuing nature.

► **Normal Income**—Accordingly, adjusting for all possible non-recurring items and excluding the commercial transport cost restoration, previously written off, Martin's 1949 earnings, reflecting its "normal" manufacturing operations for the year, may be modified to about \$3,207,361 or around \$2.85 per share.

These non-recurring adjustments do not detract from the company's outstanding improvement in both earnings and financial position. After reflecting these modifications, the company

showed a net profit margin of almost 6.2 percent on sales of about \$52 million. For 1948, sales were higher, around \$72.7 million, yet the company submitted to a substantial deficit, largely due to inventory write-offs on its commercial transport development.

Martin has also cleared up its tax situation, a condition which was troublesome in past periods. In a previous action, the company was held liable for \$7,874,221 in additional federal taxes on 1945 earnings. Of this amount, \$2,569,776 was paid prior to Dec. 31, 1949. The balance is payable in installments, the last due Oct. 1, 1950.

This additional tax payment is more than offset by the fact that the company was not subject to any taxes on 1949 earnings because of its carry-forward tax credits. The management believes that it has additional tax credits for future years. The company is also entitled, under terms of a recent settlement, to recover \$1,187,457 in excessive taxes paid for 1943 and 1944.

► **Working Capital**—A much stronger balance sheet is presented at the 1949 year-end, in comparison with previous periods. From a peak indebtedness to the Reconstruction Finance Corp. of \$26.6 million, a material reduction to \$3 million at Dec. 31, 1949, has been accomplished. This amount is not payable until August, 1951, and may easily be anticipated.

Despite the debt reduction program of 1949, net working capital increased to \$11.1 million at the year-end compared with \$9.7 million a year earlier. The company's net worth amounted to \$19.6 million as of Dec. 31, 1949, up from the \$17.1 million shown in 1948.

In commenting upon the recent orders for 65 4-0-4's placed by TWA and Eastern, Martin's newly elected president advances significant observations in declaring: "Although little, if any, profit may be realized directly from the contracts . . . such activity would be of major importance in sustaining employment and in carrying portions of fixed charges that would otherwise be borne by other production. It is believed logical to expect, moreover, that if commercial production is resumed on the basis of these two orders, other airlines

. . . will also find it to their advantage to order this equipment, in which event reasonable profits will be realized."

Total Martin backlog at the 1949 year-end was \$71,655,000. This excludes the \$35 million plane order received from TWA and Eastern.

► **C-W Comeback**—Progress of another nature is revealed in the 1949 annual report of Curtiss-Wright Corp. Net profit for the year was placed at \$2,750,361 compared with \$5,313,298 for 1948. It is significant, however, that during the first half of 1949, the company lost \$1,909,309 but earned, after tax adjustments, \$2,750,361 in the second half. The new management presumably was able to effect corrective measures after it assumed office toward the end of the first half.

The key factor in the Curtiss-Wright Corp. remains in Wright Aeronautical Corp., its principal subsidiary. Of the parent's 1949 sales amounting to \$128,578,227, Wright accounted for about 58 percent. In 1948, the Wright contribution was only 45 percent of C-W's total sales of \$111,747,027. Despite increased sales by Wright, its net income declined from \$1,517,020 in 1948 to \$1,296,835 for 1949.

► **Development Costs**—This decrease in earnings is attributed to the large expenditures made by Wright for engineering and research development. Such charges bulked large in the parent's consolidated report, amounting to \$11,910,865 for 1949 compared with only \$6,419,078 for 1948. The management has indicated that it has made sharp reductions in this type of expenditures.

Pointed reference is made in the Curtiss-Wright annual report to the marked reduction in the company's net working capital position in recent years. This reduction is due primarily to the payment of dividends during 1948 and 1949 largely out of accumulated surplus developed in prior years. Further, a major drain was the cash outlay of \$4,234,898 for the purchase of 446,652 shares of the company's common stock. As a result, net current assets, as of Dec. 31, 1949, were down to \$78,123,098, off some \$25,217,859 from 1947.

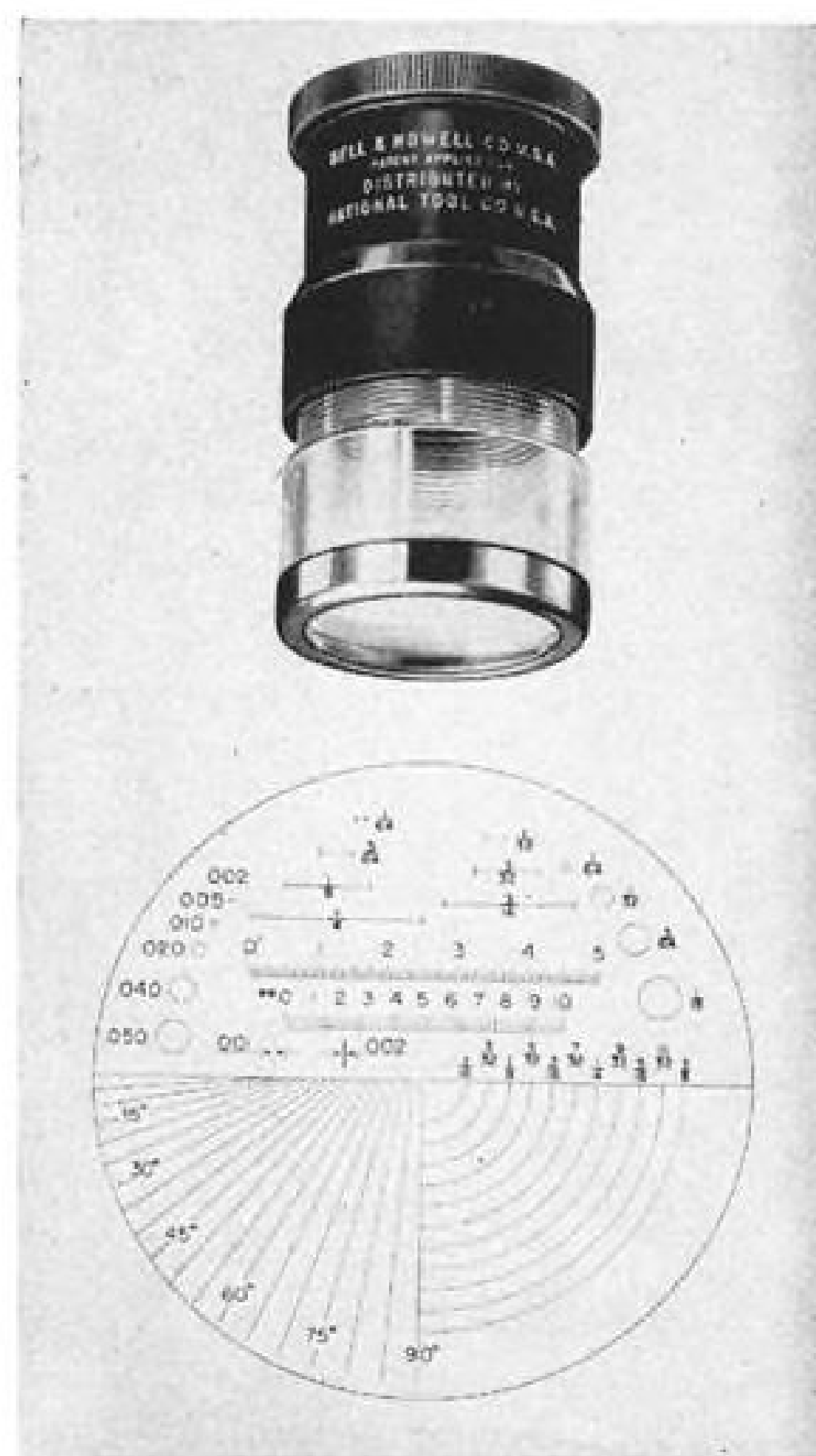
This would indicate that management is attempting to discourage any additional hopes for further retirements of its capital stock through new tender offers.

► **Real Test Ahead**—The management looks to 1950 and 1951 as a more accurate measure of the results expected to be achieved by its new policies. Among other things, policies as to quality control, cost control, budgeting and scheduling on a scale "not before attempted in the aircraft industry" will be in effect and carry the company's hopes of regaining leadership and sustained profitable operations.

—Selig Altschul



## NEW AVIATION PRODUCTS



### Quicker Inspection

Permitting inspection of parts without removing from production line and minimizing use of stationary inspection machines, Pocket Comparator, made by Bell & Howell Co., Chicago, Ill., is multi-purpose unit suitable for checking radii, angles, chamfers, threads, small holes, odd shapes and lineal, radial and tangent dimensions on machined, stamped or cast parts.

This single unit takes place of many different checking devices, which otherwise would be needed to perform these various inspections.

Distributed by National Tool Co., 11200 Madison Ave., Cleveland, Ohio, instrument has triplet-design, aplanatic-type magnifying lens through which parts can be checked against finely calibrated pattern or reticle. Lens has magnification of about 7 to 1.

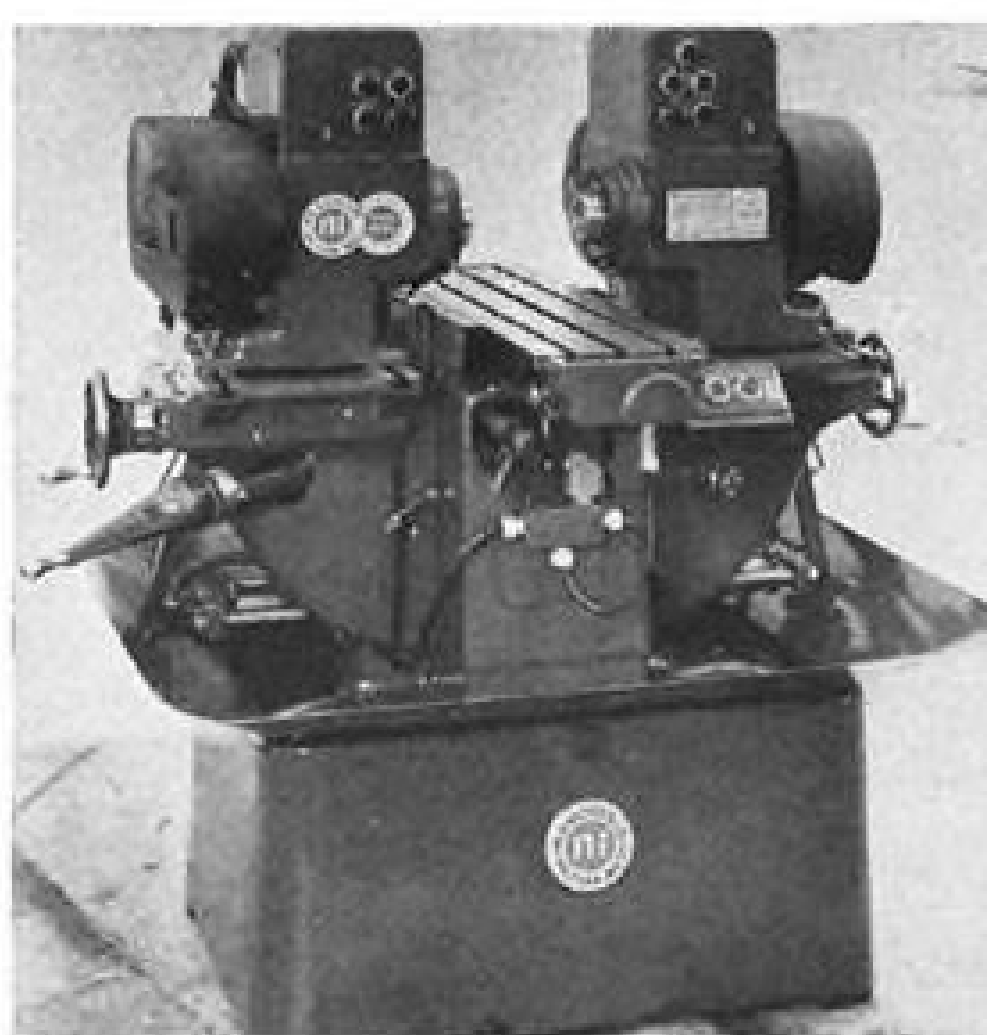
While instrument is new to industry, it reportedly has been used in Bell & Howell's own plants for several years to check forms and sizes of punches and dies, gages, templates and layouts, forms and dimensions of many types of cutting tools, amount of wear on cutting edges, size holes, fine threads and wires.

In aircraft manufacture, maker believes comparator would be particularly applicable in general inspection work, die casting and plastic molding, laboratory work and metallurgy.

### Spotlights Production

Spotlight helps locate work in blind operations and alleviates difficulties involved in positioning large assemblies on resistance welders, automatic riveters, dimpling and countersinking machines, punch and drill presses.

Offered by Sciaky Bros., Inc., 4915 W. 67 St., Chicago, Ill., unit is quickly attached by means of threaded stud and retaining nuts. It is easily positioned on ball and socket joint and spot of the light can be adjusted down to  $\frac{1}{8}$  in. dia. Beam is claimed to be intense enough to be clearly visible under all sharp lighting conditions. Spotlight has telescopic adjustment and special lens to permit sharp definition of the spot in a wide range of diameters. It can be equipped with a transformer of 110 or 220v., depending on line voltage required.



### Parts Milled Faster

To increase machine shop production, W. H. Nichols Co., Waltham, Mass., offers equipment designed to mill two or more surfaces simultaneously, but requiring one fixture and one operator.

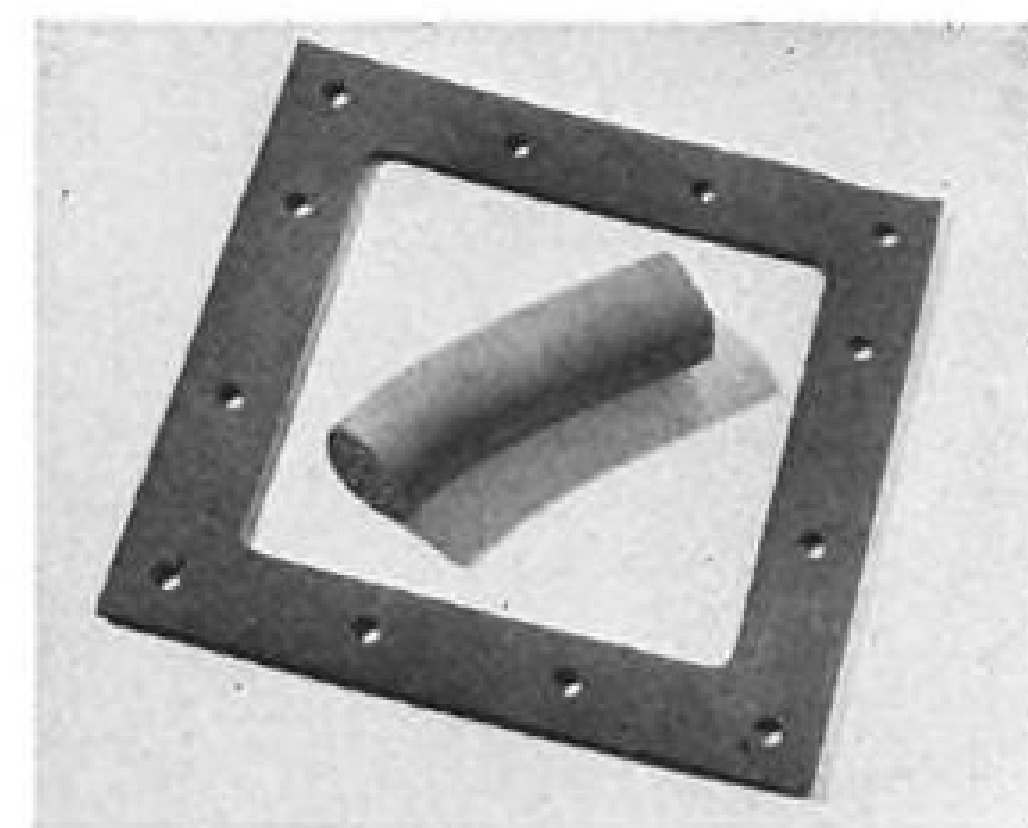
Intended primarily for automatic, light, high-speed milling operations on all machinable materials to very close limits, device, known as Twin Mill, has two independently geared milling heads mounted opposite each other on knee and saddle assemblies of conventional design. Table reciprocates automatically between milling units.

Each head is driven by individual 1-hp. motor providing a selection of 15 spindle speeds in geometric progression.

Either head may be independently adjusted up or down, in or out. Push button control system, mounted on each head, permits operation independently or in unison, forward or reverse.

Machine table, designed for auto-

matic operation, is powered by air-hydraulic system affording rapid approach to cutting position, infinitely variable, hydraulically controlled cutting feed, and rapid traverse to starting position. When work must be indexed between cuts, provision can be made for automatic repetition of table feed cycle and automatic indexing of work piece.



### Sealing Material

Improved Cohrlastic silicone rubber sponge, offered by Connecticut Hard Rubber Co., 407 East St., New Haven, Conn., is stated to be particularly suited for the fabrication of seals, gaskets and fairing strips which must have high vibration dampening ability at extreme temperatures.

Recent developments in silicone rubber compounds permit the production of sponges with a density of 25-35 cu. in./lb., which will resist temperatures ranging from -100 to 160 F.

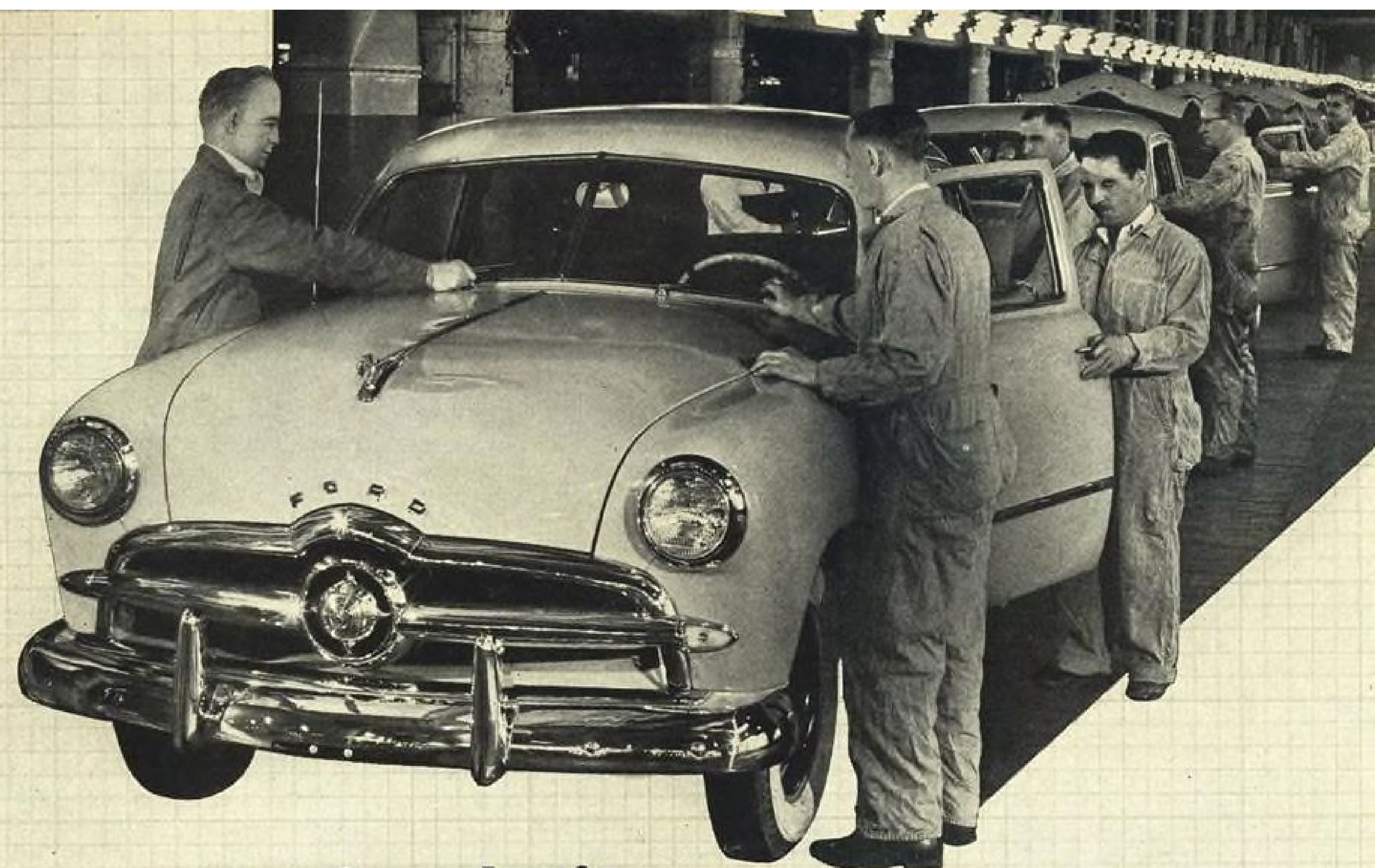
Cell size in this product is claimed to be more uniform than in earlier constructions. Material also has higher tensile, elongation and tear strength, and improved abrasion resistance.

It is available in  $\frac{1}{8}$ ,  $\frac{1}{4}$ , and  $\frac{1}{2}$ -in.-thick sheet, extrusions and molded shapes.

### Measures Fuel Flow

"Rotorol" 350-gpm. rotary meter, developed by Bowser, Inc., Fort Wayne 2, Ind., is lightweight unit designed for use with bulkplant, pipeline and tank-truck high-speed fueling operations. Device measures fuel flow through positive displacement, accomplished in precision chamber during each  $\frac{1}{4}$  revolution of rotor. Quick gear change permits reverse flow.

Complete dynamic balancing of rotor assembly is said to preserve accuracy and lengthen meter life by eliminating hydraulic and mechanical stresses. Designed for vertical or horizontal mounting, device has stainless steel ball- and needle-type bearings on rotor shaft. Running action of unit, provided by cam rollers, is claimed to be free enough to offer practically no resistance to liquid flow in gravity or pump systems.



to speed production

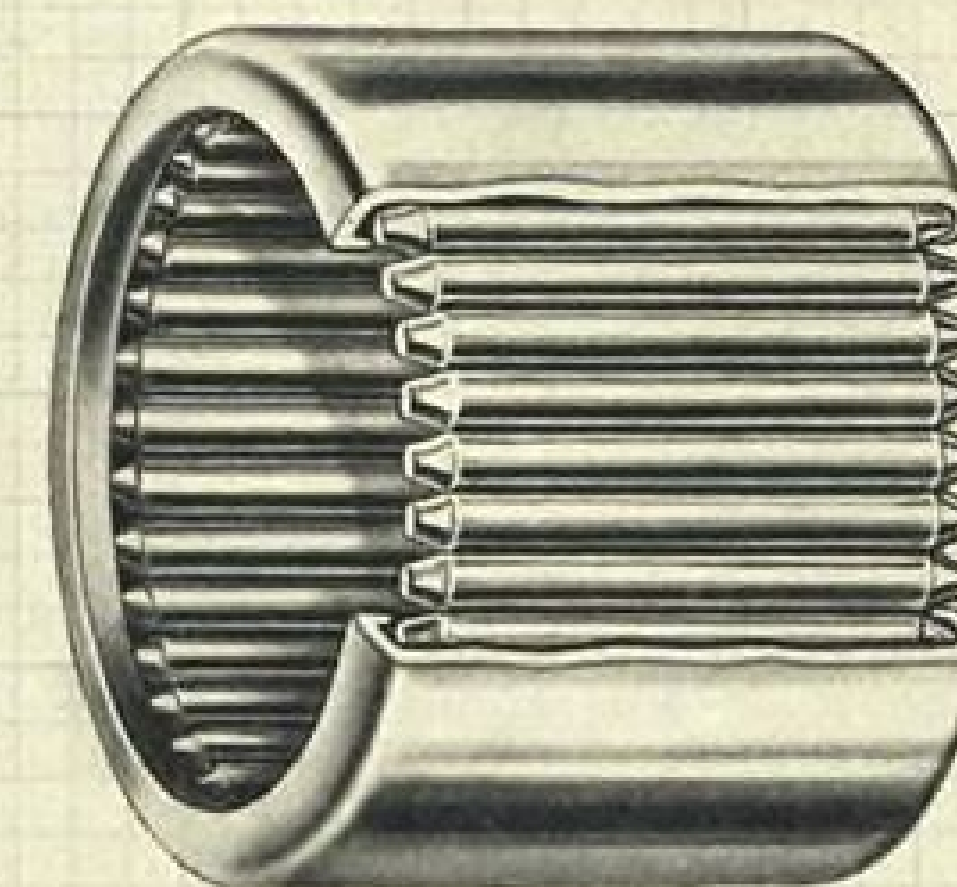
## TORRINGTON NEEDLE BEARINGS

simplify  
assembly

A full complement of small diameter rollers, retained within a hardened race as illustrated, became a single, compact unit widely known as the TORRINGTON NEEDLE BEARING—a unit which simplifies and aids assembly, facilitates disassembly and speeds up installation.

In addition, no complex housing structure is required... only a simple bore machined to proper dimensions. And no spacers or retainers are needed!

If you're seeking ways to speed production and simplify assembly, it can pay you real dividends to investigate the merits of Torrington Needle Bearings in terms of your own requirements. Call on our engineering department at any time.



### THE TORRINGTON COMPANY

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## TORRINGTON NEEDLE BEARINGS

NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • STRAIGHT ROLLER • BALL • NEEDLE ROLLERS



# AIR TRANSPORT

## Scheduled Cargo Lines' Rates Hit

Slick asks mail pay-subsidy separation; contracts 60c-a-ton-mile for mail with 15-c freight charge.

Equalization of the mail and freight rates of the scheduled airlines has been urged on the House Interstate and Foreign Commerce Committee by Slick Airways' president, Earl Slick.

Backing enactment of legislation separating airline subsidies from mail pay, the all-freight carrier president took issue with "those who would lead us to believe that a 60-cents-a-ton-mile mail rate is a service rate with no subsidy element present." He pointed to 15-cents-a-ton-mile freight rates on the scheduled lines and added, "Everybody knows it costs more to fly freight than mail. The freight carrier must solicit, pick up, sort, bill, deliver, collect the charges and handle the pay claims for each individual shipment."

► **Alternatives Seen**—He put his argument on an either-or basis: Either the 60-cent "non-subsidy" mail rate is too high and should be drastically cut back if and when mail pay is put on a cost-plus-reasonable-profit basis; or the regular airlines' freight rate has been set too low just to meet the competition of all-cargo carriers and should be boosted sharply.

Allowing a 10 percent profit, Slick said the operating cost per ton mile under the 60-cent "compensatory" mail rate would be 54 cents. He applied this 54-cent cost to the 28 million ton miles of freight handled by American Airlines over the first eleven months of last year at 15 cents a ton mile. His conclusion: American would have lost \$9,958,478 on the freight operation, which produced a total revenue of \$5,301,313.

If American's reported \$220,000 profit on its 1949 airfreight business is correct, Slick declared, then "the amount of subsidy in that so-called 'service' mail rate of 60 cents must be tremendous."

Other developments:

• **Senate Interstate and Foreign Commerce Committee**, which held extensive hearings on subsidy separation legislation last year, moved forward with a comprehensive report on the subject, due for release shortly.

• **Air Transport Assn.** was neutral on whether there should be separation. In testimony before the House committee, ATA general counsel Stuart Tipton argued that if there is to be separation,

the Civil Aeronautics Board should be given free rein to determine service rates on the basis of its wide knowledge of airline operations.

• **Seventeen carriers**, fearful that earmarking of subsidy payments would put airlines in a vulnerable position, asked that a study first be made "to determine whether segregation is feasible." This recommendation was made in a letter to Sen. Edwin Johnson (D., Colo.), chairman of the Senate Commerce Committee. If approved, the move would postpone separation.

• **Secretary of Commerce Charles Sawyer** suggested a separation plan to the House committee that would result in a slash in mail rates. He proposed that operating costs be allotted proportionately to the volume of business. Since approximately 80 percent of airline business is passenger traffic, this service would have to bear the major cost burden, and only a small portion would be allotted to mail service. Sawyer did not urge the plan, however, and said that determination of service rates should be left to CAB.

• **Association of American Railroads** vigorously endorsed separation in testimony before the House committee. AAR has long contended that low airline fares, luring passenger traffic from the rails, are supported by government mail subsidies.

## Carriers' Reports List 1949 Profits

Results of last year's traffic boom are continuing to make pleasant reading for airline stockholders.

Annual reports issued recently by United Air Lines, Northwest Airlines, Capital Airlines and Chicago & Southern Air Lines all disclose substantial profits for 1949. Operating revenues in each case were at an all-time peak.

► **January Up**—Adding to the air of optimism are the first official figures on 1950 business. They show that January's revenue passenger mileage on the 16 domestic trunklines was up 13 percent over the same period last year. Several carriers reduced their losses for the usually poor mid-winter period, and there was a sprinkling of profits.

United Air Lines' annual report for

1949 shows a \$2,249,405 net profit (88 cents a share on outstanding common stock). The earnings were UAL's first since 1946 and compare with 1948's net loss of \$1,070,358.

Company revenues last year totaled \$91,553,000, up 10 percent over 1948. Operating expenses gained only 2 percent.

► **UAL Mail Pay Down**—President W. A. Patterson said the 1949 increase over 1948 actually was greater than indicated by net income figures. UAL's air mail payments averaged 63 cents a ton mile, against 91 cents in 1948; federal and state income taxes were \$1,919,000 against tax credits of \$128,000 in 1948, and depreciation charges were \$12,308,000 compared with \$10,458,000 the preceding year.

(United's 1949 results, as well as those for 1948 and the last half of 1947, are not final because CAB has not granted a permanent mail rate for the period.)

Patterson said that UAL and the industry as a whole moved to a new level of economic stability last year. He expressed optimism over 1950 but cautioned that any nationwide lowering of air fares at this time could be highly destructive.

► **NWA in Black**—Northwest Airlines announced a systemwide net profit after taxes of \$1,357,649 in 1949, compared with a \$787,474 net loss in 1948. Last year's earnings equal \$1.11 per common share of stock outstanding after allowance for preferred dividends.

NWA's domestic and international revenues last year were a record \$40,501,000, up 15 percent over 1948. Operating expenses rose 6.89 percent. Company's 90,896,000 revenue passenger miles flown on coach operations accounted for almost 90 percent of Northwest's total passenger traffic gain in 1949.

Capital announced a net profit of \$834,178 last year (equal to \$1.74 a common share), compared with \$123,997 profit in 1948. In addition, an \$847,493 profit was realized through purchase of debentures for sinking fund payments. Thus the net income transferred to earned surplus at year-end was an impressive \$1,681,671.

► **Mail Pay Down**—The \$26,905,000 operating revenue in 1949 was 15 percent higher than the previous year. Passenger revenue soared 23 percent and cargo revenue climbed 21 percent over 1948 levels. On the other hand, while mail ton miles increased, revenue from this source declined \$337,000, reflecting a 23 percent cut in the unit cost of mail service to the government.

Capital's net working funds increased from \$640,000 at the end of 1948 to \$1,987,000 at the end of last year. The company paid \$996,000 in current and prior period interest on its debentures

during 1949 and retired \$2,165,000 in debentures, thereby bringing both interest and sinking fund payments to a current position. A \$3 million bank loan was paid off on Jan. 31, 1950.

► **C & S Business Up**—Chicago & Southern reported a \$630,000 net profit in 1949 (equal to \$1.24 a share on capital stock), compared with a \$639,000 net profit in 1948. Despite the slight drop in net earnings, business last year was in many respects the best in C & S history.

The company's 1949 operating profit of \$1,165,000 compared with \$889,000 the previous year—a 31 percent gain. But in 1948 the net was higher because income taxes were reduced \$138,000 by a carry-over benefit.

C & S paid a 35-cents-a-share dividend last October and was one of only three domestic airlines to make such a disbursement on common stock in 1949.

► **Outgo Itemized**—Of the carrier's record \$12,368,000 gross revenue last year, \$8,560,000 (69.2 percent) came from passengers, \$3,305,000 (26.7 percent) from mail, \$429,000 (3.5 percent) from express and freight, and \$73,000 (under 1 percent) from miscellaneous sources.

Expenditures included \$5,082,000 (41 percent) for salaries and wages, \$1,449,000 (11.7 percent) for gasoline and oil, \$1,102,000 (8.9 percent) for depreciation, \$1,189,000 (9.6 percent) for rent, landing fees, utilities and agency commissions, \$710,000 (5.7 percent) for taxes, \$613,000 (5 percent) for materials and parts, \$333,000 (2.7 percent) for food and passenger supplies, \$155,000 (1.3 percent) for insurance, and \$1,101,000 (8.9 percent) for all other items.

The \$174,000 paid out in dividends was 1.4 percent of gross revenues; while the \$451,000 retained in the business equaled 3.6 percent of total revenues.

► **1950 Prospects**—C & S believes domestic business in 1950 will be as good as last year, although a recession in Venezuela's oil industry may affect the international run adversely. Next August, the carrier will take delivery on the first of five Constellations ordered in September, 1949. Now using DC-4s and DC-3s, C & S hopes the new ships will permit it to regain its full share of long-haul competitive business.

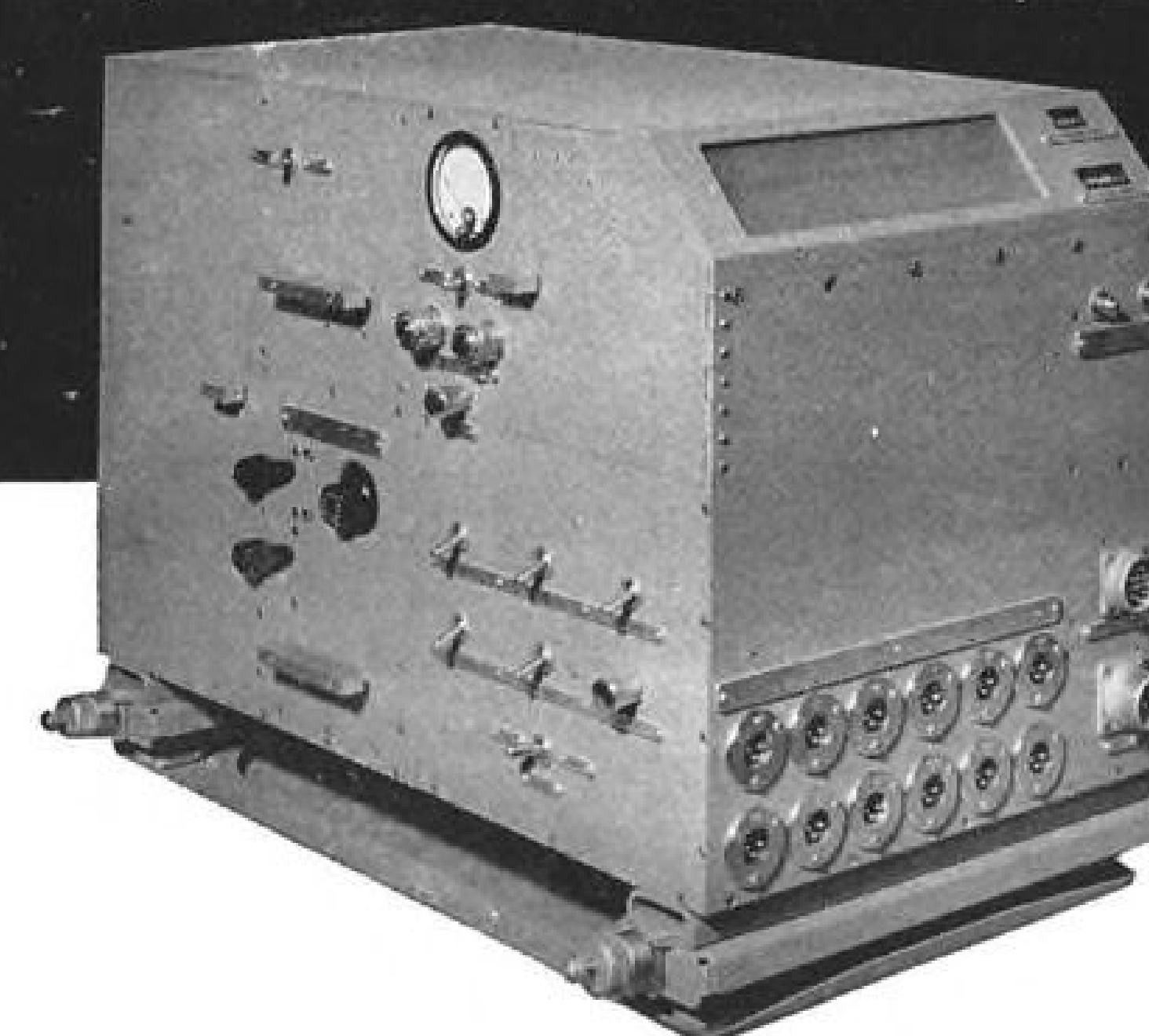
## Resort Airlines Under CAB Scrutiny

Following complaints by Colonial Airlines and Eastern Air Lines, the Civil Aeronautics Board has started an investigation into the activities of Resort Airlines, Pinehurst, N. C.

Resort was certificated last year to provide all-expense air tours between the

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where any or all of the above information is an important factor.



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U. S. and Mexico, the Caribbean area, South America and Canada. CAB will try to determine whether Resort has engaged illegally in interstate air transportation between New York, N. Y., and Lake Placid-Saranac Lake, N. Y., (as alleged by Colonial) and between New York and Miami (as alleged by Eastern).

The Board will also look into possible illegal flights from New York to New Orleans and from Miami and West Palm Beach, Fla., to West End, Grand Bahama Island. Resort recently requested a certificate for the latter run.

Whether Resort has disregarded its tariffs or engaged in "unfair or deceptive methods of competition" are other issues involved in the case, which might lead to a cease and desist order. Resort now has three DC-3s and leases two C-46s.

## Northwest Nonskeds Opposed by IAM

Nonscheduled airlines flying between Seattle and Alaska will be dealt a severe blow if a contract demand of the International Association of Machinists is granted.

The Alaskan salmon industry would like to continue using nonskeds for transporting machinists to and from the territory during the fishing season. It would only require that the planes meet "air carrier specifications." But the union wants its members to make the Seattle-Alaska run only on the scheduled airlines, which have shared the business in the past with the nonskeds.

► **Scheduled Carriers Blamed**—Salmon industry officials accuse Pan American Airways and Northwest Airlines of fomenting the union demand. The two scheduled carriers say it isn't so.

Real story behind the union demand, some observers believe, is the unhappy experience of a union official in a non-sked C-46 last season. He emerged with shattered nerves after a rough ride and is said to have sworn that the cannery companies would transport workers "first class" in the future—or else.

► **Troubled Waters**—IAM is one of two major unions dealing with the salmon industry. Should the machinists gain their demands, the other major—and larger—union, the fishermen's, might act similarly. Result would be a major loss of revenue for Seattle-Alaska nonskeds, which are already plagued by Civil Aeronautics Board crackdowns and frequently cut-throat competition.

## Hawaiian Lines Have Poor Year

Bringing competition to Hawaii's passenger air lanes has proved an expensive venture.

Trans-Pacific Airlines, which last year won a CAB certificate to challenge Hawaiian Airlines' 20-year monopoly of Hawaiian inter-island air traffic, has reported a 1949 deficit of \$363,000. Of the loss, some \$200,000 was incurred converting to scheduled operations that started last June. The carrier does not fly air mail.

TPA's total debt, adding in losses from the time the line was started in 1946, stands at \$752,000, according to President Ruddy F. Tongg. Stockholders have paid in roughly \$900,000.

► **On the Other Hand**—Meanwhile, Hawaiian Airlines reported a \$54,000 net profit in 1949—well below its 1948 earnings of \$105,000. Its passenger total fell from 345,000 in 1948 to 304,000 last year.

TPA in the last six months of 1949, when it was operating as a scheduled carrier, hauled 43,000 passengers—substantially under the mark it had set itself. Besides blaming each other, both Hawaiian and TPA can blame some of their troubles on the May-to-October dock strike which slowed down business in the islands and nearly throttled the tourist trade.

► **New Capital Sought**—Negotiations are now under way to get more capital to keep TPA going. Three offers to buy Tongg's stock are reported. TPA also is seeking a \$150,000 Reconstruction Finance Corp. loan.

Tongg, it is understood, will sell his stock only if assured that the airline will be kept operating and that minority stockholders will be protected. The company's stockholders' report cites two other possible sources of income for TPA: damages in a monopoly suit against Hawaiian and its parent company, Inter-Island Steam Navigation Co.; and mail pay, which the carrier requested from CAB recently (AVIATION WEEK, March 20).

## Field Fire Protection Problems Discussed

Indianapolis—The present fight between the scheduled airlines and airports in the United States over which will pay the costs of a program of protection against fire accidents in commercial aviation will probably be worked out on an individual basis, the Committee on Aviation and Airport Fire Protection of the National Fire Protection Assn. was told at its meeting here.

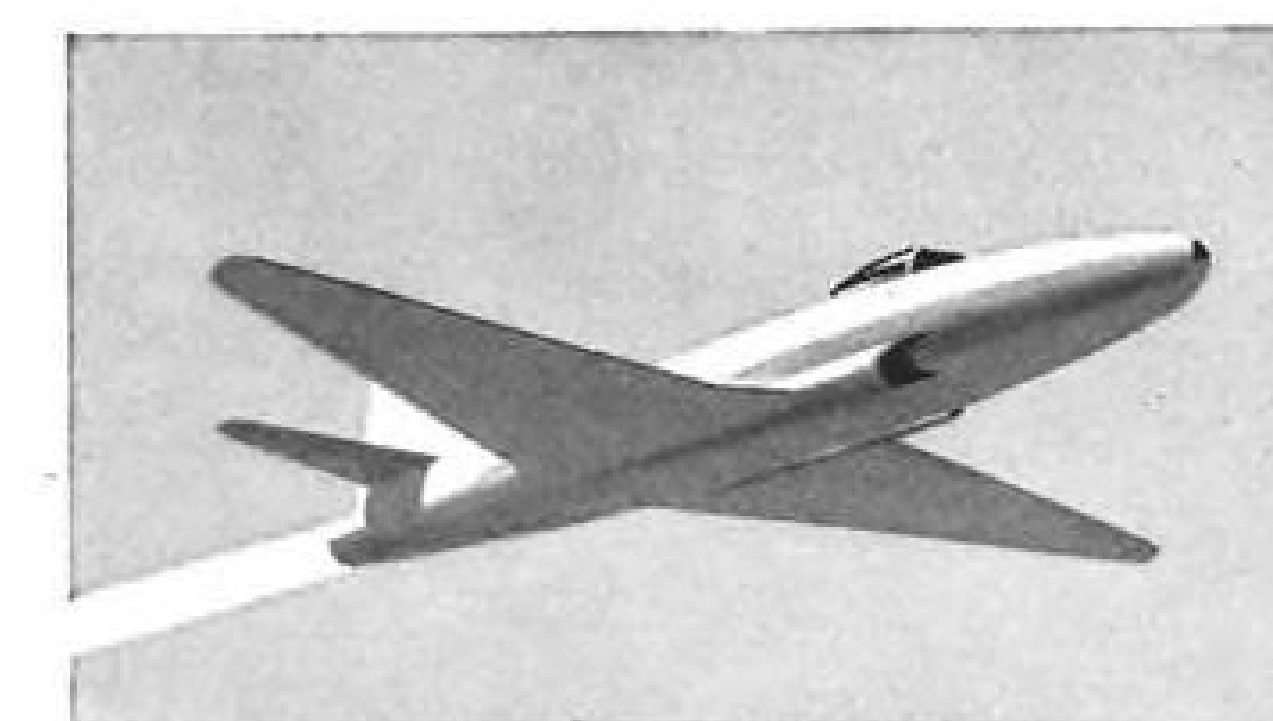
Jerome Lederer, President of Flight Safety Foundation, advised the 69 delegates that the problem was principally one of economics but that it remained to be met. He cited an official report of 140 alarms at LaGuardia Field in New York last year and six to date this year, as an indication that compre-

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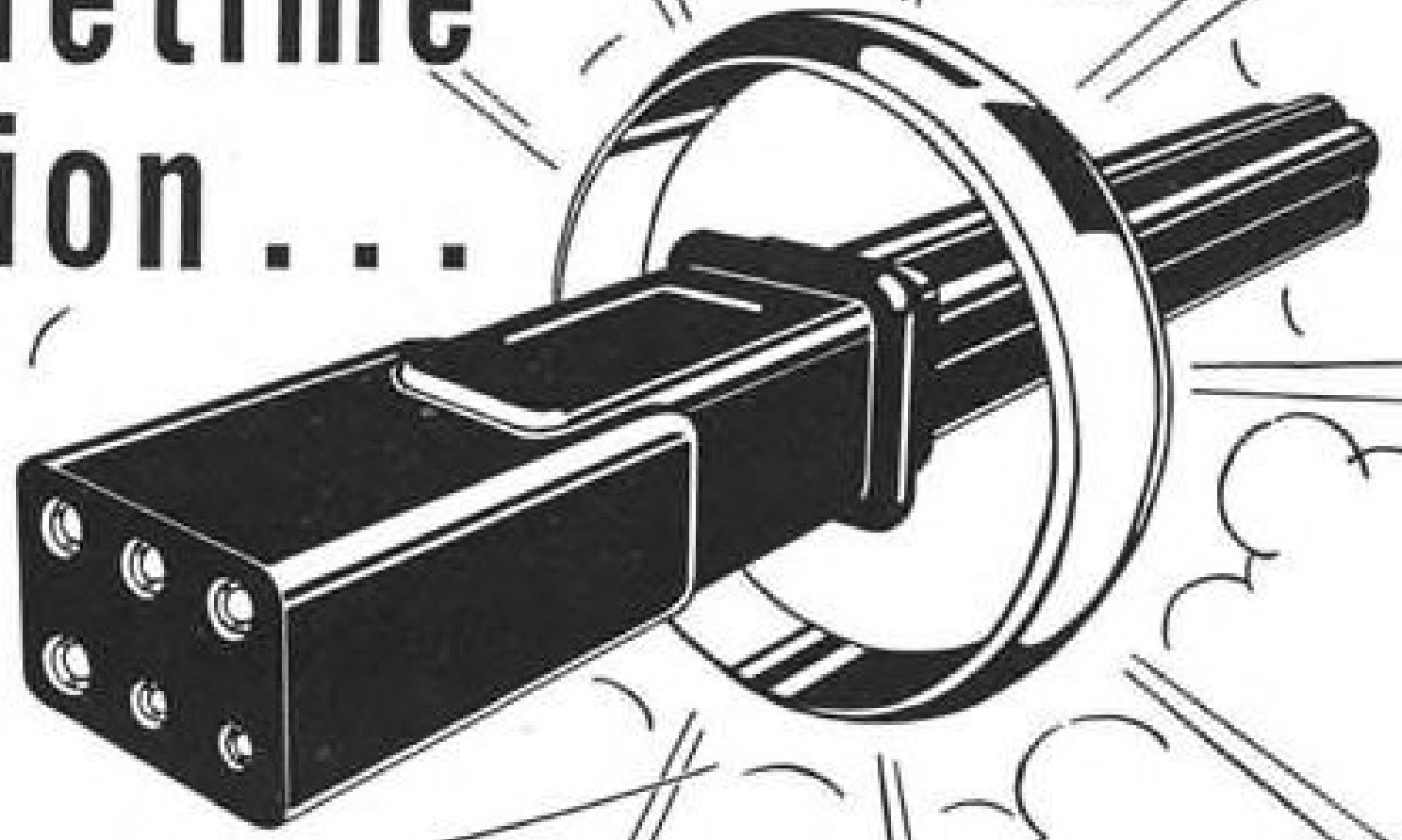
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hensive programs still were necessary.  
► **Designer's Role**—Aircraft engineers also have a part in the problem. Fire protection in aircraft should be considered much earlier in design than is now the practice, the delegates were told by I. J. Hammill, Fire Extinguishers Manufacturers Assn. representative.

He said present practices in aircraft design handicap fire equipment manufacturers in developing and providing effective equipment.

But cooperation between the Aircraft Industries Assn. and the Air Transport Assn. already has brought a marked improvement in commercial aviation safety, Allen W. Dallas, ATA's director of engineering, told the meeting.

Two of the most notable advances, he said, were propeller feathering and placement of fuel and oil shutoff valves on the safe side of the firewall. He said the latter feature was now standard in U. S. commercial aircraft design.

► **British Contribution**—Peter Hadfield, technical assistant to the Civil Air Attache of the British Embassy in Washington, told the meeting that impact-actuated fire extinguishing systems in British civil aviation had been proved a definite success.

The system is now used on all British civil aircraft, in contrast to U. S. civil aviation, in which it is hardly used at all.

Hadfield said that fears of U. S. aviation experts had not been borne out by experiences in England, where there is not a single failure on record. No accident, major or minor, from accidental operation of the system has occurred, he said.

► **Equipment**—American fire fighting equipment in civil aviation is not 100 percent perfect, but perfection must be sought in a combination of techniques and equipment, rather than in any single approach, Chief Milton M. Fischer of the Mitchel Air Force Base of New York, told the meeting.

He said the effectiveness of American equipment was the best in the world and that it has proved its purpose in rescue and extinguishment.

## Reductions Offered For Atlantic Travel

A bonus of over 20% is now being offered trans-Atlantic air travelers who schedule their trips during the off-season rather than the peak season.

The new rate structure was set by International Air Transport Association at its Mexico City Meeting last November.

The new schedule is being followed by IATA's ten members flying the North Atlantic: Air France, American Overseas Airlines, British Overseas Airways Corp., KLM Royal Dutch Air-

lines, Pan American World Airways, SABENA Belgian Airlines, Scandinavian Airlines System, Swissair, Trans-Canada Air Lines and Trans World Airline.

► **Good for Year**—Travelers flying in either direction will be able to take advantage of the reduced rates during seven months of the year. Smaller reductions will be offered on trips made one way during the peak season and one way during the off-season. Full fares apply during April, May, June, July and August, with reductions in force the rest of the year. Tickets will be good for one year.

Some typical roundtrip fares to or from New York, with the full fare listed first, followed by the off-season fare and then the rate for trips one way during peak and one way during slow season: London, \$630, \$466.70, \$548.40; Paris, Brussels or Amsterdam, \$666, \$493.40, \$579.70; Copenhagen, \$696.60, \$531.20, \$615.70; Rome, \$786.30, \$614.40, \$700.40.

## New TCA Route

Trans-Canada Air Lines has been granted a foreign air carrier permit to



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Pan American Airways cargo pilots no longer need depend on cold box lunches. Instead they can have a hot dinner in the cockpit with the help of a self-heating tin can. One container sheathes another holding the food, with a lime compound in the space separating them. When the outer can is punctured, water drops into the chemical, generating chemical heat. Pilots have a choice of such items as chicken chop suey, chicken noodles, chicken and rice, hamburger and mushrooms, frankfurters and beans, egg noodles a la king, chile con carne, beef stew, chicken fricassee, spaghetti, egg noodles and cheese, and corned beef hash. Capt. Leslie Brissette is shown demonstrating the new meal warmer by puncturing the outer can.



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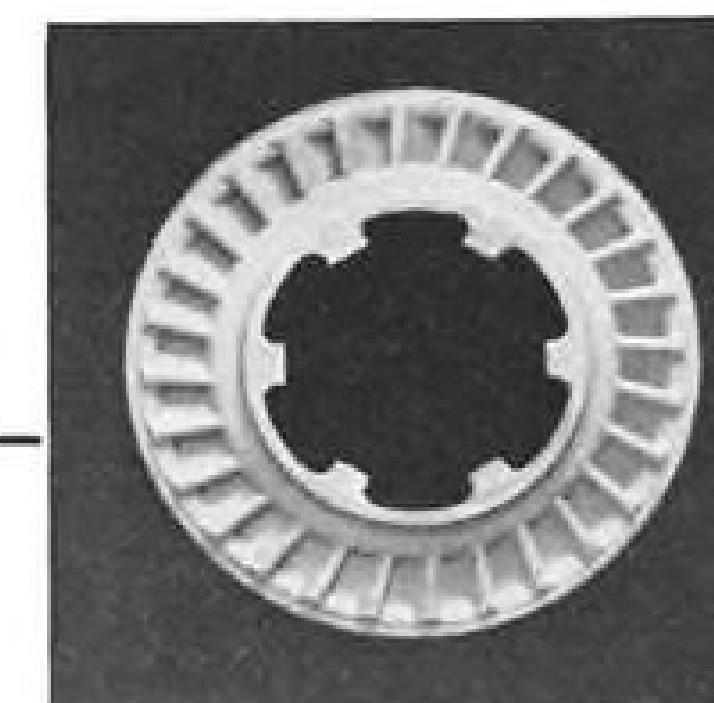
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Civil Aeronautics Board granted the permit, with White House approval, in accordance with a bilateral air agreement now in effect between the U. S. and Canada. TCA plans to operate Canadair DC-4M-2 aircraft on the route. Tentative schedules call for two roundtrips weekly between Canadian points and Tampa-St. Petersburg, one trip terminating at Nassau and the other at Kingston, Jamaica.

## ALPA's Design for DC-3 Replacement

The Air Line Pilots Assn., which had harsh things to say about both the Martin 2-0-2 and the Convair-Liner when those planes first appeared, has proposed its own specifications for a short-haul transport to replace DC-3s.

Compiled by ALPA's engineering and air safety department, and outlined in the union's magazine, the specs call for a twin-engine, tricycle gear monoplane of either high-wing or low-wing design. Plane would seat 20-26 passengers with rows of two seats on each side of the aisle, and no passengers in the "propeller danger area." It should be able

to use DC-3 service and maintenance facilities.

ALPA says high speed is desirable, but not at a sacrifice of low landing speed.

## SHORTLINES

► **All American**—Is planning large promotion posters on the bulkhead opposite the entrance of its planes and may later consider selling the space to an advertiser.

► **American**—Reports its passengers can now order rental cars to be available on arrival at any of 60 points in the U. S. and Europe.

► **Arrow Airways**—The California non-scheduled recently obtained a temporary stay in the U. S. Court of Appeals for the District of Columbia against enforcement of a CAB regulation adopted late last year which governs the relations between large irregular carriers and their ticket agents. The CAB rule requires carriers and agents to put their agreements in writing, tries to prevent combination of carriers directly or through common ticket agents, and requires tickets to show which nonscheduled is to make the flight.

► **Braniff**—Has asked CAB for a certificate amendment designating New Orleans as a co-terminal with Houston on its Latin American route.

► **BOAC**—Is conducting an experiment with white paint on top surfaces of Canadair transports operating from London to South America and the Far East. It is hoped that the paint will reduce the planes' cabin temperature by 12-15 deg. during stops at tropical airports. Similar tests have been made in the U. S.

► **Civil Aeronautics Board**—Worried by past abuses, has tightened its rules of practice so that no person formerly associated with CAB can represent a client before the Board, directly or indirectly, on any matter which he handled while employed by the governmental agency. Neither may he use confidential information obtained while he was with CAB unless the Board first gives its consent.

► **Delta**—Reported the best business in its history during February. Passenger mileage was up 26 percent over the same 1949 month. Aircoach flights had a load factor of around 93 percent and regular flights had a 79 percent load factor.

► **Flying Tiger Line**—Has signed an interline freight agreement with Braniff.

► **National**—Had a \$384,000 profit in February—best in company history and well over the \$301,000 profit for February, 1949. Revenues were up 26 percent over the comparable period last year, and revenue passenger miles rose 47 percent.

► **Pan American**—Expects a record flow of tourists between the U. S. and Latin America this summer.

► **Railway Express Agency**—Recent Interstate Commerce Commission action authorizing REA to boost rates 10 percent on first-class, less-than-carload rail shipments is expected to benefit air-freight business. It is the fourth rate hike granted REA since the end of the war.

► **Sabena**—President Gilbert Perier believes jet transports will be ready for delivery before the carriers will be in a position to operate them efficiently with present ground organizations and air traffic control. . . . The carrier's trans-Atlantic passenger traffic last year was about 50 percent over 1948, and 1950 should see further improvement.

► **TWA**—During January carried 56 percent more passengers from the U. S. to Rome than in the same period last year. Holy Year traffic was expected to swell even more during February.

► **United**—Soon will increase its cargo lift substantially through conversion of four passenger DC-4s into all-cargo planes. The carginers will be available this summer and have a 17,000-lb. capacity, giving UAL an all-cargo fleet of eleven DC-4s and 13 DC-3s.

► **Washington National Airport**—Has started testing its new system of high-intensity, slope line approach lights.

► **Wisconsin Central**—Carried 48,311 passengers in its first two years of operation, which ended Feb. 28.

## CAB SCHEDULE

Mar. 27—Prehearing conference in National-Eastern sky coach tariff case. (Docket 4302)

Mar. 27—Resumption of hearing in West Coast Airlines certificate renewal case. (Docket 3966 et al)

Mar. 27—Hearing on CAB's enforcement action against Arrow Airways. (Docket 4199)

Mar. 27—Hearing on enforcement action against National Travel Club, Inc. (Docket 4194)

Mar. 29—Prehearing conference in Big Four mail rate case. (Docket 2849 et al)

Mar. 30—Prehearing conference in re-opened California-Nevada service case. (Docket 2019 et al)

Apr. 3—Oral argument in U. S.-Alaska service case. (Docket 3286 et al)

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

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

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

June 19—Hearing on CAB investigation of Northwest Airlines' tariff practices and uncertificated operations of Fly Freight, Inc., and Sterling Freightways. (Docket 4230)

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Published by Temple Press, Ltd., Bowling Green Lane, London, E.C. 1, over 574 pages, price \$1.47.

### New Literature

Kansas Airport Directory for 1950 contains 72 pages listing services available at the 178 municipal, commercial, and CAA intermediate airports in the state, also includes 250 private airstrips. Included are light code for airport traffic control, air emergency distress signals code and safety hints. Write to division of aeronautics, KIDC, 903 Harrison, Topeka.

Booklet published by Dow Corning Corp. describes and illustrates aircraft and electronic uses for DC 4 silicone compound for excluding moisture from ignition systems. Write the company at Midland, Mich.

"A Guide to Air Shipping via the Port of New York" is latest edition of booklet describing air cargo procedures and services available to shippers and air carriers serving N. Y., with locations of their principal offices in the U. S., shipping rates from 20 principal U. S. cities to N. Y. via railway express, air parcel post, and air freight, and air cargo rates to nearly 100 foreign cities. Available from Port of N. Y. Authority, Dept. of airport development, Port of N. Y. Authority, 111 Eighth Ave., N. Y. 11, N. Y.

Booklet giving analysis of pension plans appraises the many problems management must consider in desiring whether or not a pension plan is desirable and feasible. Write The Research Institute of America, Inc., 292 Madison Ave., N. Y. 17, N. Y.

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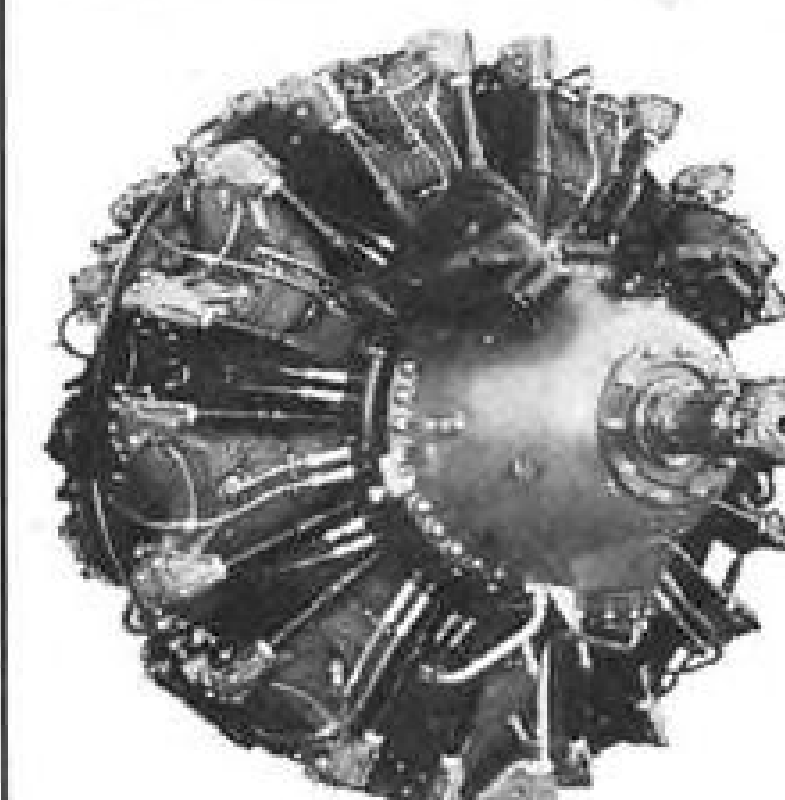
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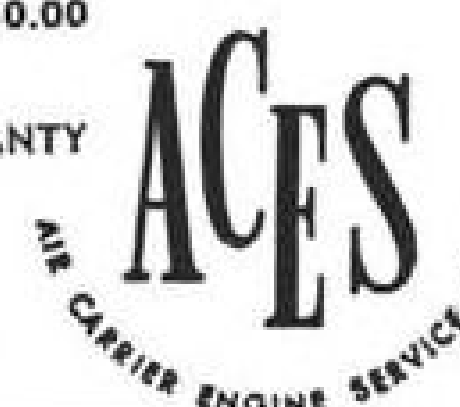
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EDITORIAL

The Impact of Air Coach

Free enterprise is having another fling in the air transport industry. It is proving to be an energetic ghost—perhaps too energetic for its own good.

For the most part, untrammelled airline competition was laid to rest by the Civil Aeronautics Act of 1938. It tried to come back through postwar non-scheduled and contract carriers. But the Civil Aeronautics Board has cracked down on many of these operations, ruling that they are in violation of the agency's economic regulations.

With interstate services under increasingly rigid controls, California Central Airlines tried its hand at scheduled intrastate flights between Los Angeles and San Francisco a little more than a year ago. Operating 28-passenger DC-3s at the three-cents-a-mile fare envisioned by C. R. Smith, the Burbank-based operator took on this imposing array of competitors: the Southern Pacific, and Atchison, Topeka and Santa Fe Railroads; three bus lines, including Pacific Greyhound; four certificated airlines (United, TWA, Western and Southwest) and five other uncertificated airlines.

Thus far, Cal Central's gamble in free enterprise has paid off. Except for the first month of service it apparently operated in the black throughout 1949.

More importantly, the Los Angeles-San Francisco run (one of the three most traveled air routes in the U. S.) has become a testing ground for how much air transportation the public will buy if the price is right. Bitter complaints by surface carriers, and the scramble by certificated airlines to climb the intra-California coach bandwagon, attest to the drawing power of a three-cent airline.

Still, Cal Central's success on the 350-mi. Los Angeles-San Francisco run could be duplicated on few, if any, other routes in the U. S. Such a low-fare, uncertificated operation requires a heavy natural traffic flow between two large cities located in the same state but far enough apart to bring out the airplane's time advantage over surface transportation.

Comparison of rail, bus, air transportation between Los Angeles and San Francisco during the past two years illustrates the tremendous impact of air coach. In 1948, before the advent of intrastate air coach, the railroads handled 421,000 passengers (44.4 percent of the common carrier total) between the two California cities; buses accounted for 266,000 (28 percent) and the airlines 262,000 (27.6 per cent).

But in 1949, the airlines, both certificated and uncertificated, were in first place, carrying 406,000 passengers or 43.1 percent of the total common carrier business. Rails last year handled only 308,000 passengers (32.7 percent) and buses 228,000 (24.2 percent). Total air coach revenue on the San Francisco-Los Angeles link last year exceeded \$1.7 million.

By the start of 1950, daily San Francisco-Los Angeles airline schedules—both first-class and coach—numbered 43. This compares with 11 railroad and 38 motorbus schedules.

The \$9.95-\$9.99 fare charged by the coach airlines on the intrastate run contrasts with \$19.15-\$21.05 (about 6 cents a mile) on regular airline flights; \$16.30-\$26.48 by rail Pullman; \$6.20-\$7.50 by rail coach, and \$5.15-\$5.65 by motorbus. Airline travel time of 2-3 hr. (airport-to-airport) compares with 9½-15 hr. by rail or bus.

Surveys made by the California Public Utilities Commission indicate that 41 percent of the Los Angeles-San Francisco air coach business comes from people who either would not have made the trip at all or would have used a private automobile. Around 34 percent of the air coach business was diverted from first-class airline flights, 20 percent from the railroads and 5 percent from the buses.

When Cal Central carried over 2000 passengers during its first month of operation (January, 1949) and kept gaining business, there were two reactions. One group of carriers—railroads, buses and certificated airlines—tried to get the California Public Utilities Commission, the Civil Aeronautics Board and even the labor unions to upset CCA's applecart. Another group of uncertificated airlines jumped into the intrastate coach business themselves.

Hard hit by the coach competition, Western Air Lines President T. C. Drinkwater last July lashed out at the "unscrupulous" cut-rate carriers for allegedly flying without proper safety regulation, confusing the public with misleading advertisements, paying non-union wages and flying only when they had a profitable load. But little more than a month later, Western Air Lines of California (of unadmitted parentage) began \$9.95 Los Angeles-San Francisco coach flights using not only high-density DC-4s leased from Western, but also Western crews, maintenance, dispatching, communications and ticketing facilities.

WALC made money from the start and soon was carrying more passengers than Cal Central (AVIATION WEEK Feb. 6). This month, Western was ready to ask CAB permission to conduct \$9.95 Los Angeles-San Francisco coach flights under its own name.

United Air Lines complained bitterly to CAB against Western of California, characterizing the carrier as "a mere instrumentality of Western" set up in possible violation of the Civil Aeronautics Act. Cal Central filed a \$500,000-damage suit against WALC and WAL, charging violation of the state's anti-trust law, unfair trade practices, libel and slander.

(Continued on page 54)



# EDITORIAL

(Continued from page 53)

But now UAL has decided to fight fire with fire. Still convinced that air coach is "uneconomic," United nevertheless plans to ask CAB permission to start three-cents-a-mile flights between Los Angeles and San Francisco on May 14 with 70-passenger DC-6s. Use of DC-6s might well play hob with present DC-4 and DC-3 operations.

Meanwhile, the question of whether three-cents-a-mile intrastate coach services are uneconomic was decided in the negative by the California Public Utilities Commission on March 14. It said that the \$9.95-\$9.99 fares are sufficient to return operating costs and yield some profit—as proved in the cases of Western of California and Cal Central.

In dropping its investigation of the cut-rate airlines, the commission conceded it is problematical whether these carriers can continue to show profits in the future if competition intensifies.

Col. C. C. Sherman, Cal Central president, has had long experience with cut-rate air coach operations. He was general manager of Airline Transport Carriers, Inc., which since 1946 has been one of the major non-scheduled transcontinental operators.

As happens sooner or later to almost all nonskeds, ATC last fall became the object of CAB enforcement action. The company was prohibited from making more than eight roundtrips between any two interstate points during any four successive weeks.

Thus restricted in its coast-to-coast operations, ATC was doubly glad that some of its planes and crews were being leased to Cal Central for intrastate flights that presumably are beyond CAB's economic jurisdiction.

Last year, with a fleet of nine DC-3s, Cal Central flew more than 91,000 passengers without mishap. Col. Sherman, a World War II pilot, frequently takes over the controls on his company's flights. He says Cal Central's safety standards are in line with scheduled interstate carriers and fully meet CAB's stiffened requirements.

According to Sherman, Cal Central showed "an appreciable profit" during its first year, but he gives no figures. However, the California Public Utilities Commission estimates that during the first 10 months of 1949 CCA made well over ten percent profit on its investment.

In his suit against Western, Sherman contends that the certificated company created Western of California as a "firing squad" for Cal Central and other intrastate lines—some of whom were forced out of business when WALC appeared on the scene. But with a wary eye on United's DC-6 coach proposal, Sherman is going ahead with plans to boost his DC-3s' capacity to 32 passengers and bid for even more business.

Sherman is proving once again that free enterprise doesn't die easily. If it did, air coach might still be missing from the U. S. air transportation scene.

—C. L. A.

## An Editorial Apology

Last March 28 on this page we ventured our editorial opinion that United Air Lines was making "an honest mistake" in its refusal to consider air coach service.

We then wrote: "We also predict that UAL will have a lower fare schedule well within six months." Immediately thereafter we received several unofficial and indignant comments from United people to the effect that their organization would "never" institute air coach service.

Now, United, as the last major airline hold-out, has filed with the Civil Aeronautics Board its intention to start coach operations with DC-6s on the already heavily competitive San Francisco-Los Angeles segment May 14, where low-fares were pioneered by the nonskeds.

It was inevitable that United eventually would be compelled to start air coach service. But the six-months period of our forecast was up as long ago as Sept. 28. We regret this inaccuracy and apologize to our readers.

P. S. In the same editorial Mar. 28 we also said, "And if American doesn't enter this coach picture before long we will abandon all attempts at forecasting." American started in December.

## Wanted: Teamwork

The Air Transport Association's Executive Vice President, Robert Ramspeck, made an address before the TWA Management Club that is deserving of more attention.

"One of the major problems facing the airlines . . . is the adoption of a unified public relations program," he said. "It should be confined to major principles and should be implemented by each member company of the ATA. Since I came with the Association in January 1946 we have had no industry public relations program. In fact, we have had no industry program. We have been waiting until the fire bell rang—then we rush out to stop the fire. That is defensive action only. We need a positive program."

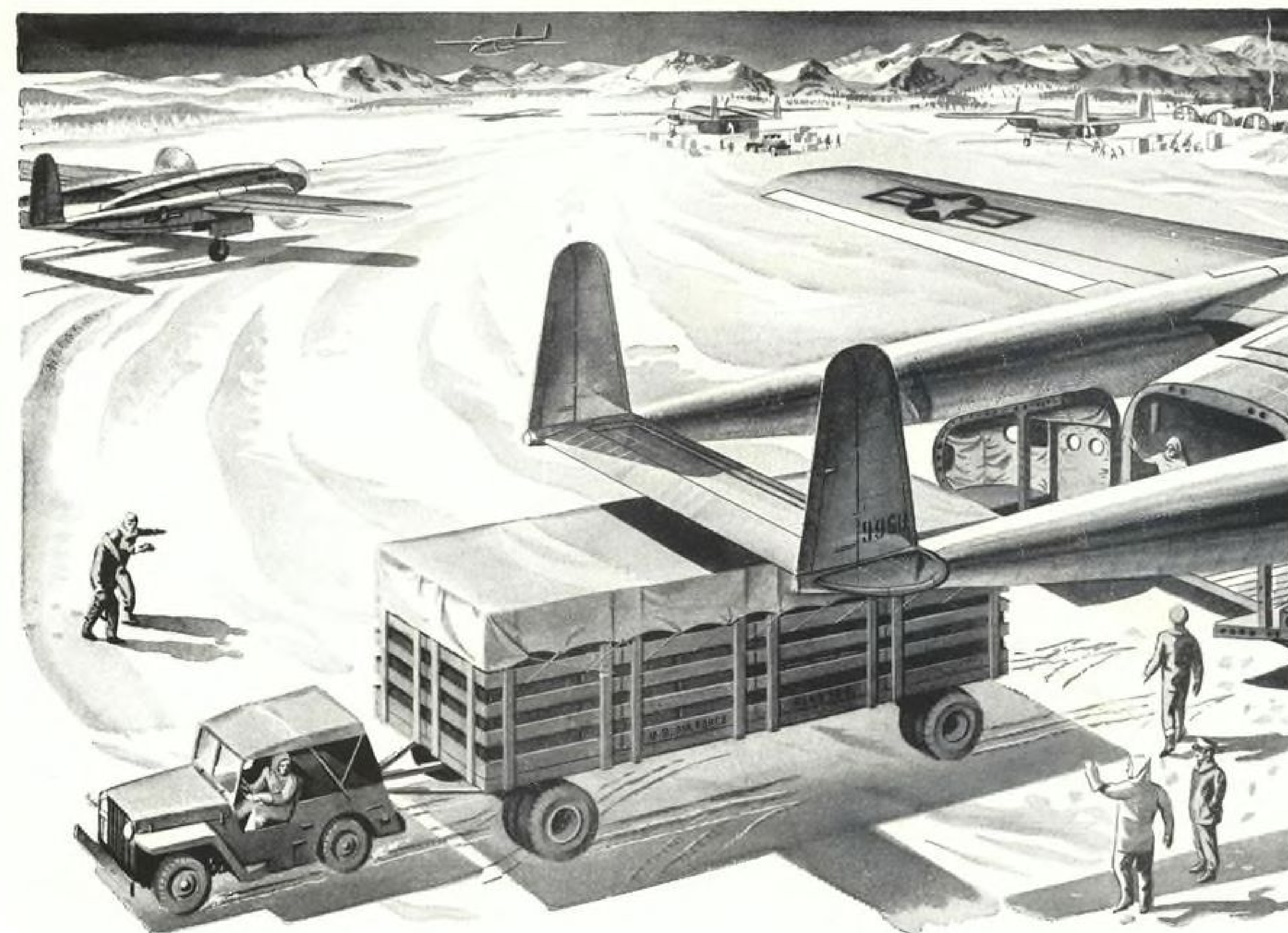
Mr. Ramspeck, who came to ATA from the House of Representatives as one of the most distinguished members that body ever had, says this positive program should deal with employe relations, community relations, customer relations and governmental relations.

"What we need in this industry is team work. Let us give the facts to our employes, to the communities we serve, and to the public—also to our public officials, federal, state and local."

Mr. Ramspeck knows what he is talking about. The various members of the ATA have everything to gain and nothing to lose by closer cooperation.

No transportation industry ever had such a glamorous or more impressive service to sell the American people. A strong, positive, cooperative campaign to "fly the millions" has great possibilities. The people want to fly. First give them a chance with good, safe service at low fares. Then sell!

—Robert H. Wood.



## DELIVERY —

# Via the Air Route

The Military Air Transport Service (MATS) contributes to the mobility of the Armed Forces by airlifting cargo and personnel *whenever* and *wherever* needed to fulfill national military requirements.

Fairchild C-119 Packets, soon to be flying for the Military Air Transport Service, help fulfill this vital air transportation mission. Capable of carrying 64 passengers or 10 tons of cargo, this twin-engine transport and cargo plane has the *versatility* to accomplish numerous types of operations required via the MATS Air Route.

The C-119's unique rear loading at truck-bed

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ENGINE AND AIRPLANE CORPORATION  
**FAIRCHILD** Aircraft Division  
HAGERSTOWN, MARYLAND



# Ideas For Sale

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