

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

DEC. 22, 1952

50 CENTS

To our friends
the world over

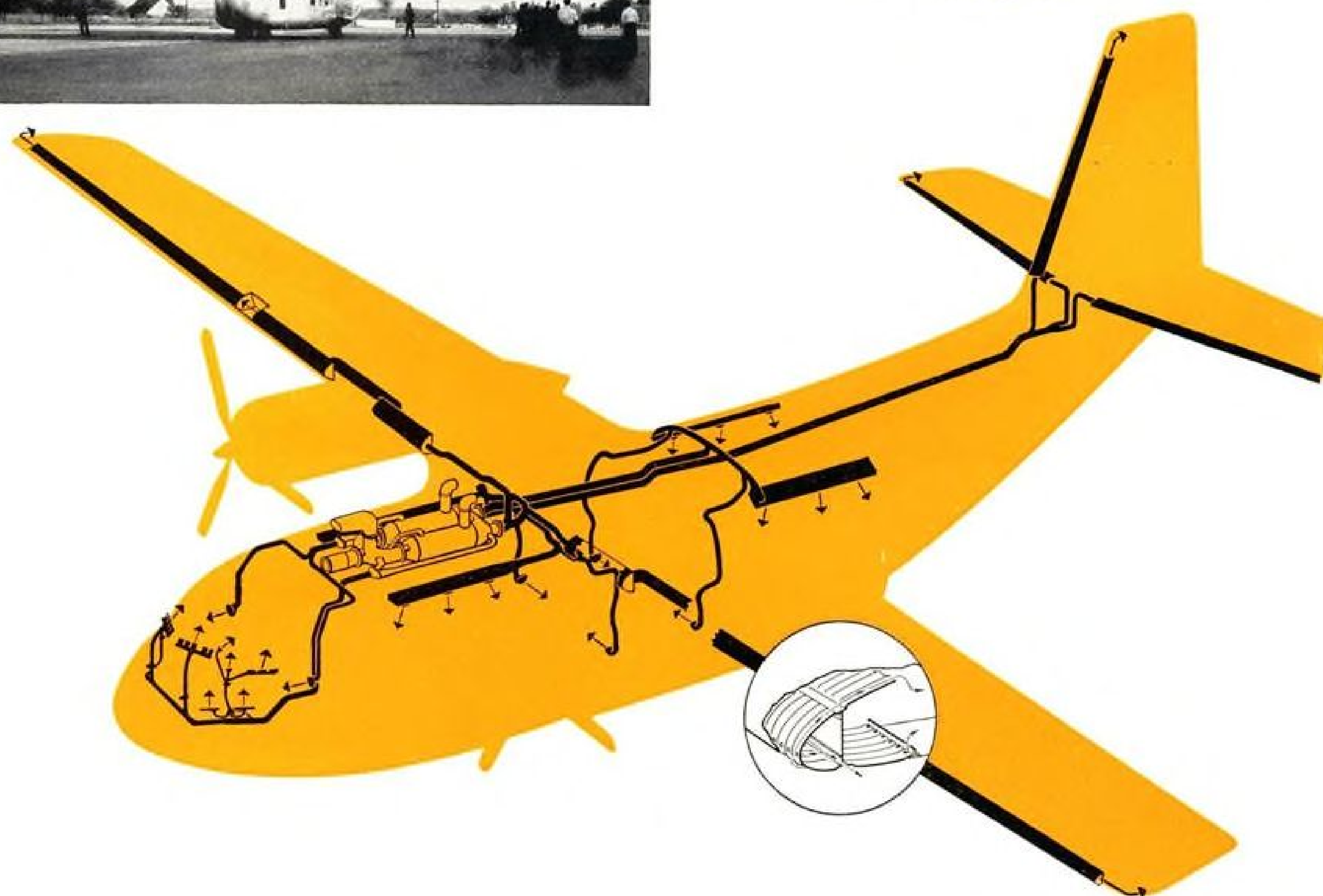
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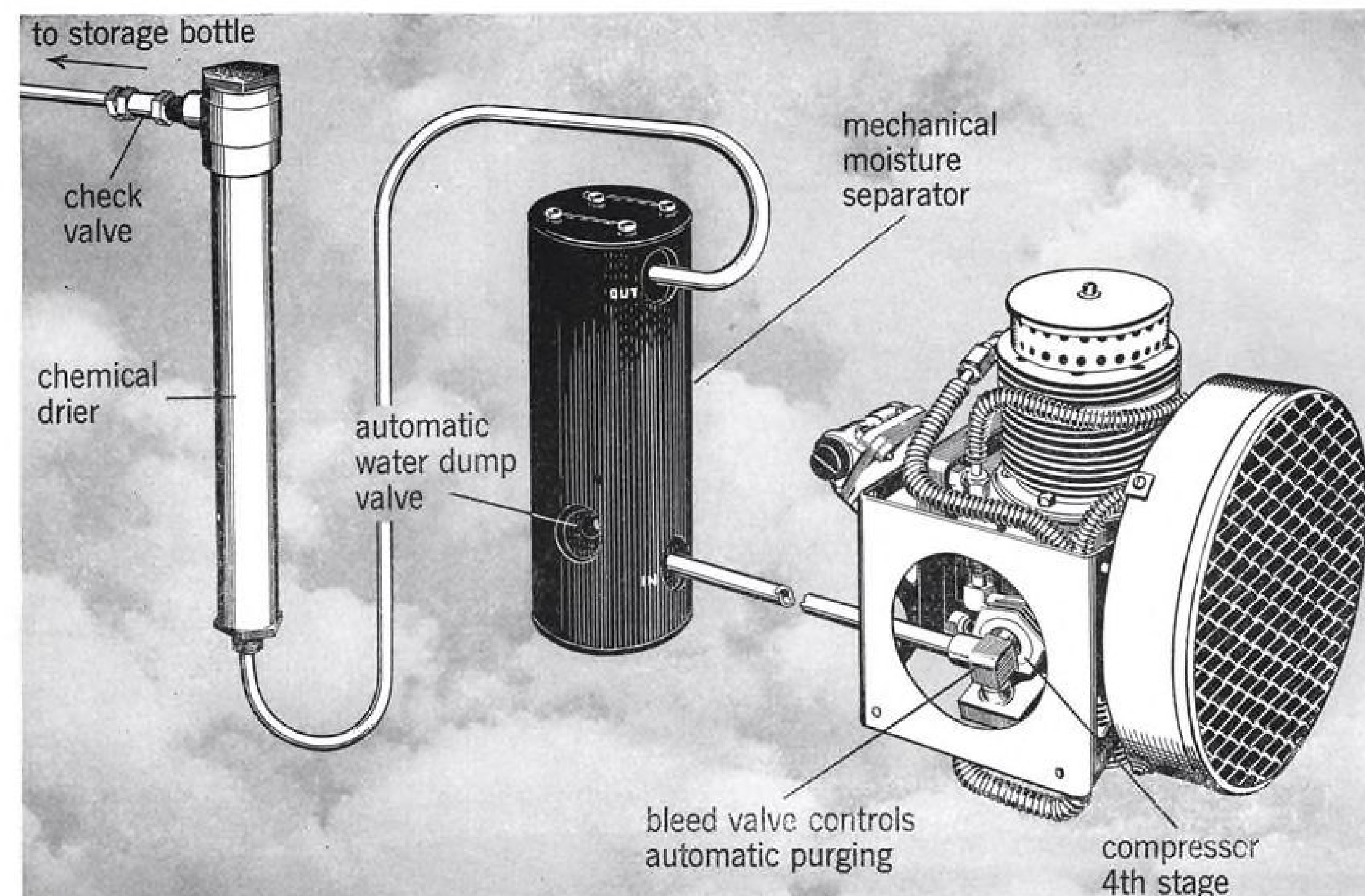


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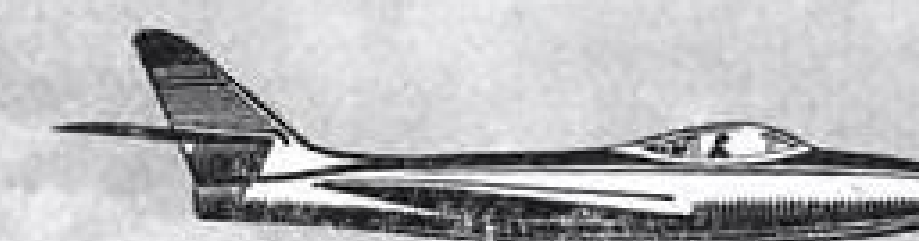
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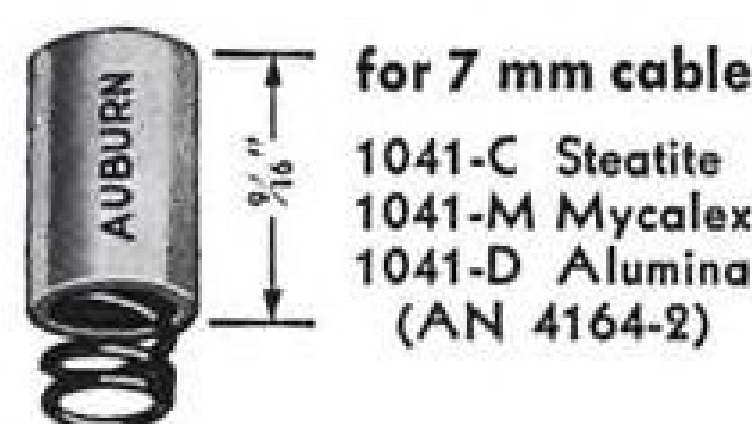
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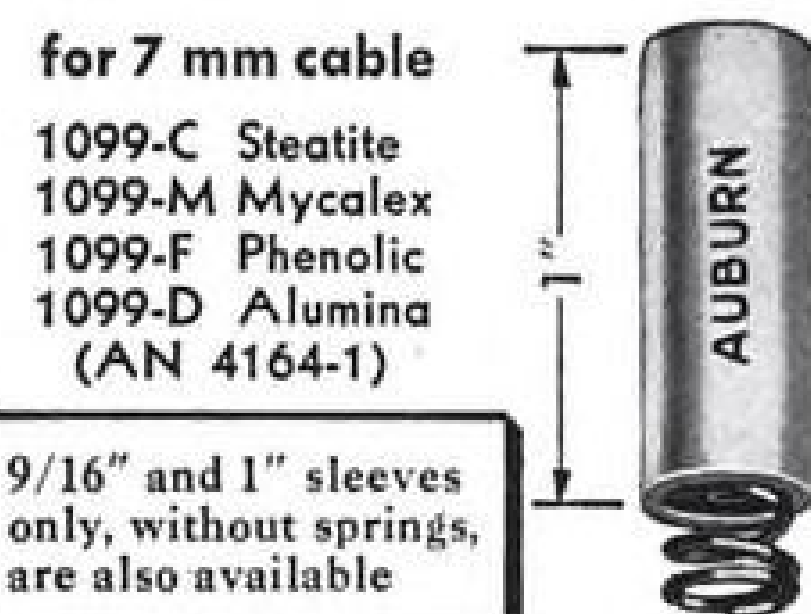
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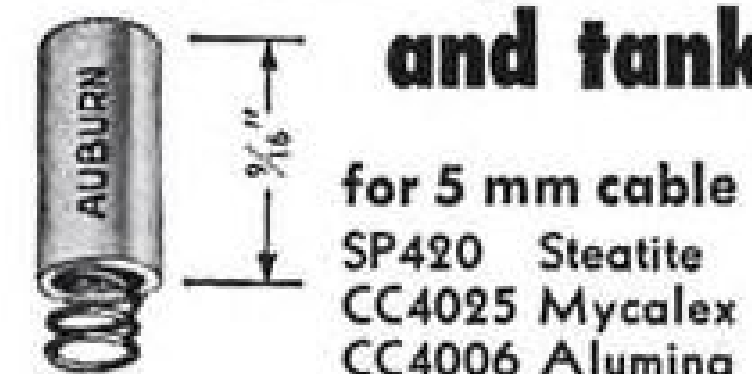
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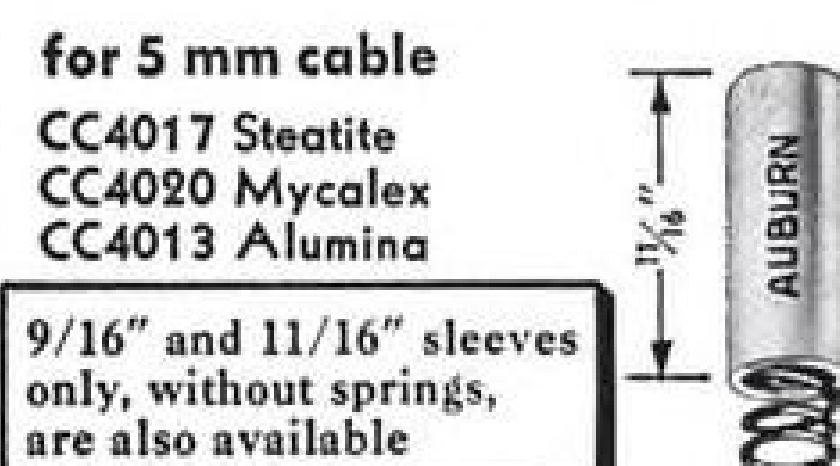
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Aviation Week



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December 22, 1952

Number 25

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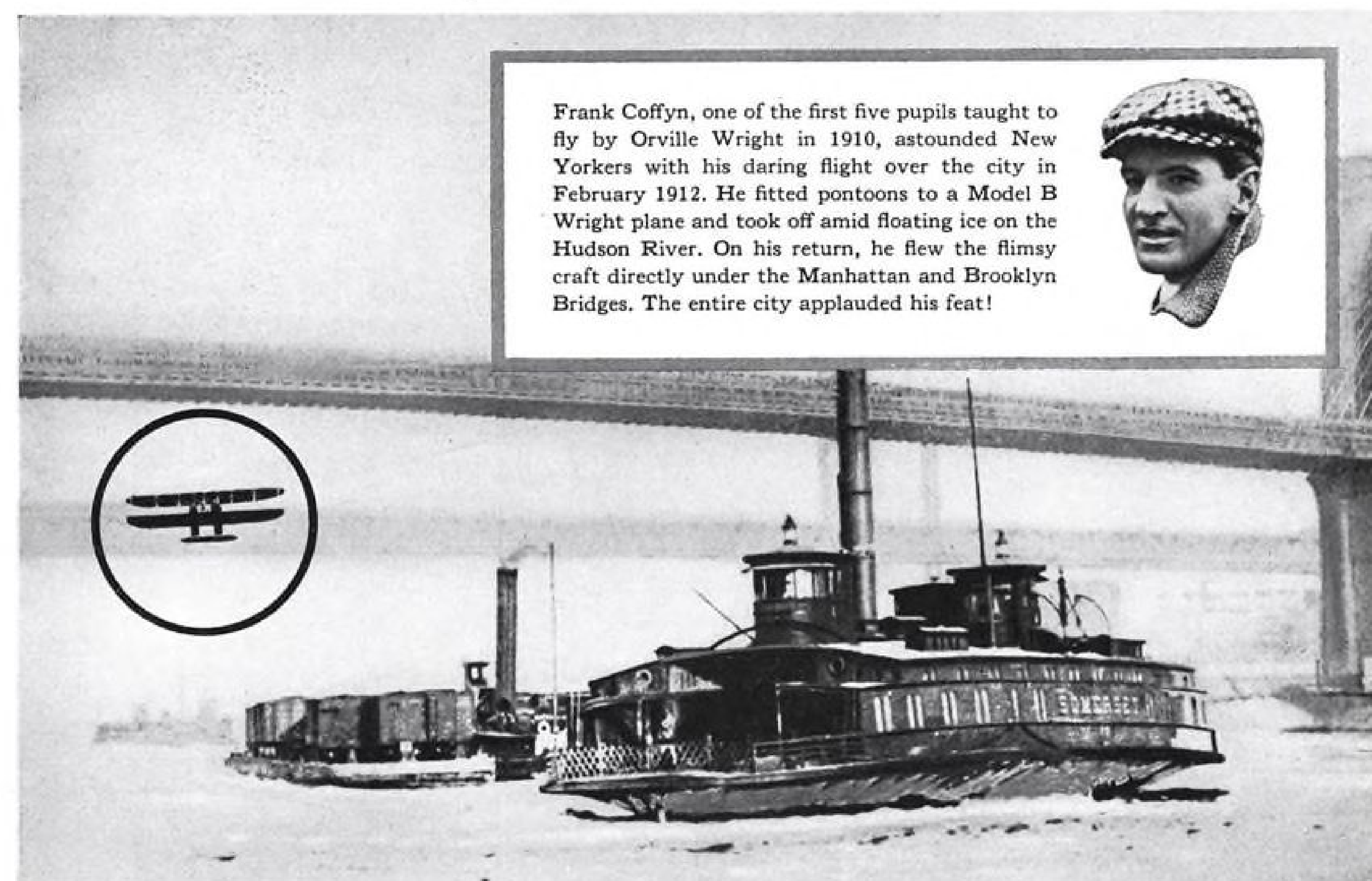
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Frank Coffyn thrills New York-1912



Frank Coffyn, one of the first five pupils taught to fly by Orville Wright in 1910, astounded New Yorkers with his daring flight over the city in February 1912. He fitted pontoons to a Model B Wright plane and took off amid floating ice on the Hudson River. On his return, he flew the flimsy craft directly under the Manhattan and Brooklyn Bridges. The entire city applauded his feat!



FORTY YEARS LATER. Today Frank Coffyn still takes an active interest in aviation. A member of Hiller Helicopters' staff, he is shown here (left) seated with Stanley Hiller, Jr. in one of the firm's "360" helicopters.

The pages of aviation history are filled with remarkable exploits of adventure and research, experiments which helped pave the way for aviation's pre-eminent position in the world today!

Another phase of aviation research—that pertaining to fuels and lubricants—has also contributed much to aviation's growth! Phillips Petroleum Company has played an important part in this development. Today, Phillips is one of the country's largest suppliers of aviation fuels for commercial and military use. In addition to a tremendous capacity for supplying 115/145 grade aviation gasoline, Phillips is always ready with the very latest fuels for turbo-props and jets.

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AVIATION PRODUCTS

*U.S. Air Force's new twin jet
reconnaissance aircraft*



the Douglas RB66A

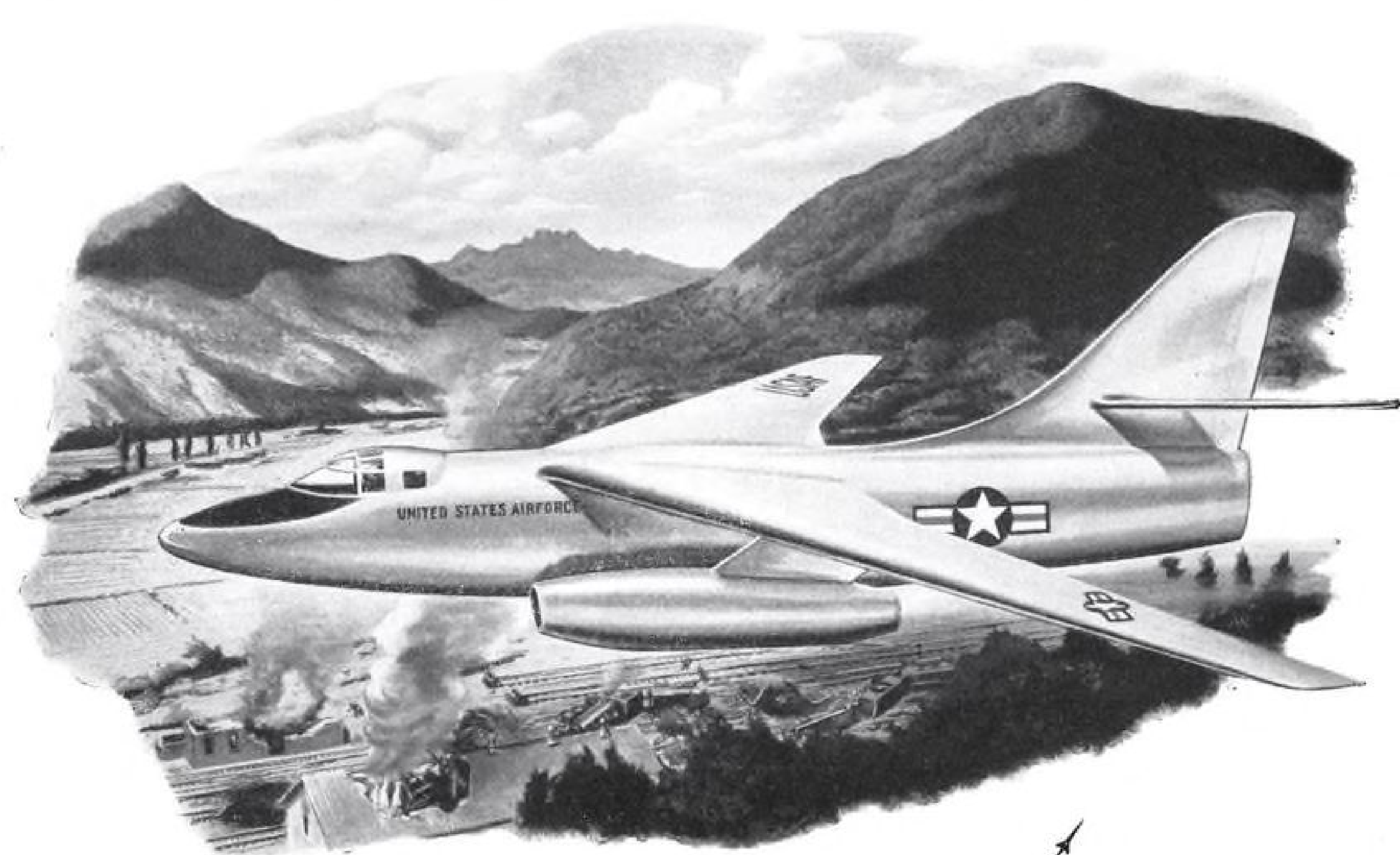
Built to perform in the stratosphere, or to scrape treetops in low-level missions, the new U.S. Air Force RB66A will be one of the most versatile photo-reconnaissance planes ever designed.

Complete performance data must still remain secret, but the Air Force permits

release of the information that the Douglas RB66A will be in the 600 to 700 mph class—with range enough to fly deep into enemy territory, and return. Powered by twin jets, slung in pods below the wing outboard of the fuselage, RB66A will carry the most

modern photographic equipment, for accurate reports on operations.

Design of RB66A is another example of Douglas leadership in aviation. Planes that can be produced in quantity to fly *further and faster with a bigger payload* is a basic concept at Douglas.



Depend on **DOUGLAS**



First in Aviation

NEWS DIGEST

Domestic

A Trans World Airlines Super Constellation was damaged when it made an emergency night landing at the Fallon, Nevada, Naval Air Station, 70 mi. from Reno Dec. 7. No. 3 and 4 engines had failed. Plane veered off the runway, collapsed the right main landing gear and damaged the wing tip. None of the 39 passengers or five crew members on the New York-San Francisco flight was injured. Cause of the engine failures was not given.

Rufus T. Amis, Jr., president of Aero Design & Engineering Co., Bethany, Okla., has been elected chairman and to the board of governors of the Utility Airplane Council of the Aircraft Industries Assn. for 1953. He succeeds C. F. B. Roth, president of Aircooled Motors, Inc., Syracuse, N. Y., in both positions.

McDonnell Aircraft Corp. last week named Kendall Perkins, vice president, engineering, to the board of directors and the executive committee. C. Warren Drake, vice president, manufacturing, and already a board member, was elected to the executive committee. President James S. McDonnell, Jr., and Robert H. Charles, vice president, contracts, are the other members of the executive committee. Now vice presidents are Garrett C. Covington, airplane chief engineer; William A. Roth, factory manager; William R. Orthwein, Jr., manager of personnel and public relations, and John F. Aldridge, Jr., manager of sales and service. Executive committee shifts were simultaneous with announcement of the resignation of Don Berlin as vice president-general manager, to become president of Piasecki Helicopter Corp. He replaces C. Hart Miller who remains as Piasecki executive vice president-general manager.

Martin Viking 9 rocket attained 135-mi. altitude during Navy firing at White Sands Proving Grounds, N. M. The 7½-ton rocket achieved a speed of 3,900 mph.

American Airlines has awarded a large contract to Burns Aero Seat Co., Burbank, Calif., for aircoach seats for 80-passenger DC-6s. Conversion will allow American to double its scheduled trans-continental tourist service by early spring of 1953.

Republic Aviation Corp. has passed the \$100-million point in annual wages, said to be the first time a Long Island, N. Y., firm has reached this mark.



DE HAVILLAND DOVE demonstrator belonging to Pacific Airmotive Corp., Linden, N. J., which crashed Dec. 9 near Staten Island Airport, N. Y., killing pilot and co-pilot and injuring two PAC officials. The

plane was being demonstrated to Avco Mfg. Co.'s chief pilot. Cause of the crash is undetermined, but early reports indicated no aircraft or engine malfunctioning. Cabin remained relatively intact.

Aviation Distributors and Manufacturers Assn. new officers elected this month at Miami include L. W. Trees, Scintilla Magneto division, Bendix Aviation Corp., Sidney, N. Y., president; Lawrence F. Zygmunt, General Aircraft Sup. Corp., Detroit, and James Riddle, National Aeronautical Corp., Ambler, Pa., vice presidents.

Detroit Harvester Co. has purchased all assets of Clinton Machine Co.'s Warner division, one of the largest manufacturers of aircraft and ordnance hydraulics, for cash "in excess of a million dollars."

Keel of USS Saratoga, (CVA 60), the Navy's second super carrier, was laid at the Brooklyn Navy Yard. Cost of the carrier is estimated at \$209,700,000. Navy eventually plans to build 10 super carriers and tentatively plans to use atomic power to propel the fourth in the series.

First production FJ-2 Fury, sweptwing North American jet fighter, has been accepted by the Navy for carrier duty.

Financial

Trans World Airlines reports that at recent offering of common stock to stockholders, the firm sold 353,822 shares at \$16 a share for a total of \$5,661,152. TWA will not issue the 28,094 shares offered but not purchased.

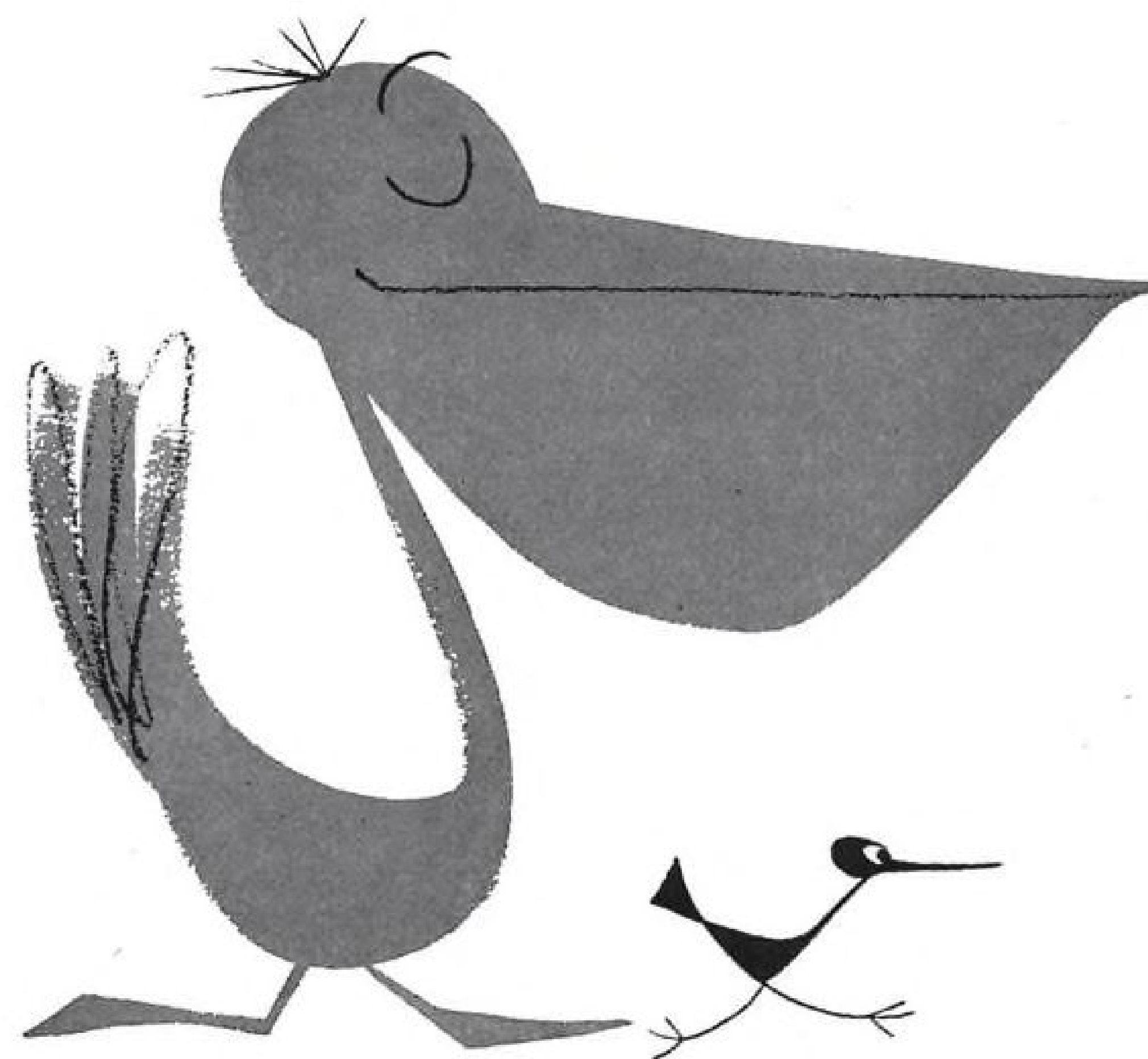
Aeroquip Corp. reports net earnings of \$923,492 for year ended Sept. 30. A total of \$173,438 was paid in dividends during fiscal 1952, and a year-end extra of 2½ cents per common share also was paid. Regular 7½-cent quarterly dividend has been declared since Oct. 1. On that date backlog amounted to \$12 million.

General Dynamics Corp. has paid a last quarter dividend of 75 cents a share. Net sales for the firm and its subsidiary, Canadair Ltd., amounted to over \$110 million during 1952. Backlog of the organization has been estimated at \$385 million.

International

Society of British Aircraft Constructors anticipates a temporary layoff of about 2,500 workers in the British aircraft industry followed by an increase of 10,000 workers during 1953. Until recently announced production cutbacks of obsolescing types, the British aircraft industry has been growing at a rate of about 2,500 workers a month during the past year.

Japan will start negotiations soon on civil air pacts with Sweden, Denmark, Norway, The Netherlands and France, according to Nippon Times. An air agreement has been reached with the U. S. and a pact with the U.K. will be signed soon.



THERE'S A BIG DIFFERENCE

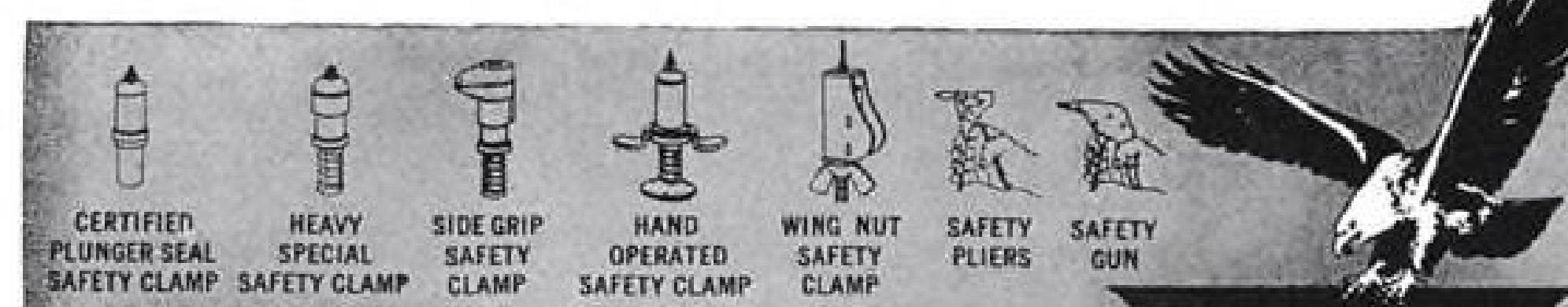
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AVIATION CALENDAR

- Jan. 8-9—Symposium on Industrial Application of Automatic Computing Equipment, sponsored by Midwest Research Institute, Hotel President, Kansas City, Mo.
- Jan. 12-16—Annual meeting and engineering display of Society of Automotive Engineers, Sheraton-Cadillac Hotel, Detroit.
- Jan. 14-16—AIEE-IRE-NBS Conference on High Frequency Measurements, Statler Hotel, Washington, D. C.
- Jan. 15-16—Fifth Illinois Custom Spray Operators Training School, University of Illinois, Urbana, Ill.
- Jan. 19-23—Plant Maintenance Conference, Public Auditorium, Cleveland, O.
- Jan. 19-23—Winter general meeting of the American Institute of Electrical Engineers, Hotel Statler, New York, N. Y.
- Feb. 12-13—National Aviation Education Council annual meeting, Atlantic City, N. J.
- Feb. 18—New York Section of the Instrument Society of America, Hotel Statler, New York, N. Y.
- Feb. 18-19—Eighth Annual Society of the Plastics Industry, Reinforced Plastics division, conference, Shoreham Hotel, Washington, D. C.
- Mar. 10-11—Eleventh Annual Conference, Society of the Plastics Industry Canada, Inc., General Brock Hotel, Niagara Falls, Canada.
- Mar. 25-27—National Production Forum of the SAE, Hotel Statler, Cleveland, O.
- Mar. 31-Apr. 2—First International Magnesium Exposition, National Guard Armory, Washington, D. C.
- Apr. 4-12—Second Annual International Motor Sports Shows, Grand Central Palace, New York, N. Y.
- Apr. 20-23—Aeronautic Production Forum, National Aeronautic Meeting and Aircraft Engineering Display (SAE), Hotel Governor Clinton and Hotel Statler, New York, N. Y.
- May 11-13—IRE National Conference on Airborne Electronics, Dayton Biltmore Hotel, Dayton, O.
- May 18-22—Fifth National Materials Handling Exposition, Convention Hall, Philadelphia.
- June 9-11—Second International Aviation Trade Show, Hotel Statler, New York, N. Y.
- Sept. 7-13—1953 SBAC Coronation Year Flying Display, Farnborough, Hampshire.
- Sept. 14-17—Fourth Anglo-American Aeronautical Conference, London.
- Oct. 10—International Air Race, England to Christchurch, N. Z., entry deadline Jan. 31.

PICTURE CREDITS

7—Wide World; 9—(top) USN; (center) Boeing Airplane Co.; (bottom) Hawker Siddeley; 14—NACA; 17—American Airlines; 21—Curtiss-Wright Corp.; 24—(top) General Electric; (bottom) Landis Tool Co.; 29—Fairchild Engine & Airplane Corp.; 54—Aeroquip Corp.; 63—CAA; 68—American Airlines.



DOUGLAS XA3D-1 FIRST FLIGHT—Here is the first actual photo of Navy's new heavy attack plane taken during its first flight at Edwards AFB, Calif. Prototype is powered by two Westinghouse J40s slung under the wings in pods, but production models will have P&WA J57s. Gross weight is about 70,000 lb. and top speed is in the "600-700-mph. class." Bulge atop tail houses anti-spin chute.



BOEING KC-97F ALOFT—The latest model Stratofreighter (left) complete with Flying Boom tucked under its tail. Now in production for USAF's Strategic Air Command, the P&WA R4360-powered KC-97F also can carry personnel, cargo, patients and handle air resupply.

Military Planes Show Their Stuff

HUNTER WITH SAPPHIRE—Flight tests have been started on the new Armstrong Siddeley Sapphire-powered Hawker Hunter F.2 jet interceptor (below). RAF has ordered this new version into production on a super-priority basis, as it did the earlier Rolls-Royce Avon-powered Hunter F.1. The more powerful Sapphire engine will make the new model even faster than the F.1, which is classed in the supersonic category.



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WHO'S WHERE

In the Front Office

J. V. Naish has been elected executive vice president of Consolidated Vultee Aircraft Corp., San Diego. He previously was vice president for sales and contracts at Convair, which position has been given to J. G. Zevely.

Donald G. Royer has been appointed assistant to the president of Slick Airways, Inc., where he will negotiate gasoline and freight drayage contracts in addition to administrative duties.

Col. B. L. Anderson, vice president of Philippine Air Lines, has been elected a member of the board of directors. In addition four new vice presidents have been named: C. M. Biondi, general traffic and sales manager and European regional director; Col. Walter L. Hurd, Jr., general operations manager; Rafael Ygoa, treasurer; Daniel M. Gomez, secretary. Other new appointments were Juan de Ibazeta as comptroller and Capt. Elfen Abad Santos as general industrial relations manager. Col. Lee A. Telesco has been named administrative assistant to Col. Anderson.

Changes

Harry E. LeRoy has been named director of manufacturing for Aviation Engineering Corp., L. I., N. Y.

Robert S. Kinsey has been named manager of industrial engineering and planning for Wright Aeronautical division, Curtiss-Wright Corp., Wood-Ridge, N. J., a newly created position. Kenneth Mehrhof, public relations manager for Wright Aeronautical, is leaving to accept a position in the advertising field in New York.

Helmut Schelp has been assigned to investigate and screen new products for manufacture for AiResearch Manufacturing Co., Los Angeles. W. T. von der Nuell has been appointed senior project engineer at AiResearch.

Barton Tyler has been named executive assistant to the administrative head of Northrop Aircraft's Special Weapons division, Hawthorne, Calif.

Allen W. (Skip) Walz is new executive staff assistant to vice president-engineering of Arma Corp., N. Y.

Ferd Gillig has been appointed head of Ethyl Corp.'s new aeronautical section.

Albert E. Namey has been named chief engineer of the Test Equipment Design Department at the Tucson plant of Bendix Radio division, Bendix Aviation Corp. and Norman Caplan is new chief engineer of the Military Communications and Navigation Engineering Dept. of Bendix Radio.

Edward N. Townsend has been designated superintendent of supply and controls at Lockheed Aircraft service-international, N. Y. and Mark J. Maidel has been named production superintendent.

Kenneth F. Leaman has been appointed assistant division manager and general works manager of Grand Central Aircraft Co., Tucson, Ariz.

INDUSTRY OBSERVER

► USAF is getting ready to award a development contract for a lightweight "stripped-down" interceptor (AVIATION WEEK Oct. 13, p. 11) with North American Aviation, Inc., most likely to get the job. Lockheed and Northrop also are in the competition.

► Convair's supersonic bomber, for which USAF is readying a production contract (Aviation Week Oct. 8, p. 11), is known as the "Hustler" within the company and had been given the designation XB-58 by Air Force during the design study phase. It is likely that new USAF designation will be assigned to the production version to be built at Convair's Ft. Worth plant.

► Another accident has delayed flight testing of the crescent-wing Handley Page H.P.80 bomber, according to industry observers recently returned from England. Fire during hydraulic fluid draining operations killed one mechanic, injured several others, severely damaged the bomber's nose and ruined the cockpit. Previously, the H.P.80 landing gear collapsed just before initial flight tests and kept it out of the Farnborough SBAC show. The fire is expected to delay flight testing for at least three months. The H.P. 80 bomber also is expected to serve as a prototype for the H.P.97 jet transport (AVIATION WEEK Sept. 29, p. 15).

► Wording of the latest military agreement on the Army's integral aviation may mean future trouble for manufacturers now developing convertiplanes for use by the Ground Forces. Industry observers are wondering why the memo (Aviation Week Sept. 29, p. 14) refers to "rotary wing type aircraft, the total lift and propulsion of which are achieved solely from rotors." This theoretically would eliminate hybrid aircraft using jet engines for forward thrust and designs which would utilize stub wings for lift.

► Allison division of General Motors Corp. notes that jet engines built in its Indianapolis plant have now logged over 2 million hr. of flight time. This is just about twice as much jet operations as claimed by Rolls-Royce, Ltd., largest British jet engine manufacturer.

► United Air Lines has given RCA a short-term airborne radar study and development contract aimed at eventual use of radar for terrain clearance and storm warnings. Under the program, RCA, which now builds the AN/APS-42 transport radar for the military services, will seek methods of improving reliability, reducing complexity and cost and adapting equipment for airline flight operations.

► Big problem in the fast approaching era of heavy press operations for aircraft manufacture is how to reduce the machining required for finishing certain areas of large forgings. Airframe manufacturers would like to get these large parts off the press as "precision forgings"; little further machining would be required before actual use. Estimates on machining cost of these parts runs from \$20 to \$200 for each pound of weight removed. Another problem is the distortion induced in large forgings during machining operations.

► Pratt & Whitney Aircraft's general manager, Bill Gwinn, recently noted a sore spot that has troubled U. S. manufacturers trying to build jet engines of British design. British thrust ratings are based on the average output of engines coming off the production line with as much as 4% allowance below the guaranteed rating still acceptable for delivery. U. S. ratings are a minimum guarantee and every engine accepted must deliver rated power. According to British standards, a jet rated at 5,000 lb. static thrust could deliver only 4,800 lb. and still be accepted. According to U. S. standards, every engine that did not deliver guaranteed rating of 5,000 lb. thrust would be rejected. Thus, on a standard production line operation involving engines of the same rated thrust, U. S. manufacturers are building engines which are more powerful than their British counterparts.

Washington Roundup

OSD: Still Mushrooming

Office of Secretary of Defense, since it was created under the 1947 Unification Act to cut down military cost, has mushroomed from a \$3-million-a-year operation to a \$14-million-a-year operation, and is still growing. OSD doesn't think \$14 million is enough, asked \$15 million for the current year, but Congress trimmed the request.

Although funds for aircraft and other weapons were held down during the pre-Korean years of defense economizing, OSD has grown steadily year by year. OSD employment was 542 in the fiscal year 1948, soon will be up to around 2,000—almost a four-fold growth.

Overall OSD includes the staff directly under the Secretary of Defense, plus the staffs of the Joint Chiefs of Staff, Munitions Board and Research and Development Board.

- Biggest boom has been in Munitions Board, overseer of production and procurement, which in five years has developed more than seven-fold, from an \$812,000-a-year operation to a \$6-million operation.

- Secretary of Defense's direct staff has grown from a \$934,000-a-year operation to \$4.6 million, more than a four-fold increase.

- Cost of Joint Chiefs of Staff organization has gone from \$557,000 to \$1.6 million a year.

- Most modest increase is in Research and Development Board, which has developed from \$1-million-a-year to a \$1.8-million-a-year operation.

Research and Development

Although plane procurement orders will start to taper off in 1954, the upward trend in Air Force and Naval Air contracting for research and development projects is expected to continue indefinitely. This is in line with the decision to put emphasis on technological advancement instead of weapons stockpiling.

Both USAF and Naval Air are well along on obligating this year's research and development funds—about 75% of which is in industry contracts.

- USAF obligated more than \$193.5 million of its research and development funds in the July-to-November period, an average of \$48.8 million a month.

- Naval Air obligated \$65.8 million in the period, an average of \$16.4 million a month.

- Unless USAF and Navy let up slightly on their rate of obligating for the first four months of fiscal 1953, they will run out of funds to commit before the end of the year, July 1.

- For the remaining months of fiscal 1952, USAF has \$377 million and Navy more than \$110 million to obligate for research and development.

But USAF's and Naval Air's pockets are bulging with unspent cash earmarked for research and development projects already underway. The total: about \$1.4 billion:

Korean Record

For the period from the start of the Korean war June 26, 1950, to December 1952, the services give this report on aerial performance:

- Air Force: 548,400 combat sorties.

- Naval Air, including Marine aviation: 203,008 combat sorties.

- The allocation of effort: USAF 63%; Naval Air, 37%. This requires some adjustment in favor of the Navy, since the Naval sorties do not include observational or helicopter flights and USAF sorties include all missions beyond the front line.

Patterson Backtrack

Air Transport Assn. gracefully slapped down W. A. Patterson's suggestion that Interstate Commerce Commission be given authority over air transport regulation.

The United Air Lines president's proposal:

"We should re-examine the recommendation . . . that the Interstate Commerce Commission coordinate the activities of the various regulatory agencies, act as moderator, coordinator, and court of appeals."

But ATA, a few days later, unanimously voted a re-affirmation of its long-standing position in favor of an independent Civil Aeronautics Board. Apparently in a gesture to Patterson, however, the association tacked on a clause stating its willingness to examine or re-examine any proposal for a different organization. Patterson went along.

Local service lines particularly are adamant in favor of an independent board. James Ray, Washington representative of several local lines commented: "Young airlines particularly would be smothered under ICC regulation. If air transport had been under ICC in 1947, there wouldn't be any local carriers."

Nonskeds, perennial complainers that CAB is "dominated by the scheduled airlines," nevertheless are squarely behind the independent agency organization for air commerce regulation and do not want it lumped in with surface regulation.

People

Sinclair Weeks, successful businessman slated to become the new Secretary of Commerce, is expected to clamp down on federal support for airports, airways facilities and other public works. During his brief service in the Senate (1944) under appointment, Weeks urged: strong defense, including air power; warned against postwar disarming, and attacked proposed postwar outlays for public works such as airports. He observed at the time: "You can have state socialism or free enterprise but cannot indefinitely have a mixture of the two."

Walter Williams, designated to become the new Undersecretary of Commerce, is a protege of United Air Lines' director Paul Hoffman. He followed Hoffman as head of the Committee for Economic Development and later joined Hoffman in pushing Eisenhower for the Republican nomination. He was defeated for the Washington Senate seat by Sen. Warren Magnuson in 1950, but made a remarkable showing for a political newcomer.

Sen. Alexander Wiley, top-ranking Republican on Senate Judiciary Committee, wants to start off the year with an investigation to ascertain whether political influence has figured in the Democratic Administration appointment of officials to high-salaried positions in firms seized during World War II. General Aniline Film and Dye Corp., headed by Jack Frye, former TWA president, is the top firm on Wiley's list. Among the directors of the firm appointed by the Democratic Administration: Sperry Corp. director Thomas Morgan and TWA counsel Gerald Brophy.

—Katherine Johnsen

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AF Aircraft Deliveries Hit Postwar High

- Gilpatric says manufacturers met 98% of schedules in November; farther stretchout appears doubtful.

- But production delays, engineering difficulties with J65 engines, F-89 and F-84F planes are reported.

By Robert Hotz

Aircraft manufacturers are meeting their production schedules for the Air Force and no further stretchout is contemplated, according to USAF Undersecretary Roswell L. Gilpatric.

Deliveries of aircraft to USAF in November reached the highest point since World War II, Gilpatric said. A total of 666 planes, representing nearly 8 million airframe pounds, were accepted from manufacturers last month. The figures represented 95% of schedule by weight and 98% in terms of numbers.

Gilpatric emphatically denied that there had been any major shift in USAF production goals since the original stretchout of last January, although he admitted three new production schedules had been submitted to the Munitions Board since the A-16 stretchout schedule. However, the A-18 schedule (AVIATION WEEK Aug. 25, p. 14) called for deferring some 16 million airframe pounds of production from the next two years until late 1955 and early 1956. Normally USAF accounts for about 75% of total aircraft production.

Under a recent Munitions Board directive, Gilpatric disclosed, only one aircraft schedule a year will have to be filed by USAF and Navy unless the production program is changed by at least 10%.

► **Observers Agree**—Industry observers agreed with Gilpatric's analysis of the current USAF production situation. They noted that except for the specific problems mentioned by Gilpatric and the recent action by both USAF and Navy to phase out production of rapidly obsolescing types earlier than scheduled (AVIATION WEEK Nov. 24, p. 14), there were no indications of major changes in the offing. Gilpatric said that only a congressional limitation on expenditure of funds already appropriated could change materially the present outlook for the aircraft industry until 1956.

USAF contractors have nearly doubled their deliveries of aircraft during the past year, Gilpatric said. Deliveries for December are expected to total 733 planes, with 750 expected in January.

Plane Deliveries

The following table shows the number of planes actually delivered to the Air Force for the months specified and the schedule for future deliveries to mid-1956:

Deliveries	
November 1950.....	130
November 1951.....	365
May 1952.....	566
November 1952.....	666
Scheduled	
December 1952.....	733
January 1953.....	750
April 1953.....	800
July 1954.....	800
July 1955.....	500
June 1956.....	300

The peak production rate of 800 planes a month will not be reached until the second quarter of 1953, about four months later than planned under the stretchout program.

Although Gilpatric claimed there is

Stratojets

USAF now has two combat wings equipped with Boeing B-47 Stratojet bombers, AF Undersecretary Roswell Gilpatric says. Production of the Stratojet at Boeing's Wichita plant is expected to fall off soon from its current rate of better than one a day as the result of bringing the RB-47 photo-reconnaissance version into quantity output. At present, the B-47 modification centers operated by Douglas Aircraft at Tulsa and Grand Central Aircraft at Tucson are meeting Strategic Air Command's requirements for combat-equipped Stratojets, but SAC is getting fewer B-47s than originally expected. Douglas and Lockheed are expected to manufacture their first B-47s under licenses from Boeing early next year at Tulsa and Marietta, Ga., respectively.

no major lag in the Air Force production program as a whole, he admitted that production delays and engineering difficulties are being encountered on certain new aircraft and engine models. He cited:

- Wright Sapphire (J65) jet engine program.

- Northrop Scorpion (F-89) night fighter structural difficulties (AVIATION WEEK Dec. 1, p. 16).

- Republic F-84F Thunderstreak program.

Gilpatric said it will be necessary to replace aluminum compressor blades with steel blades in the first three stages of the Sapphire axial-flow compressor because of vibration problems at relatively low revolutions per minute. He said aluminum blades in the Sapphire are cracking under vibration encountered in the 4,000-6,000-rpm. range and that USAF pilots are instructed to get through this portion of the engine's operational range as fast as possible. Normal cruise for the J65 is 8,000 rpm. The critical range is encountered just after takeoff and just before landing.

► **Need New Blades**—Several months' production of the J65 will continue with aluminum blades to meet the demand for this engine by initial F-84F production at Republic's Long Island, N. Y., plant. These and other J65s already built will be re-fitted with steel compressor blades after Wright is in production on the new type blades. Gilpatric said Wright had designed and tested steel blades to U. S. standards and was planning to put them into production. He also said that similar vibration problems had been encountered in England on Sapphires built by the Armstrong-Siddeley Motors, Ltd.

Wright has built enough J65s to take care of the first F-84Fs now coming off the Republic line, but Gilpatric said the New Jersey engine plant was operating a "pilot production line" and still was in the process of tooling for its principal production. Wright has passed an official 150-hr. qualification test with aluminum blades and Gilpatric emphasized that "there is strong support for the Sapphire across the board in the Air Force."

Commenting on persistent press reports that the Sapphire production program was the prime bottleneck in the military aircraft production program, Roy Hurley, Curtiss-Wright Corp. president, said:

"The American people who are foot-

ing the bill are entitled to know the truth about air power. Attempts are being made insidiously to discredit the remarkable record of aircraft production in this country. The net result could be to scuttle the aircraft production program and to interfere seriously with the defense of the United States."

► **Buffalo Statement**—At Buffalo, where C-W has a plant currently manufacturing aluminum compressor blades for the J65, Hurley said:

"The J65 engine is capable of developing substantially greater power ratings and these engines will require steel blades instead of the present aluminum alloy blades. The Buffalo plant is building steel blades which have passed their Air Force model tests.

"However, aluminum blades which the Buffalo plant is also producing are entirely satisfactory for engines of the present power ratings. The later use of steel blades will be a normal refinement to meet increasing power requirements. The design of the engine is such that the aluminum blades can be replaced by steel blades at any overhaul period."

A Curtiss-Wright spokesman said the J65 completed a 150-hr. teststand run using steel compressor blades in November. The J65 now has more than 5,000 hr. of teststand and flight test time, according to the spokesman.

Buick has not yet passed a 150-hr. test on its Sapphire and still lacks about five critical machine tools to complete its production tooling. Gilpatric said Buick would improvise substitutes for the critical tools to get under way.

► **Auto Men Learn**—"We find that automobile manufacturers are pretty cocksure that their methods are sufficient to tackle aircraft engine production," Gilpatric said. "And we have some quality control problems until they understand that aircraft engine builders' standards are considerably higher. This is true of Ford, Nash, Chevrolet and the rest of the auto licensees in the aircraft program."

The combined output of Wright and Buick will provide enough Sapphires to meet the growing F-84F production schedules and also to take care of the twin-jet Martin B-57 Canberra when it gets into production next year, Gilpatric said.

USAF expects Wright to continue Sapphire development and eventually come up with an 8,300-lb. thrust version similar to the rating now claimed by Armstrong-Siddeley after an official British 150-hr. qualification test. The current Wright Sapphire is rated at 7,200 lb. static thrust.

► **F-89 Too Fast**—Gilpatric said Air Force had concluded that the Northrop Scorpion disintegration at the Detroit Air Show last August (AVIATION WEEK Sept. 15, p. 17) was caused by pilot exceeding the critical airspeed for which

the aircraft was red-lined below 10,000 ft. USAF pilots previously reported that the F-89 had been restricted to speeds under 450 knots below 10,000 ft.

The Republic F-84F program had slipped several months behind schedule, according to Gilpatric, but the situation is now improving. Two Thunderstreaks are now flying. He noted that there would be a temporary dip in Republic's production output as the plant shifted from F-84G Thunderjet to the new sweptwing F-84F.

"This will happen every time we switch production to a newer and better plane," Gilpatric said. "It will continue to happen as long as the Air Force retains its present leadership, because it is our policy to strive for constant improvement of the quality of our aircraft even at the expense of the maximum possible production.

"Republic is now the largest single producer of jet-powered combat aircraft this side of the Iron Curtain. I have no reason to doubt Republic's ability to accelerate production of the F-84F in view of its previous history in building up output of the F-84G to a rate of 10 a day."

Air Force has obligated about half of its fiscal 1953 procurement funds, and early in December reached a strength of 95 combat and troop carrier wings.

"While our aircraft program will continue to experience some delays in pro-

duction and technical difficulties as long as we continue to stress qualitative improvement and to bring in new types, we anticipate no major setbacks in our program and no major changes to plague the industry," Gilpatric concluded.

French Develop New Jet Braking System

(McGraw-Hill World News)

Paris—SNECMA is flight testing a "jet deviator" that twists the thrust of a jet engine something like 120 deg. toward the front giving a braking effect that permits landing on a much shorter strip.

Flight tests began July 26 in a Vampire equipped with a de Havilland Goblin engine. SNECMA (Societe Nationale d'Etude et de Construction de Moteurs d'Aviation) says the tests have been "very successful."

Design and performance data are secret, but SNECMA says officially:

"The goal sought of reducing the length of landing strips is attained. It is even possible to land and stop the airplane without using wheel brakes."

Although official information as to how the jet deviator works is unavailable, excellent sources give a general description. They say a number (eight or ten) of small jet nozzles circle the nacelle housing the engine. A mechanism switches thrust to these nozzles, which gradually turn thrust forward and increase braking action.

► **Vampire Test**—In the Vampire, twin booms on each side of the nacelle prevent the installation of nozzles at the side, so they are installed only at the nacelle top and bottom.

The deviator has been tested thus far only on the Vampire, but engineers say there is no reason the nozzles can't be installed on the sides of the nacelle in a plane of different construction.

De Havilland's Vampire was chosen for the initial testing because it is an operational French air force plane in a slightly modified type called the Mistral, powered by a Hispano-Suiza Nene instead of the Goblin.

The jet deviator has been under test more than two years. After a series of factory experiments, the deviator was installed on the Goblin in the summer of 1951 and put through a factory testbed workout.

► **British Interest**—From Nov. 22, 1951, to Jan. 3, 1952, a Goblin equipped with the deviator was tested in an air tunnel at Chalais Meudon under government supervision.

Installation of the deviator on the Vampire began Feb. 21 and that plane flew July 7 for the first time—without using the deviator.

SNECMA says the results of all these

tests are "very satisfactory—even spectacular." A mission from the British aviation industry already has watched deviator tests and is reported actively interested.

Breather Pilot Seat Eases Long Flights

The Air Force may adopt as standard equipment a pulsating seat designed to relieve the strain on fighter pilots kept in the air for long periods during missions stretched out by in-flight refueling. Service trials produced favorable reaction, according to reports.

After a few hours in flight, a fighter pilot gets tired from sitting and there's nothing much he can do about it. He must stay rooted in his seat for the length of the hop, shifting his weight around to ease pressure. Even the Navy's contoured seat isn't comfortable on long flights, it is reported.

The pulsating seat uses a "breathing" action to relieve pressure and promote circulation. The pulsating rubber cushion gets its pressure from the air supply to the cockpit canopy seal and a small cycling motor directs the air to the various compartments in the seat four times a minute. The pulsating action is reported to be so gentle the pilot normally isn't conscious the equipment is functioning. Its effectiveness is marked even for the duration of a 10-hr. flight, according to claims. Weight of the installation is about 1 lb.

It has been tried in conjunction with the Navy contour seat and reported highly effective in the combination.

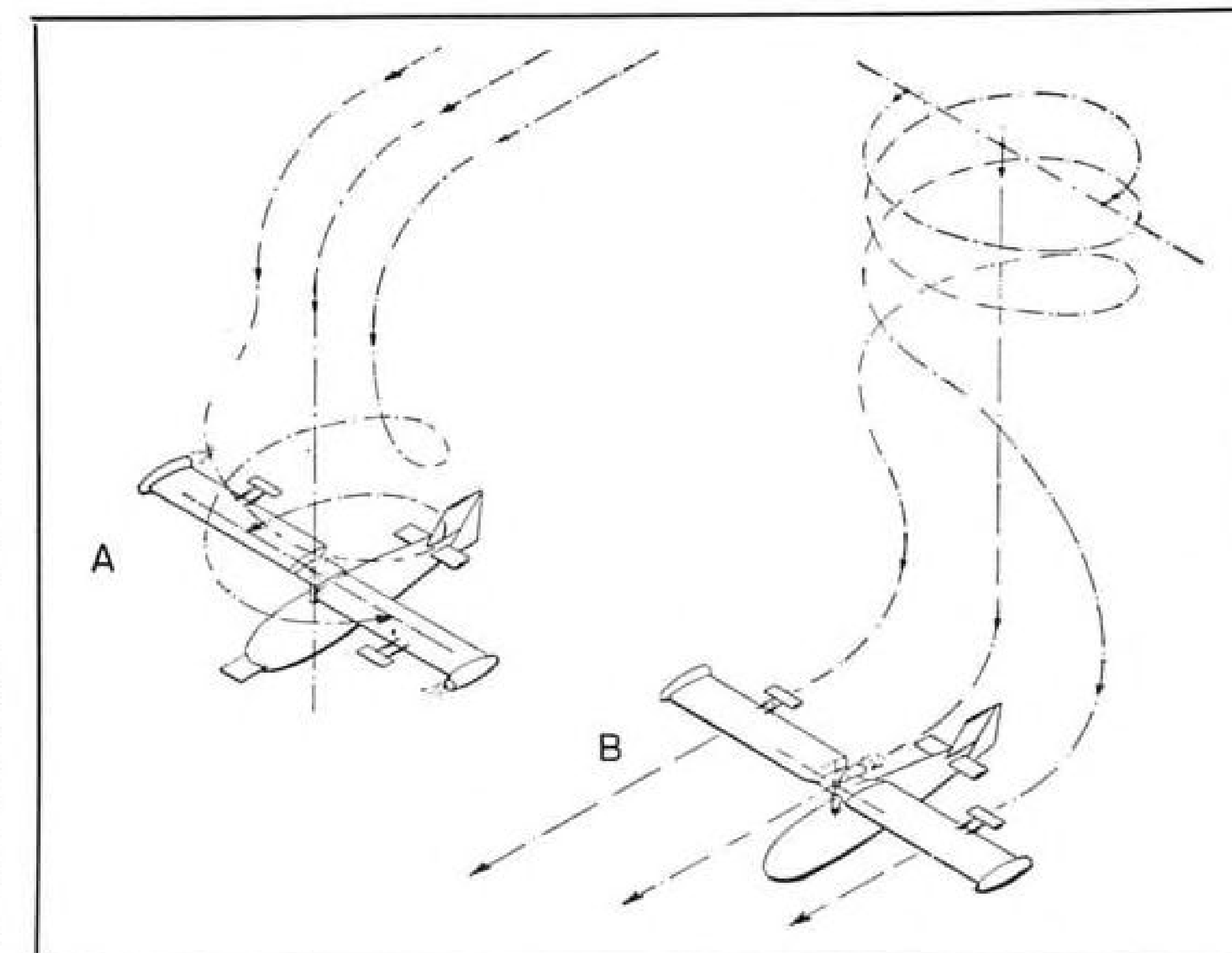
Lear VHF Set Gets CAA Certification

Lear, Inc., has obtained CAA type-certification of its 36-channel VHF transmitter-receiver, permitting its use on aircraft operating on scheduled interstate and foreign commerce.

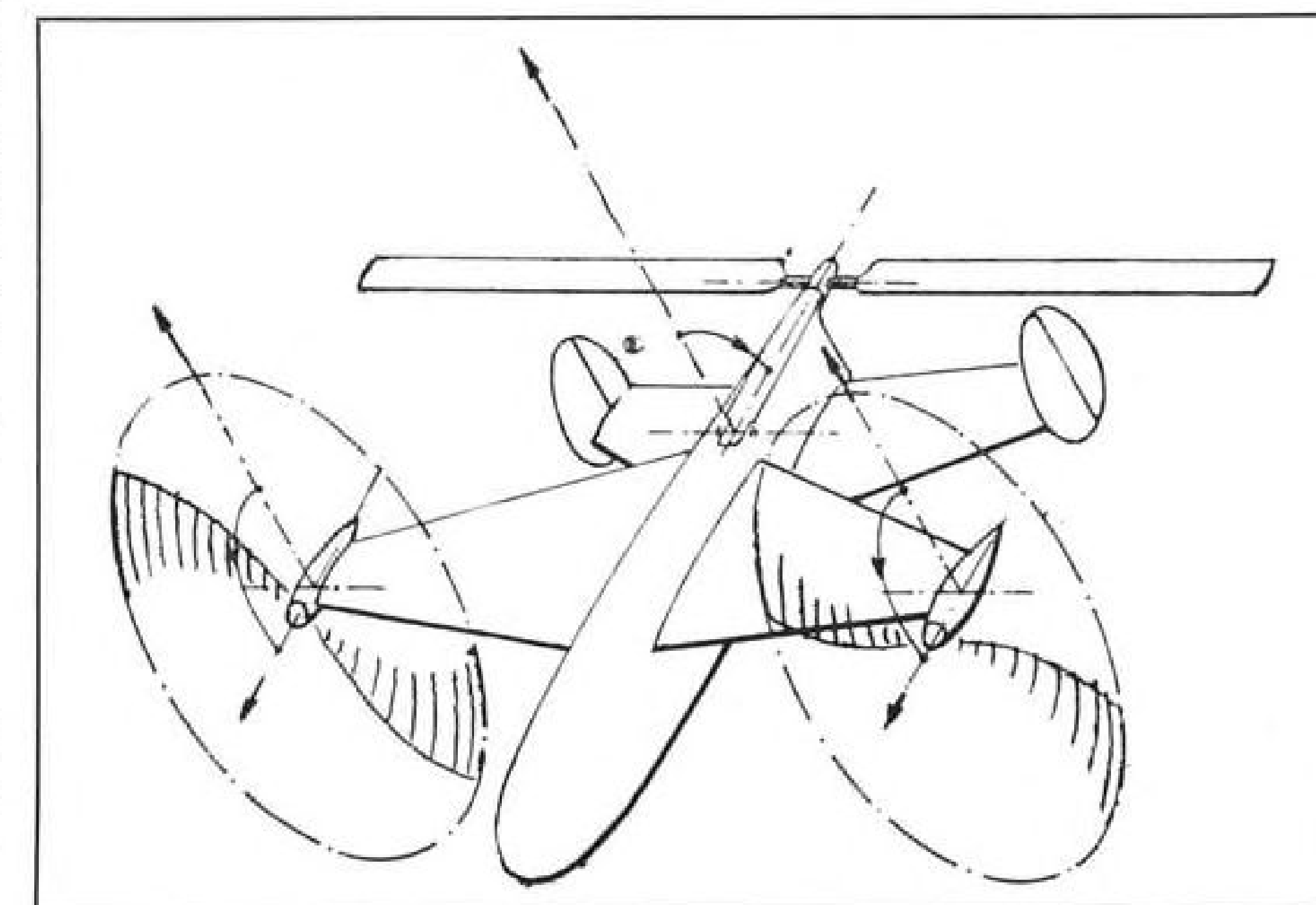
First announced earlier this year, the LTVR-36 includes a 5-watt 36-channel VHF transmitter, a 36-channel receiver, and a remote frequency selector. The set is designed to allow the transmitter to be installed and operated by itself, and the receiver added later, if desired. The LTVR-36 weighs about 20 lb. and can operate from either 14 or 28 volts d.c.

Crash Kills Cessna Official

Sherman S. Graves, general manager of the Cessna Aircraft Helicopter division, was killed in an aircraft accident last week at Richmond, Ind., Municipal Airport. A plane piloted by Graves and a Lake Central Airlines DC-3 collided at a runway intersection.



SWIVELED-WING contains jet engines at tips, acts as rotor for vertical flight (left) and is fixed for horizontal high-speed flight (right).



FIXED-WING design based on Pardel Duo-monoplane, has large tail rotor, which can be swiveled in conjunction with outboard props for vertical flight.

Army Cool Toward Convertiplane

By Alexander McSurely

Philadelphia—Brightest future for the convertiplane lies in development by private enterprise unfettered by government military or civil red tape, Grover C. Loening, Oyster Bay, N. Y., veteran engineer and apostle of rotary-wing aircraft, told the Second Convertible Aircraft Congress here.

The nature of government research organizations is incompatible with maximum achievement in new aviation

fields, Loening told his audience, because of the necessity of accounting for each government research expenditure on a basis of return to the taxpayer. This, he said, negates the earnest efforts of many brilliant government researchers in military and civilian government establishments.

He forecast a trend toward more free enterprise research which would be able to risk capital in promising projects without demanding a 100% return on each of the projects, as government



COLLIER WINNER

John Stack, NACA aerodynamicist, and a group of his unnamed associates at the NACA Langley Memorial Laboratory were awarded the 1952 Collier Trophy for their work in developing a windtunnel capable of conducting research through the transonic speed range. Research results obtained from the tunnel have been a major contribution to production of U. S. combat aircraft capable of operating at the speed of sound, the Collier Trophy committee reported.

accounting practices currently demand. **►Loening Warning**—Loening warned against premature regulation of convertiplane operations and specification by civil aviation agencies.

"CAA, at best, can never regulate on a more recent basis than last year's developments," he said. "This means that the manufacturers and engineers constantly will be forced to argue for changes of regulations based on last year's developments, in the light of newer developments which have happened since the regulations were made. CAA should make no attempt to regulate convertiplanes for 10 years, at least."

Indications that the Army is pleased with its present and forthcoming helicopters and is less eager than formerly to get into a convertiplane program were given by the Army spokesman at the congress, Col. William B. Bunker, chief of Army Air Transport Service division, U. S. Army.

►Army Switch—"The old saying about building a better mousetrap is not enough this time," Col. Bunker said. "The cost factor enters in. There has to be a worthwhile overall saving, as well as a gain in performance."

Bunker indicated that if the helicopters could do the Army transport job adequately, as advance indications showed, the convertiplane's chances to replace it soon are not bright.

"Perhaps the helicopter may be obsolete in terms of the convertiplane, eventually, but all I can say is, it is no consolation to a mouse if he is caught in a mousetrap, whether it is obsolete or not."

The statement indicated a major switch from former Army thinking which called for initial Air Force con-

tracts to three manufacturers, Bell, Sikorsky and McDonnell for convertiplane prototypes.

►Unorthodox Designs—Earlier Army statements had indicated they considered helicopters as a stopgap until convertiplanes capable of relatively high speed forward flight as well as vertical takeoff and landing are developed.

An interesting array of unorthodox configurations, designed to combine the advantages of vertical and horizontal flight, were laid before the congress in a series of engineering papers illustrated with movies and model flights at the Franklin Institute Auditorium.

Highlights included:

- Wayne University, Detroit, demonstrated a rubber motor-powered twin-rotor convertiplane model which actually made vertical takeoffs and turned its rotors into horizontal thrust for forward flight.

- Viscount Louis de Monge de Franeau of Flettner Aircraft Corp. discussed a number of various configurations for convertiplanes, including an arrangement for making the Pardel Duo monoplane design into a convertiplane with a rotor attached at the tail, which would be elevated on a vertical shaft for vertical takeoffs.

- Dr. J. A. J. Bennett, former British rotorcraft expert now on the engineering staff of Hiller Helicopter Corp., discussed a plan for using flying crane jet rotor helicopters to hoist conventional fixed-wing craft vertically out of downtown airports to eliminate the need for long runways. The plan also involves an aerial hitchup of the two aircraft for lowering plane at small airports.

- Similarity between the Hiller plan and an Air Force project at All-American Airways to carry a helicopter pick-

back on a fixed-wing transport, which also involves the problems of aerial release and aerial attachment, was discussed. Problems of attachment particularly in instrument weather become complicated, it was indicated, and further work on the solution to these difficulties is needed.

- Prof. Alfred I. Roman of City College, New York, discussed a group of convertiplane designs which he has patented. They involve changing the angle of incidence of the wings by as much as 90 deg. to accomplish vertical and horizontal flight while the fuselage maintains its same attitude.

- Gerard Herrick, inventor of the Herrick Convertiplane, showed movies of his experiments in the 1930s with converted flight. Flight of a man-carrying aircraft which converted from fixed-wing to rotor craft in flight was included.

- David C. Prince, former General Electric engineer, discussed the pressure jet rotor system used on the Hughes XH-17 and his subsequent work on ramjet convertiplanes involving ramjet rotors.

NCAA Probe Pushed

National Advisory Committee for Aeronautics faces a congressional quizzing early next year on alleged over-employment at its Lewis Flight Propulsion Laboratory in Cleveland.

Rep. George Bender will push for the investigation by House Committee on Expenditures in Executive Departments, of which he is a member. NACA states that a 111-man reduction in personnel at the laboratory is the result of an appropriation cut and does not imply that the laboratory has been over-staffed.

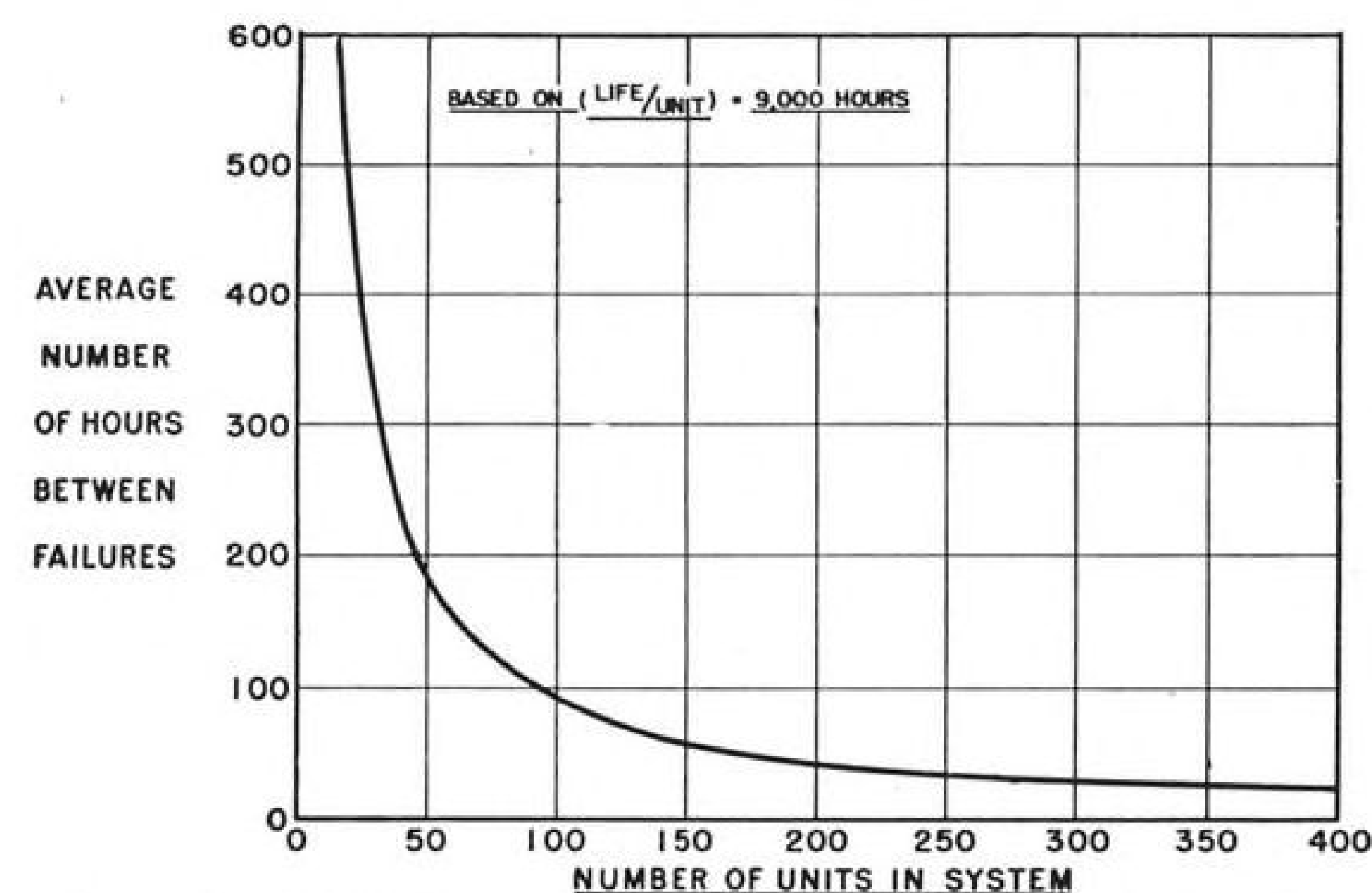


NEW GRUMMAN HUNTER-KILLER MAKES DEBUT

Pictured just prior to its first flight Dec. 4 at Bethpage, L. I., N. Y., is the new Grumman XS2F-1 anti-sub plane, which combines hunter and killer functions in one aircraft. The XS2F-1 has numerous electronic devices for seeking its prey in all types of

weather. It carries a crew of four. Two Wright R1820 engines of approximately 1,300 hp. turn Hamilton Standard propellers. It is designed for short takeoff and landing distances off carriers and can cruise at low speeds while tracking its target. Note

that a retractable tailwheel is used in addition to the tricycle main landing gear. Two different models of the earlier AF Guardian anti-sub plane were required to handle the function which the XS2F-1 now combines.



PRICE OF COMPLEXITY is pointed up in this graph depicting average number of hours between failures as a function of total pieces of equipment fitted to airliner.

Jet Prices Too High: Littlewood

Wright Brothers lecturer also tells how engineers could improve safety design of airliners.

William Littlewood, vice president-engineering for American Airlines, says U. S. airlines would not be interested in buying jet transports or powerplants "which threaten to cost anything like the numbers which have been quoted in the American press. The figures just do not smack of reality, or of any real desire to do the job."

The AA executive engineer addressed his views to aviation industry representatives in Washington, D. C., at the 16th annual Wright Brothers Lecture.

Although he didn't name names, he may have been referring to early reports that Douglas estimated it would take \$30-\$40 million to launch its four-jet DC-8, and production units would be price tagged at about \$3 million each. Boeing has said that jet transport development might also run into eight figures and individual models would cost somewhere between \$2.5-\$4 million.

►Federal Funds—Littlewood also took sharp issue with the slow rate of progress on jets in this country. He indicated that government subsidy might mean government interference in design and that airlines would not buy high-speed transport in which they had no voice in design and development. Some manufacturers have decided to finance their projects out of profits, without federal aid.

His 73-page paper, "Technical Trends in Air Transportation" detailed developments of the many refinements in airframe, powerplant and accessory equipment, which in a brief span of 25 years led to use of the airplane as a mass trans-

portation medium. He also took note of the many achievements in designing inherent safety characteristics in today's transports.

But he frankly pinpointed numerous instances where improvements could be made in airliner design.

Littlewood said there are "pressures which are adverse to a quiet and thorough contemplation of safety in design, (but) there is no substitute for a constructively critical review of all design from a safety experts' point of view. We have not done it adequately—let's do it."

►For Safer Design—Regardless of how future transport configurations emerge, the lecturer expressed hope they will be based on the low-wing design. "... The



WILLIAM LITTLEWOOD

irrefutable advantage of low-wing design lies in the area of safety." And he developed this argument by discussing the low-wing's proven advantages in absorbing impact energy and for ditching.

As to rearward-facing seats, he said that "turning our existing seats to the rear would provide no more, if as much, safety as present . . . that any action or regulation which limits the direction of seats . . . would be premature and ill-advised."

"It is not difficult to see many ways in which aircraft crash safety can be made superior to any other" by proper design of chair structures, mountings, belts and elimination of hard or sharp objects or loose items of equipment that become flying missiles, he said.

Littlewood made some sharp comments on fire detection methods stating that in nearly 50% of the cases he knew of, the danger was initially spotted by passengers or crew members, or became apparent because of engine malfunction, rather than operation of the warning equipment. He said this has been because of improper location of detectors, deficient mounting on materials which failed easily or burned away, and destruction of circuits.

►Design Must—Discussing equipment to prevent air-to-air collisions, the AA executive did not consider radar the final answer. Instead he urged more precisely controlled flight paths and development of cockpit indications and warnings possibly operated on the doppler principle.

Ready access to aircraft structures, he said, is a safety "design must" to check for materials fatigue, and the items should be made up so that they can be replaced with reasonable readiness. "It has been quite shocking" to find improper stress raising conditions, such as notches, holes and sharp cutouts in critical structures.

Littlewood also urged that all aircraft manufacturers be on the offensive for simplification, noting that there is a continuous development of good ideas adding complexity down through every department, but "no one apparently is devoted to taking things off." He saw the equipment miniaturization program as a highly beneficial one headed in the right direction.

►Maximums, Minimums—Continuous progression of a good basic transport design to keep up with increasing seat requirements by stretching the fuselage was discussed by Littlewood, who said a modern contract and specification for future airplanes should make provision for increasing capacity and power.

Littlewood sees a range requirement for U. S. domestic jet transports as being bracketed roughly from 500-2,500 mi.; above and below these distances he believes turboprops will be utilized. At the absolute minimum of aviation ranges will come the helicopter. Safety factors

for the latter should require twin-engine power, especially for operation over congested areas. "The single-engine single-pilot transport airplane went out of vogue many years ago and we must question the safety factors of such helicopter operation," he stated.

One of the problems in jet transport operation will be landing deceleration, he noted, and he looks confidently to development of reverse thrust devices.

► **Local Service**—Since jet operations often will be carried out at altitudes well over 30,000 ft., there must be absolute assurance of no decompression failures,

Littlewood pointed out. And aircraft fuselages must embody more favorable tear characteristics than present planes, to prevent considerable progressive failure following damage in flight.

In his discussion of a local service replacement for the DC-3, the American executive said such a plane probably would have similar engineering characteristics, with probably better landing and takeoff distance performance and improved single engine and flying qualities. Speed and altitude characteristics need not be much different. The approach would be to increase capacity.

Britain to Ask NATO Air Slash

By Nat McKitterick

(McGraw-Hill World News)

London—Great Britain is ready to recommend to North Atlantic Treaty Organization (NATO) a drastic reduction in the long-range West Europe defense goals, reliable sources here report.

Officials will not comment on exact figures, but Chester Wilmot, top British military writer, claimed in the Sunday Observer that British chiefs of staff recommend a goal of only 50 front-line divisions, 5,000 aircraft by 1955. That is about half what Supreme Headquarters (then under Gen. Eisenhower) and the U. S. plugged for at Lisbon last spring.

► **Strategy Change**—NATO strength now is estimated at 25 front-line divisions, slightly fewer "reserve divisions" and 3,600 aircraft.

The proposed reduction in the long-range target is in line with British assessment of the Russian threat—and the tight British financial situation. Real reason may be the bleak economic outlook, but it is obvious from recent statements by top officials that Prime Minister Winston Churchill is convinced the strategic outlook justifies reduced European commitments now.

Here are the main arguments:

• British believe the containment policy has been a big success in Europe. Intelligence claims Russia has failed to match the NATO buildup either on land or in the air. Again using Wilmot's figures, Britain doesn't think the Russians have added to the 22 divisions they had at the time of the Berlin blockade—most of which were only at 70% war strength. Nor do the British think the Russians have stepped up converting to a jet air force in keeping with NATO.

U. S. Air Force officials take issue with the British view, pointing out that the Soviet is in quantity production of the IL-28 twin-jet bomber and has far more planes of the type in service than either the USAF or RAF. Russian MiG-15s in Europe still outnumber

USAF, RAF and RCAF F-86 groups in England and France and, the Pentagon points out, the F-86 is the only NATO fighter capable of slugging it out with the MiG-15 for air superiority.

• As Churchill has indicated in almost every defense speech since last summer, Britain regards the Allied development in jet bombers as bringing back the deterrent threat of the A-bomb, which was lost when the Russians exploded theirs. The British argue that the Boeing B-47 and the Vickers Valiant, both of which should be well in service by 1954, greatly increase the ability of the Allies to deliver A-bombs to the Russian heartland.

USAF sources, however, do not feel that the Boeing B-47 Stratojet and the Vickers Valiant are contemporaries, pointing out that there already are two wings of operational B-47s and that more than 300 of these planes have been built by Boeing. Pentagon believes British estimate that the Valiant will be operational with RAF groups by 1954 is extremely optimistic. A USAF wing of B-47 bombers is scheduled to transfer to British bases next spring. Two Valiant prototypes have been built and a third is under construction.

► **Threat Eased**—The British expect the A-bomb bomber threat will force the Russians to concentrate more on their air defense at home, less on European air buildup. At the same time, the British have no evidence the Russians have anything in sight to compare with Allied bombers.

But USAF officials have publicly stated the Russians have several types of gas turbine-powered bombers under development to succeed their piston-powered TU-70 copies of the Boeing B-29.

The later British line led Churchill, Air Minister Lord de l'Isle and Dudley and Defense Minister Alexander to come out publicly in recent weeks warning against the dangers of sacrificing scientific development of air power for big spending on aircraft production now.

Churchill, always quick to appreciate new weapons, is believed to hold the view that revolutionary air warfare weapons are close enough to reality now to risk concentrating available resources on their development.

► **Middle East**—Part and parcel of the British reassessment of the strategic outlook is strong opinion that Asia and the Middle East are much more important now. This is a big form reversal for the British over the past two years.

Announcement from Downing Street this month favoring broadening the ANZUS pact into a Pacific defense organization, including Malaya, Indo-China, may point the way to the second big card Churchill has up his sleeve. Britain, like France, is known to favor a NATO-like structure for cold wars in the Far and Middle East. The French obviously want a greater U. S. commitment in their dire situation in Indo-China.

Top British officials in the past month again expressed hope the U. S. will be willing to shoulder part of the Middle East burden—preferably with troops.

► **The Rhine Bill**—The British treasury also is alarmed at prospects of footing the bill for the British Rhine army after Germany stops paying occupation costs in June.

Any increase in European commitment to Korea is bound to hinge on acceptance by the U. S. of part, at least, of these requests for burden-sharing. The British still are opposed to devoting more resources to Korea. Top officials say privately they see no military decision change there. But if President-elect Eisenhower comes up with a plausible program, chances are Britain will go along, provided the load is eased in other parts of the world.

Decisions on these matters are certain to be a top subject of any Anglo-American talk next spring and will get priority above any requests for aid to support the strengthening or converting of the pound. The British realize the short-term risk their strategic assessment in Europe involves, but they contend that the long-term risk of economic suicide, plus collapse in Asia, is worse.

Foreign Use Permitted

Permission will be given foreign air carriers who are without a permit to operate from Gander, Newfoundland, to land or take off passengers and cargo at that airport under certain circumstances, according to new regulations of Canadian Air Transport Board.

The airport manager, after consulting with Canadian immigration and customs, can permit such landings in event goods or passengers being landed are for a licensed operating carrier at Gander, or in weather emergencies and delays of scheduled services.

VISIBILITY



by Swedlow

The BOEING B-47 stratojet is the fastest known bomber in the world. This great six-jet engine powered, swept-wing bomber will be produced in quantity for the U.S. Air Force by Boeing Airplane Company, Wichita, Kansas, the Douglas Aircraft Co., Tulsa, Oklahoma and the Lockheed Aircraft Corp., Marietta, Georgia.

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Simmonds introduced the electronic fuel gage to American commercial airline use over ten years ago. Today more than 40 types of commercial and military aircraft are equipped with Simmonds fuel gages. The Simmonds Pacitron represents this type of gage at the highest point of refinement and reliability. The improved amplifier-bridge of the system has been reduced in weight to only 1.12 lbs. and in size to 7 1/8 inches long. It is shock-mounted internally for less bulk and greater installation ease. For the ultimate in accuracy and lightness, it's the SIMMONDS PACITRON.

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PRODUCTION

C-W Naturalizes Sapphire Jet Engine

- Analysis finds British design too cumbersome.
- Wright redesign cuts cost, production time.

By Irving Stone

British designs for airframe and engine components sometimes lead to production procedures considered laborious by American standards. An instance of this showed up when the Armstrong Siddeley Sapphire turbojet was brought to the U. S. by Curtiss-Wright Corp. late in 1950.

When Wright Aeronautical division engineers analyzed the British design for adapting it to American standards, one major part quickly got the spotlight. This component was the center main bearing support.

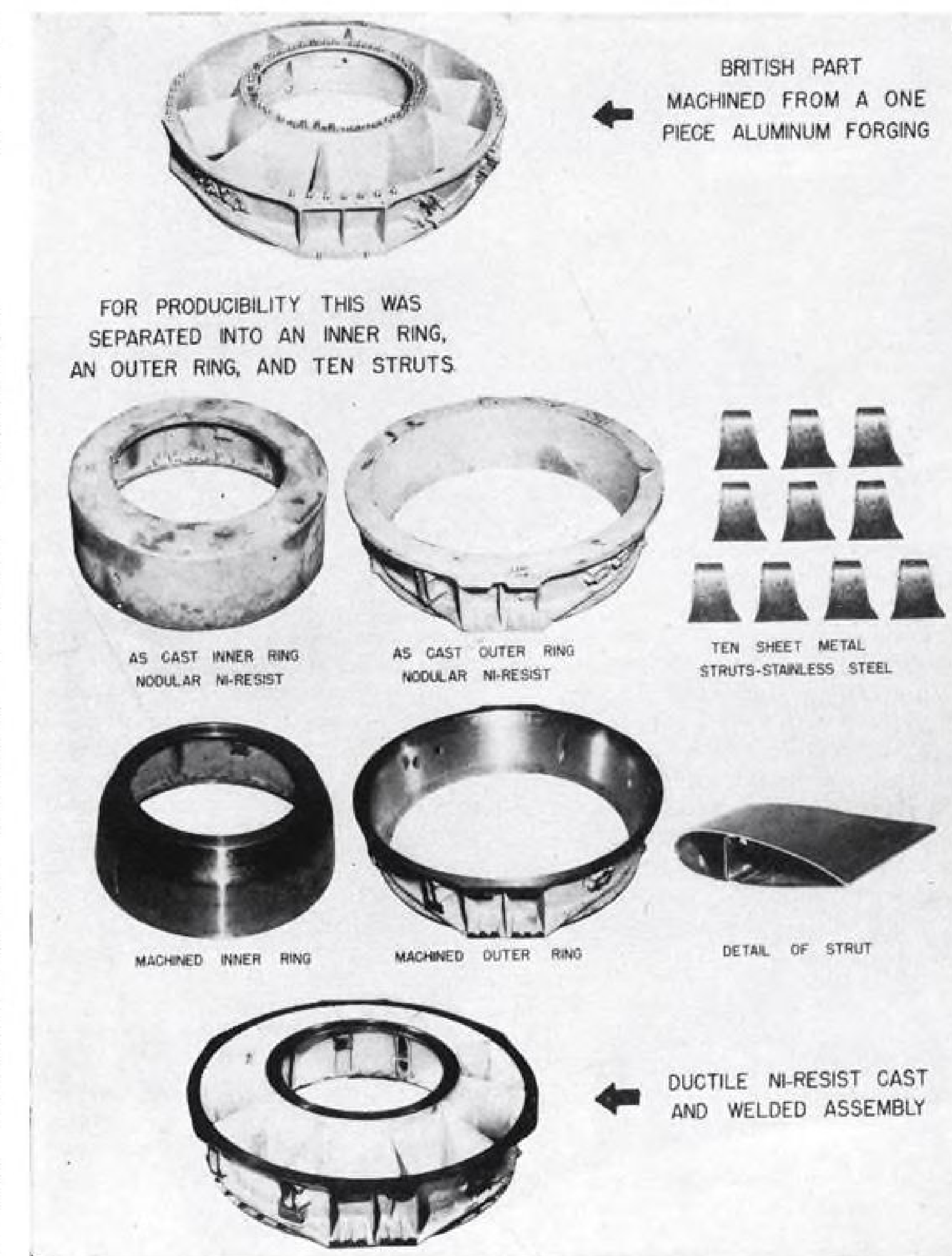
Located about midway between the inlet and exhaust, the support was a key part of the engine structure. Two trunnions attached to it carried almost the entire weight of the engine, also had to absorb all flight maneuver loads.

► **Cost Estimates**—Prototype Sapphires made by the British had a center bearing support which literally had been carved out of an aluminum alloy pancake forging (38 in. in diameter, 11 in. thick). Keller duplicating equipment was used to machine the contoured air passages. About 9 lb. of chips were produced for 1 lb. of finished product.

Wright Aero's analysis indicated that at American labor rates, minimum cost of making the part here from an aluminum contoured forging would be \$5,700. Kellering time per part would be about 700 hr.—meaning that one duplicating machine on a three-shift basis would produce less than a single unit per month. Also, USAF requirements imposed higher operating temperatures and greater peak stresses than those which the British part had been intended to withstand.

► **New Approach**—A special group was set up in Wright Aero's engineering department. Their job:

- Redesign the center bearing support so complex contour machining is eliminated.
- Establish production procedures for fast and economical processing of the part.
- Replace the aluminum alloy with ma-



SAPPHIRE ENGINE center main bearing support was machined from one-piece pancake forging in British design (top). Wright Aero redesign—with cast inner and outer rings, sheet metal struts—slashes cost and time required to make the part.

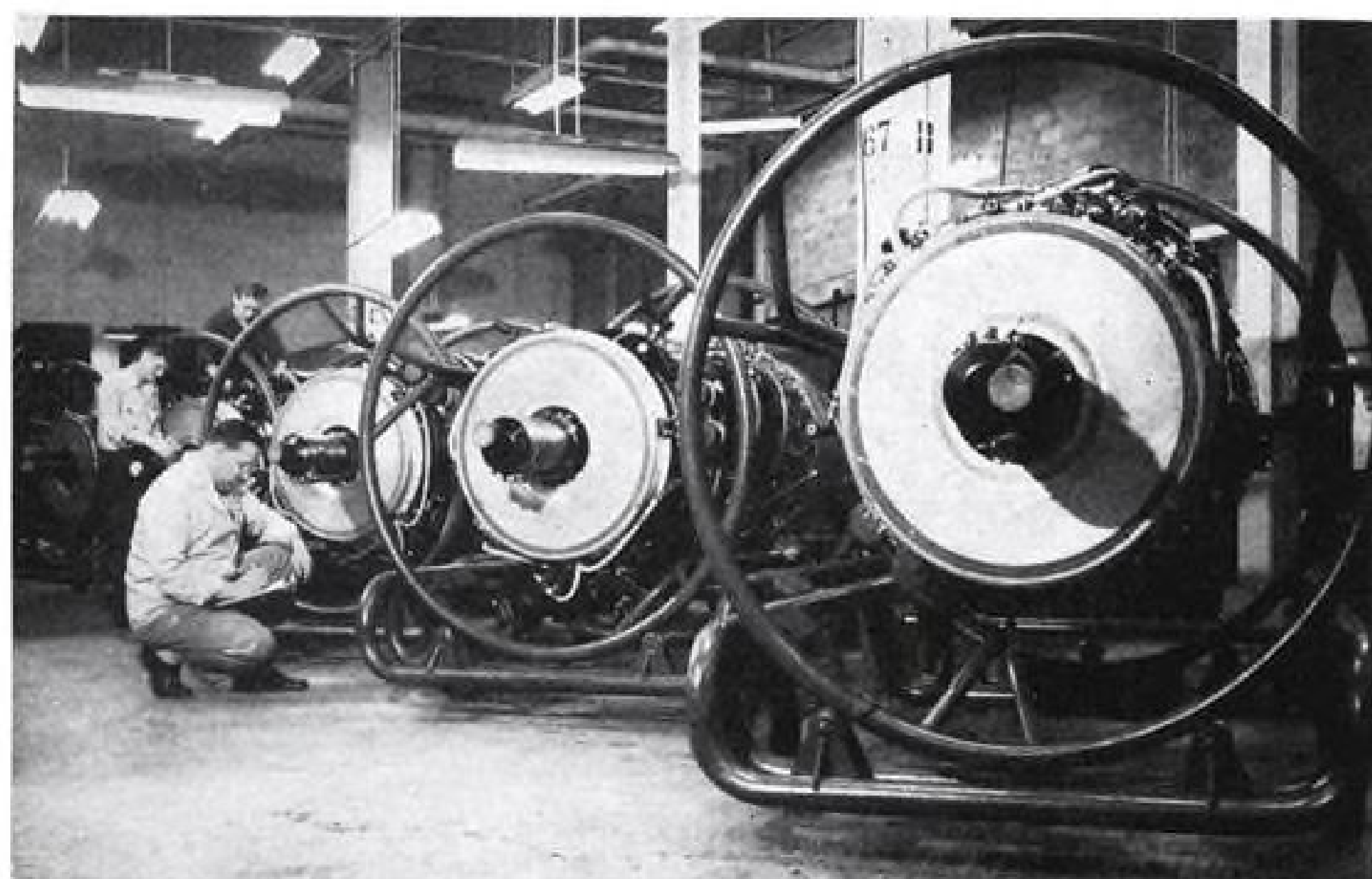
terials having greater strength at elevated temperatures.

A quick solution encompassed a breakdown of the part into an inner and outer cast ring separated by 10 struts shaped from sheet metal and welded to the rings. The rings were to be left largely as-cast, requiring only limited machining on a lathe, facing of pads and boring and threading holes.

► **Nodular Iron Selected**—In the search for the ring material, metallurgical engineers ruled out grey iron because it was too weak and brittle. Working with cast steel was deemed too difficult

to hold the close tolerances required. Nodular iron was chosen—a relatively new material, with both the temperature-resistance and the toughness required in the support. (Nodular iron is a development of International Nickel Co.). The material is ductile, bends about as easily as steel and has strength superior to grey iron. It has the carbon collected in nodular form, leaving an almost continuous matrix. This results from inoculation of the material with magnesium and nickel (serving as a carrier), before pouring.

Costs projected on a volume basis



WRIGHT J65 SAPPHIRE was brought from blueprint to mass production in 16 months. This 7,200-lb.-thrust engine powers the F-84F Thunderstreak.

—with the Wright redesign and using nodular iron—were estimated by Wright Aero's engineering team to approximate \$648 for the castings, \$250 for machining, \$20 for struts, and \$25 for welding. This gave a total of \$943—about $\frac{1}{2}$ the price for the job starting with a contoured forging, and about $\frac{1}{10}$ of the cost using a pancake forging as employed by the British.

► **Rings Cast**—American Brake Shoe Co.'s experimental foundry, Mahwah, N. J., was given the contract to develop a suitable casting technique for the inner and outer rings. Some early samples continued unstable austenite, and minor changes in the nodular alloy were required.

Brake Shoe finally achieved uniform results with a high-nickel alloy that had a coefficient of expansion to fit the parts bolted to the support—the aluminum compressor housing and stainless burner housing.

Lab analyses showed that the nodular iron withstood maximum temperature requirements. At 750F, the iron base alloy is about six times as strong as the original aluminum alloy, on the basis of short-time tensile tests. The redesigned support is only about 15% heavier (maximum) than the aluminum part.

► **Strut-Wing Weld**—Fabrication and welding of the struts themselves presented no problems. Difficult job was to work out a method of welding the stainless struts to the nodular iron rings. Wright Aero engineers came up with a 431 stainless wire which was reasonably compatible with the metallurgy of both the modular iron and the 18-8 strut material.

Welds were submitted to Rayflex testing to evaluate strength under vibration loads. Although deflection of simulated struts measured about 0.1

inch, the joint held firm. This was in excess of any condition likely to be encountered in an engine in flight. Final proving with the welded support was in a test frame to duplicate static maneuver loads. Pressure applied by the hydraulic jack was far greater than the loads that would be encountered in dives, climbs and turns. Subsequent inspection disclosed no failure of the materials or connecting welds.

► **Processing**—Five months after the start of the project—March 1951—Brake Shoe was producing castings to a dimensional accuracy of .030 in.

At Wright Aero, the rings were processed first by rough and finished turning of the air passages to a tolerance of .005 in., then similar rough and finish turning on other parts of the castings. Struts contoured to a tolerance of —.003 in. were welded in place, requiring about 25 ft. of fillet deposited at speeds up to 2 fpm. Final operations on the support are finish turning, facing the pad and drilling and tapping holes.

► **Flown in F-84F**—Six months from the start of the project, the first center bearing support was ready for installation in a YJ65 Sapphire. Test cell trials were satisfactory and the engine passed its 150-hr. model test with a nodular-material support. The new assembly also has been flown successfully in Republic's F-84F.

However, development is still continuing. Aim is to reduce the amount of nickel now required for the nodular-material support. Initially it was hoped to use a ferritic material (low in nickel) to save on strategic materials, but this produced dimensional changes that could not be tolerated on the as-cast surfaces. The relatively low coefficient of expansion of the material also introduced other problems.

As now constituted, the nodular material contains these percentages of elements: carbon, 2.7-3.3; manganese, 1.9-2.5; silicon, 2.2-3.2; phosphorus, 0.15 maximum; sulfur, 0.05 maximum; chromium, 0.50 maximum; molybdenum, 0.30 maximum; and nickel, 21.26.

PRODUCTION BRIEFING

► **Bendix Aviation Corp.** has virtually completed a new environmental test building at company's missile section in Mishawaka, Ind., which will expand activities dealing with missile development and production.

► **Cleco division of Reed Roller Bit Co.**, Detroit, has opened new sales offices and a warehouse at 18071 Wyoming Ave., Detroit.

► **Jack & Heintz, Inc.**, Cleveland, received major orders during October from Boeing Airplane Co. for hydraulic and electric actuators, electric motors and electric control panels; orders for inverters came from the Aircraft Appliance Co. of Canada. Total orders received during the month amounted to more than \$3 million.

► **Sightmaster Corp.**, New Rochelle, N. Y., has incorporated a new subsidiary firm, Sightmaster of California Co., at Gillespie Airport, Santee, Calif., to manufacture and market Chemalloy metal and microwave calorimeters. Three firms were consolidated to form the new subsidiary: Electronic division of Transport Products Corp., Louisville, Ky.; Technical Products and Services Co., and Chemalloy Associates.

► **Metco Corp.**, Dayton, has been founded to develop and manufacture test equipment and training devices.

► **Southwest Products Co.**, Pasadena, Calif., will move into their new factory building at 1705 So. Mountain Ave., Duarte, Calif., during the first week of January. The company makes Monoball bearings, rod end bearings and mechanical push-pull controls.

► **Reynolds Metals Co.**, Louisville, Ky., has awarded a contract for construction of its Robert P. Patterson aluminum reduction plant at Arkadelphia, Ark., scheduled for completion by July 1953, to Ditmars-Dickmann-Pickens Construction Co., Little Rock, and W. S. Bellows Construction Co., Houston.

► **Sub-Zero Products Co.**, Cincinnati, is the new name for the Sub-Zero Products Manufacturing division, Deep-freeze Distributing Corp. The firm makes metal chilling machines.



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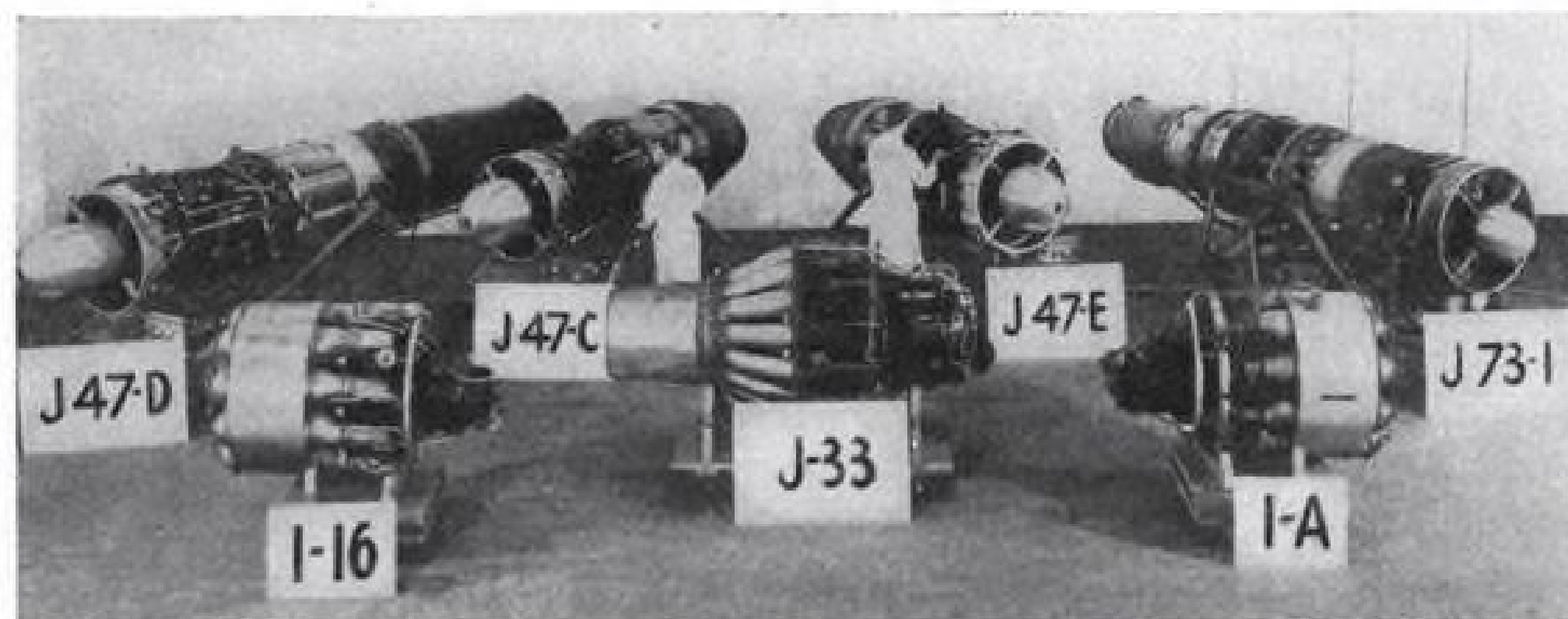
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Family Photo of GE Jet Engines

General Electric Co.'s jet engine development history is telescoped in this photo showing how this powerplant-type has changed and grown:

- **I-A**, first jet plant built in this country, was a centrifugal-flow, experimental engine based on the Whittle W2B. Rated thrust was 1,300 lb., weight was 800 lb. Two I-As were installed in the Bell XP-59A, first U.S. jet-powered plane to fly (October 1942).
- **I-16 (J31)** was the first series production GE turbojet. Thrust rating was 1,600 lb., weight was 840 lb. It flew in the Bell P-59A and Ryan FR-1 and XF2R-1.

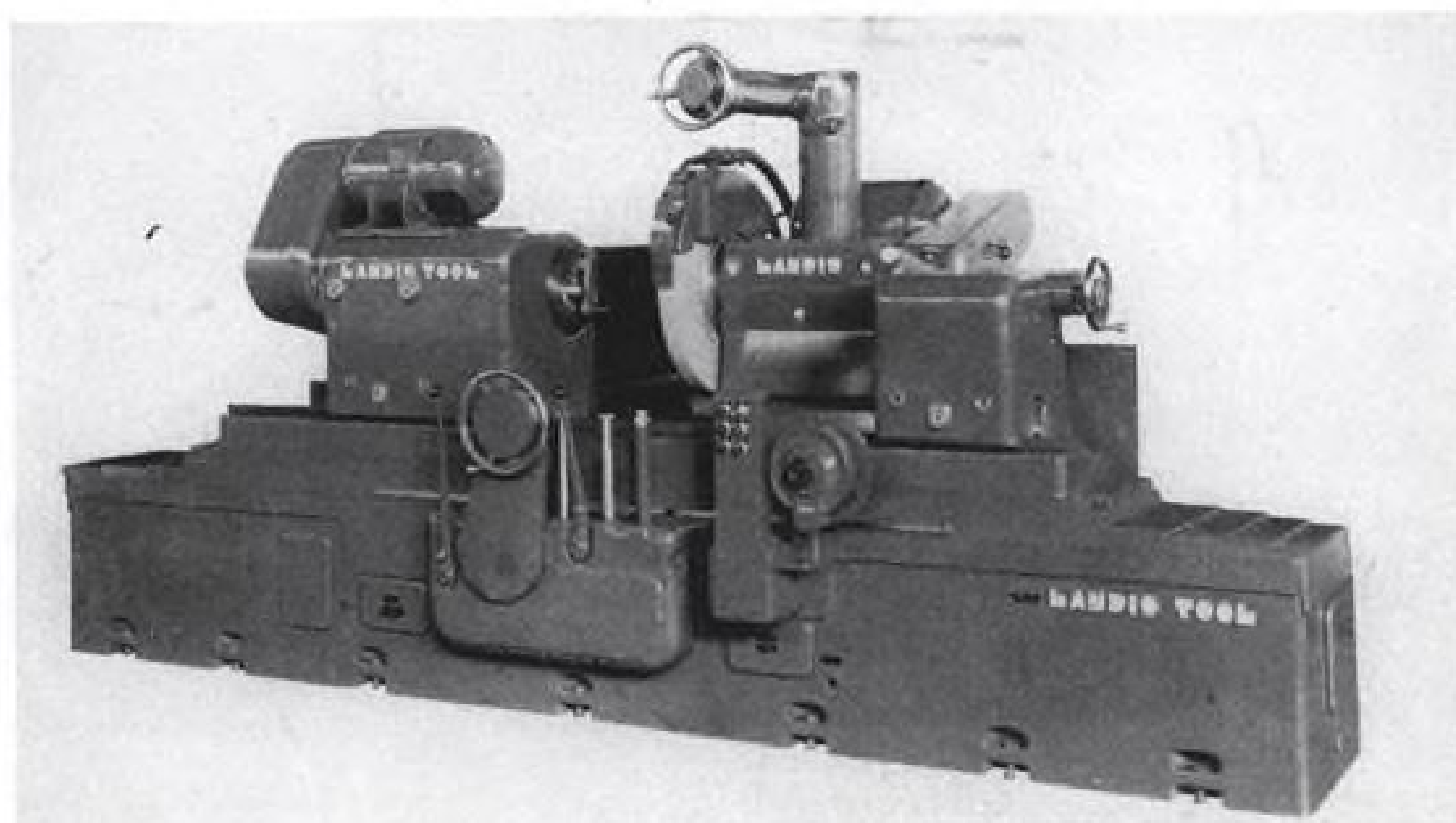
- **J33** (developed as the I-40) was first delivered for test in January 1944, and developed a thrust of 4,200 lb. Weight was 1,865 lb. It was installed in the first Lockheed XP-80A Shooting Star and was first flown in June 1944. Shortly after the end of the war, com-

plete responsibility for the engine was transferred to Allison division of General Motors Corp.

- **J35**. Engineering and manufacturing responsibilities for the J35 (not shown) also were taken over by Allison in 1947 after it had built them in quantity. This engine (also known as TG-180) was the first axial-flow turbojet developed by GE. It was rated at 4,000-lb. thrust, weighed 2,300 lb. First flight was in the Republic F-84, in February 1946.

- **J47** and the **J73** units show the sharp transition in configuration from the early designs. The **J47-C** and **-D** were tagged with a 5,200-lb.-plus thrust rating, the former weighing about 2,500, the latter about 3,000 lb. The **-E** jet carries a 5,800-lb.-plus thrust rating and has a weight of 2,550 lb.

- **J73-1**, latest of the units shown, is in the 8,500-lb.-thrust class.



Machine Grinds Large Jet Parts

Turbojet engine rotors and other large-diameter aircraft work can be handled on CHW Plain Grinder engineered to fill a gap between small-size standard machines and large, heavy-duty units.

The grinder is made in versions having 30-, 36- and 48-in.-diameter swings. Lengths between centers are 48, 72, 96 and 120 in. Variable-speed headstock

drives are standard, but constant speed is available. The slide under the wheel-head, operated either manually or by power, is a double-type to allow for a large amount of base movement. Hydraulic table traverse is adjustable to any desired speed between 3 and 130 in./min.

Swivel table may be adjusted to grind tapered work. Microsphere bearings are

designed to give accurate response to wheel feed changes and quick, positive spark-out. Eye-level wheel feed enables operator to watch grinding action from the same position from which he adjusts the wheel. Extra movements which increase fatigue and slow set-up are eliminated, according to the developer, Landis Tool Co., Waynesboro, Pa.

Dip-Brazing Speeds Aluminum Work

A new dip-brazing plant for aluminum parts has been constructed by United Aircraft Products, Inc., Dayton, Ohio.

Reported to be the largest facility of this type in the aircraft industry, the operation was completed in four months to meet production schedules for more than \$1 million in initial contracts for brazed assemblies.

Essentially, the process involves melting the joining material and fusing it with the parent materials by dipping the assembled components in a bath of molten brazing flux.

Accessibility to joints is no problem. Heat of the bath is maintained automatically, with all parts brought to the same temperature, eliminating distortion from differential expansion. Another advantage of the process is reported to be uniformity of parts appearance, pressure-tightness and joint strength, with little skill required by the operator.

In addition to being faster than the hand-welding technique, the process makes it possible to braze parts which could not be hand-processed, it is reported. The company cites an example to show the process' speed advantage: One assembly was dip-brazed in 47 minutes, against a two-hour period which would be needed if hand-torch brazing were used.

New Copter Engine In Production

The Continental R975-42 radial engine, designed specifically to meet rotary-wing aircraft requirements, is in production for Piasecki's HUP-2 copter. This new engine model is a refinement of the R975-34 used in the HUP-1. It develops 550 bhp. against the latter engine's 525 bhp. Dry weight without mounts, but including carburetor, air defectors, ignition and priming systems, is 732 lb.

The engine is adapted for installation in various copter types. With addition of a small amount of external equipment it will operate in any attitude from horizontal to vertical, says the maker, Continental Aviation & Engineering Corp., Detroit.

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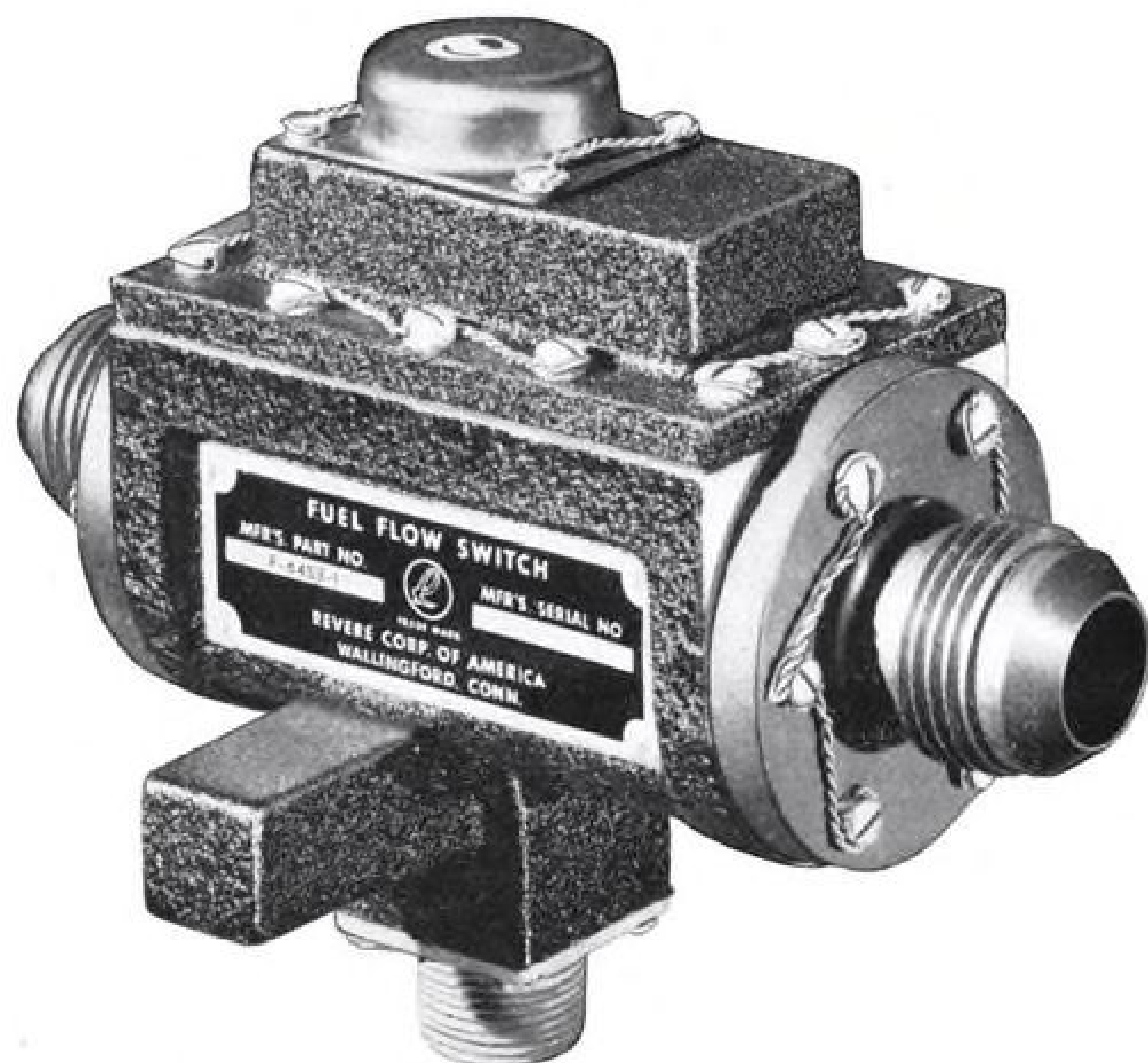


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Glass Fabric for Plastic Assemblies

A glass fabric which stretches while the yarn remains stable, stated to be the first of its kind developed, has been announced by Hess, Goldsmith & Co., for use in plastic assemblies found in aircraft.

Primarily a base for reinforced plastics, the product, Form Fab, can be used where pre-forms now are used, according to the firm. The company believes the material will find many applications in such curved molded sections in aircraft as wingtips, radomes, heating ducts and other parts.

The fabric has up to 70% elongation and it is said, equal strength can be obtained in all directions. When laminated with polyester resin it can be molded into practically any shape or size, with little heat and low pressure, Hess, Goldsmith claims. The resulting material can withstand exposure to temperatures up to 500F. It comes in thicknesses of .009 in., .012 in. and .018 in.

Company tests show the .012 fabric has an average breaking load of 567 lb./in. of width in the warp and 349 lb./in. of width in the filling. It weighs 11.79 oz./sq. yd.

Hess, Goldsmith & Co., 1400 Broadway, N. Y.

USAF CONTRACTS

Following is a list of USAF contracts recently announced by Air Materiel Command.

Beech Aircraft Corp., Wichita, miscellaneous spare parts, \$100,000.

Crosley division, Avco Mfg. Corp., Cincinnati, radio receiver, 2,363 ea., \$729,620.

Davison Chemical Corp., 101 N. Charles St., Baltimore 3, dessicant non-indicating, 16,751,312 ea., \$512,304 ea., 57,095,456 ea., \$864,568.

Dynamic Electronics Inc., 73-39 Woodhaven Blvd., P. O. Box 188, Forest Hills, L. I., N. Y., mounting, 6,507 ea., 1,240 ea., \$55,486.

Edison, Thomas, Inc., West Orange, N. J., kits, 968 ea., 351 ea., 434 ea., \$1,161,820.

Fletcher Aviation Corp., 190 W. Colorado St., Pasadena, kit, 11,870 ea., cylinder, 3,000 ea., plunger, 4,000 ea., \$594,847.

Goodrich Co., B. F., 803-4 Winters Bank Bldg., Dayton, wheel assemblies, 189 ea., 240 ea., brake assemblies, 480 ea., \$298,847; wheel assemblies, 3,538 ea., brake assemblies, 5,123 ea., \$329,091.

Land-Air, 440 Superior St., Chicago, antenna kits, 950 ea., service bulletin, 1 ea., \$67,341.

Lycoming-Spencer div., Avco Mfg. Corp., Williamsport, Pa., engine, 35 ea., spare parts, 1 lot, \$51,233.

Radiant Lamp Corp., 300 Jelliff Ave., Newark 8, N. J., stereopticon motion picture, 27,814 ea., \$50,899.

Sunbeam Corp., 5600 Roosevelt Blvd., Chicago, indicator, 1,670 ea., \$77,535.

Watts Mfg. Co., Ronceverte, W. Va., kits, spare parts, 237 ea., \$147,249; case, 5,000 sets, \$247,200.



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Up the hatch!

The old Navy phrase—"up the hatch!"—takes new meaning as the Piasecki HUP-1 Helicopter hoists man from the ground and up through rescue hatch into cabin. Ability to hover, then climb fast and get away at high speed, is in large measure due to *low structural weight*—a requirement which Piasecki Helicopter Corporation, Morton, Pa., meets with Ostruco Aircraft Tubing.

Ostruco Tubing is used by the majority of leading plane builders, and is preferred for landing gear, fuel lines, and many other applications because of its *favorable strength without weight characteristics*, and specialized forming and machining qualities. Ostruco Aircraft Tubing meets all Army, Navy and AMS specifications. Send for free Handbook A-2 packed with facts for ready reference on Ostruco Aircraft Tubing. Airframe Stock List (revised bi-monthly) also available. Address your nearest Ostruco Sales Office or write direct to General Office, Shelby 1, Ohio.

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AERONAUTICAL ENGINEERING

Flight Lab Learns to Tame Stalls

Cornell study indicates how stall may become routine landing maneuver, allow jets to brake in mid-air.

By Scott H. Reiniger

Buffalo—After years of studying the aerodynamic stall, pilots and scientists of Cornell Aeronautical Laboratory's Flight Research Dept. have learned to ride it and manage it, with new automatic stability controls.

They have not only made an aircraft controllable while completely stalled out, not simply kept it within minimum bounds of control, but have precisely guided it. John Seal, chief pilot of Flight Research, and winner of the Octave Chanute award for his work on flight stability problems, has ridden the stall all the way down to the ground many times.

A special servo system automatically controls the plane for lateral stability in these tests. The pilot keeps the nose up throughout the stall by cranking the horizontal tail surfaces to a negative angle of incidence, to create heavy downward drag on the tail. During the stalled descent, the craft assumes an angle of attack of up to 28 deg.

► **New Flight Maneuver**—Flight Research's director, W. F. Millikin, Jr., told AVIATION WEEK that his group has gone a step further than taking the danger out of riding out a stall. It has experimented with ways of using it as a legitimate flying maneuver. He thinks the stall, properly handled, may offer a new dimension of flight, making flying safer.

In developing his piloting technique in the new maneuver, Seal has found the plane can be landed as well by this method as by others. As he nears the ground, he flares out from the steep stalled descent under full power and lands with a short roll. Forward speed is less than in conventional landings.

► **For Braking Jets**—The controlled stall may be a solution to braking sleek jets efficiently in mid-air. Scientists here think jet transports might perhaps be landed more safely and with greater ease and economy by stalled descents from service altitude than by conventional means—somewhat like a helicopter in auto-rotation. Naturally, passenger reaction would be a big factor in determining whether such a landing maneuver could be adopted.

Keeping in mind that this is still only a successful laboratory experiment, here are some of the advantages a stalled

descent might offer over present landing techniques:

- **Landedown** covers smaller area, reducing risk to inhabitants near airports.
- **Landing roll** is shorter, so smaller fields, with reduced ground clearances around airports, are possible.
- **Need for drogue chutes** or other accessory means of braking may be eliminated as a result of short landing roll.
- **Fuel savings and tight scheduling** might result from the jets' ability to brake fast in mid-air, drop fast on landing point.

The stalled descent may become a completely automatic operation. Cornell is working in this direction. The maneuver became possible only through partial automatic control in the first place.

Flight Research's entire approach to the problem is revolutionary. Instead of making the plane stall-proof, this group seeks to make it responsive to control in a stall.

► **Like Sonic Region**—There is a parallel between the early stages of the stall and transonic flight. In both, the forces on the plane are unpredictable. In this "trans-stall" region, the plane is in a crisis of indecision, whether to stall or not. The craft shudders and shakes and the stall may start, then recede, then build up again. It may

originate from one or another quarter or from several points. There may be lift at some points of the wing and none at others.

If the stall forces prevail—continuing the parallel, this could be called the "super-stall" region—they must be contended with, but they have settled down to a predictable pattern.

It is this "steady state" condition of the stall where the group has made its most fruitful explorations. It has devised methods of studying dynamic behavior of aircraft and has extracted data sufficient to establish basic formulations for design work and improvement of aircraft control generally.

The controllable stall is one of the fruits of dynamic stability and control studies instituted in 1946 by Flight Research. The group has been recognized internationally and is a world leader in this field of development.

Involved in this work are some 30 large projects sponsored by the Air Force, Navy and Cornell Aeronautical Laboratory research funds. Flight Research's hangar is well-stocked with late-type military craft for carrying out its work.

► **Stability Research**—Cornell is developing artificial stability controls to make aircraft more stable and easier controlled in all conditions of flight. These are automatic sensing devices and servo-mechanisms connected into the pilot's flight controls which react to characteristic oscillation signals and damp out random disturbances whenever controls are moved. The system is new in the way it is applied, but the components are not.

As opposed to this generalized approach toward stability, there is "Little Herbert," a yaw damper servo system developed by Boeing Airplane Co. to



STRATOS GOES MODERN

This is the new home of Stratos div., Fairchild Engine & Airplane Corp. at Bayshore, L. I., N. Y. The plant houses all activities of the company, including manufacturing, engineering, sales, administrative and executive. It was erected on a 25-acre site, and built with an eye to easy expansion.

The plant has 27 test cells, a compressed air capacity of 400 lb./min., has facilities for simulating altitudes of up to 55,000 ft., incorporates air conditioning equipment with a capacity of 187 tons, has 700 employees. Architects: Fordyce and Hamby, associated with Raymond Loewy.

SQUEEZE

The 15,000-Ton

Alcoa's new 15,000-ton forging press recently went into operation at the Cleveland Forge Shop. An important addition to the country's largest aluminum forging facilities, this new press will form larger and more intricate structural shapes. It is the first step in Alcoa's "big press" program to give better service to America's aircraft industry.

Aircraft and Parts Manufacturers—

should have Alcoa "How-to-Do-It" books and sound movies to train their employees. Ask for any of the following books: *Forming Alcoa Aluminum*, *Designing for Alcoa Die Castings*, *Designing for Alcoa Forgings*, *Alcoa Aluminum and Its Alloys*. Sound films are available on most fabrication processes.

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prevent "Dutch Roll," an oscillation of the tail. This is a specialized approach, directed at one aspect of stability.

Flight Research's work amounts to complete reassessment of present methods of controlling aircraft.

These systems are not to be confused with autopilot controls which correct and bring the plane back to a pre-selected attitude, altitude and heading. Artificial stability controls are designed, rather, to make response of the plane to any adjustment of the controls, whatever it may be, as nearly perfect as possible, without hunting. The pilot has little need to correct or jockey after initial movement of the control.

Cornell says it has achieved a degree of stability and control in actual flight that is far above that experienced in conventional flight.

Rocket Papers

Trends, tests and techniques of rocket science were reported in 23 technical papers and speeches at the recent seventh annual convention of the American Rocket Society in New York.

Experimental results shared the spotlight with theoretical studies in subjects which ranged from rocket motor combustion and instability to the use of small freight-carrying rockets for establishing a large satellite in its orbit.

Because of their general interest and significance for the future, AVIATION WEEK is printing technical summaries of some of the more important papers. The first group follows:

► A Survey of Combustion Instability in Liquid Propellant Rocket Engines, R. S. Levine and R. W. Lawhead, North American Aviation, Inc.

Smoothness of propulsion system operation is a necessity for missile dependability and accuracy. Combustion instability is a recurrent problem in the design of rocket motors, especially in the large sizes of such engines. Destruction may result from mechanical failure following instability, or burnout due to local high heat transfer rates.

In smooth operation, it is possible that chamber pressure fluctuations can be less than one-third of a percent of the average chamber pressure, but this is exceptional. A 10% variation in thrust or chamber pressure is sometimes considered acceptable; and in rough operations, the fluctuations may approach 100% of the average thrust.

Four classes of combustion instability are discussed:

- Propellant flow fluctuations actuated by combustion time delay (50-500 cps.).
- Propellant flow fluctuations caused by control system instabilities (up to 50 cps.).
- Acoustic resonances of the combustion chamber (400 cps. and up).
- Inability of combustion to stabilize itself (40-3,000 cps.).

The authors expect much progress in this field in the near future so that it may be possible to eliminate combustion in-

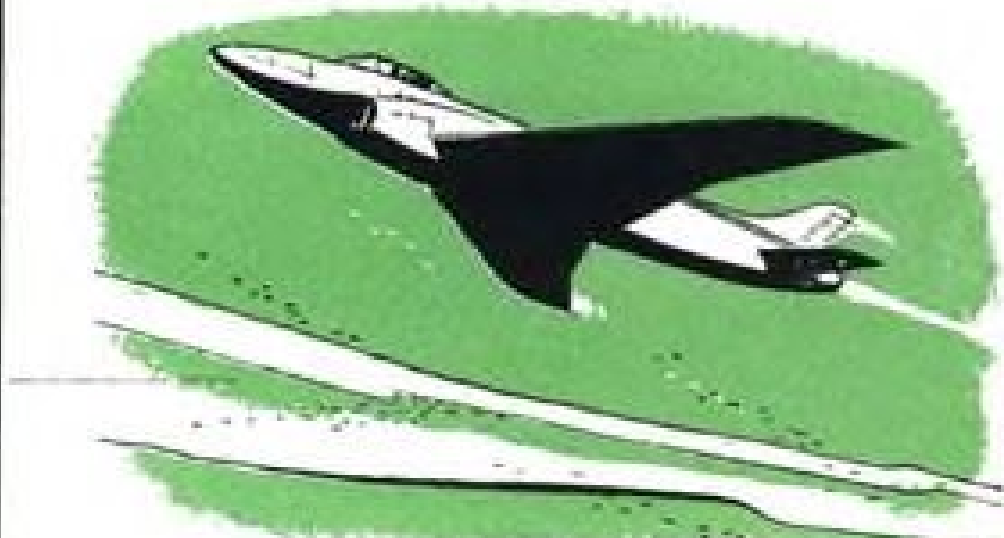
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stability in the design stage of rocket engines.

► **A simplified Combustion Analysis System**, R. K. Neumann, D. Dembrow, W. G. Berl and R. Prescott, Applied Physics Laboratory, Johns Hopkins University.

A gas analysis system has been developed which combines thermal conductivity measurements with a chemical analytic scheme. The system has been used extensively in tests of ramjet engines, although it can be applied directly to other hydrocarbon-air engines and modified for other types.

It can be used for discrete as well as for continuous determinations, for local point-by-point traverses, and for various fuels. Response time is short; a complete analysis takes from 30 sec. to two minutes and shows an accuracy of 2 or 3%.

► **Combustion Studies in Rocket Motors**, Kurt Berman and Samuel H. Cheney, Jr., General Electric Co., Malta Test Station.

Further data on combustion instability in rocket motors, studied with the aid of a rocket motor having a full-length observation window, are presented by the authors.

It has been established that high-frequency combustion instability in small-diameter motors is the result of pressure-pulse propagation along the length of the motor. The frequency of oscillation is a function of the cylindrical chamber length of the motor. The severity of unstable operation is increased by low injector-head pressure drop, long chamber lengths and large nozzle convergent angle.

In the case of very large-scale oscillation,

film-strip records show the existence of shock waves. The flow field has been measured ahead and behind the shock front.

► **The Atmospheres of Earth and Mars in the Light of Recent Physiological Concepts**, H. Strughold, M. D., Ph.D., Dept. of Space Medicine, USAF School of Aviation Medicine.

The space equivalent conditions concerning anoxia and the boiling point of body fluids are found at 50,000 ft. and above in the earth's atmosphere. On Mars they begin at the surface. Thus the Martian atmosphere is nothing more than that zone in the terrestrial atmosphere which has just recently been termed the aeropause.

Therefore the Martian atmosphere, as physical environment, is completely unphysiological for high living beings as we know them.

Apart from the conclusions with respect to Mars, comparative study demonstrates the extreme conditions which confront the present-day high-altitude flyer. To fly above 56,000 ft. would mean flying under Mars-equivalent conditions, which may serve to emphasize the importance of protective measures and equipment for flights into the aeropause.

► **Escape and Survival in Space Travel**, Fritz Haber, Dr. Ing., Dept. of Space Medicine, USAF School of Aviation Medicine.

The problems of escape and survival can be characterized by their distances from the earth.

• In the first group are those accidents

which occur at a very great distance from earth, such as with an interplanetary ship. In this region, it is very unlikely that a man would survive explosive decompression, even if he were wearing a pressure suit. Survival, even after a normal exit through an airlock, would be hopeless because of the limits of pressure suits.

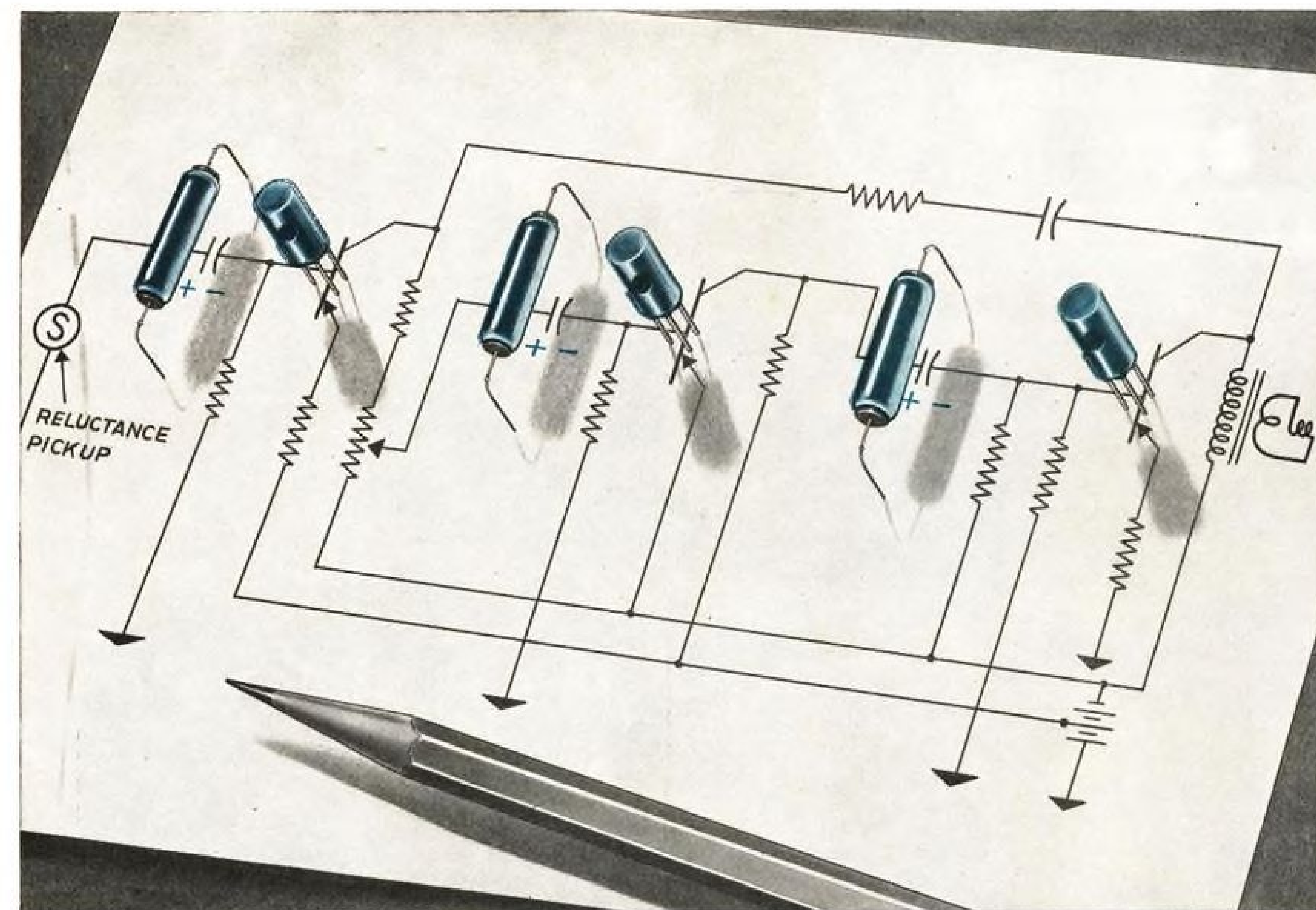
• In the second group would be accidents which occur closer to earth, such as in the vicinity of a satellite. The main difficulty in rescue operations would be location of the victim. Proper means of communication are vital to such an operation.

• In the third class are accidents which occur where the atmospheric influence can be felt. A man falling freely through the outer belt of the atmosphere would be subjected to a deceleration on the order of 300G on arrival at the top of the atmosphere, and this deceleration would be fatal. Furthermore, heating of his body due to air friction would also occur at a very high rate. Even if the deceleration could be avoided, the man would be burned to death.

► **The Application of the Ramjet to Aircraft Propulsion**, Malcolm Harned, Chief Designer, Marquardt Aircraft Co.

The ramjet is a powerplant with enormous potential application in the Mach number range between 2.0 and 4.0. In this range it offers the minimum fuel consumption, highest thrust-weight ratio and minimum initial cost per horsepower of any air-breathing powerplant.

This paper was abstracted in considerable detail in AVIATION WEEK Dec. 15, p. 21.



TRANSISTORS . . . TANTALYTIC CAPACITORS teamed in 100-milliwatt tubeless amplifier

General Electric engineers at Electronics Park, Syracuse, have developed a new tubeless audio amplifier circuit that utilizes three junction transistors and three Tantalytic capacitors.

Although still experimental, this 3-stage amplifier promises significant advances in miniaturized equipments. It has a power output of 100 milliwatts—less than 10% distortion—and a power gain of 70 db.

Tantalytic capacitors were a "natural" for inter-stage coupling in the circuit because of their small size, large capacitance and low leakage current. They match the transistors in ruggedness and long operating life. And they will operate over a wide temperature range (−55°C to +85°C with at least 65% capacitance at −55°C). Other features include light weight, long shelf life, and hermetic sealing.

If you have a capacitor application where you need small size and superior performance, it will pay you to investigate Tantalytic capacitors. They're available in polar and non-polar construction and in

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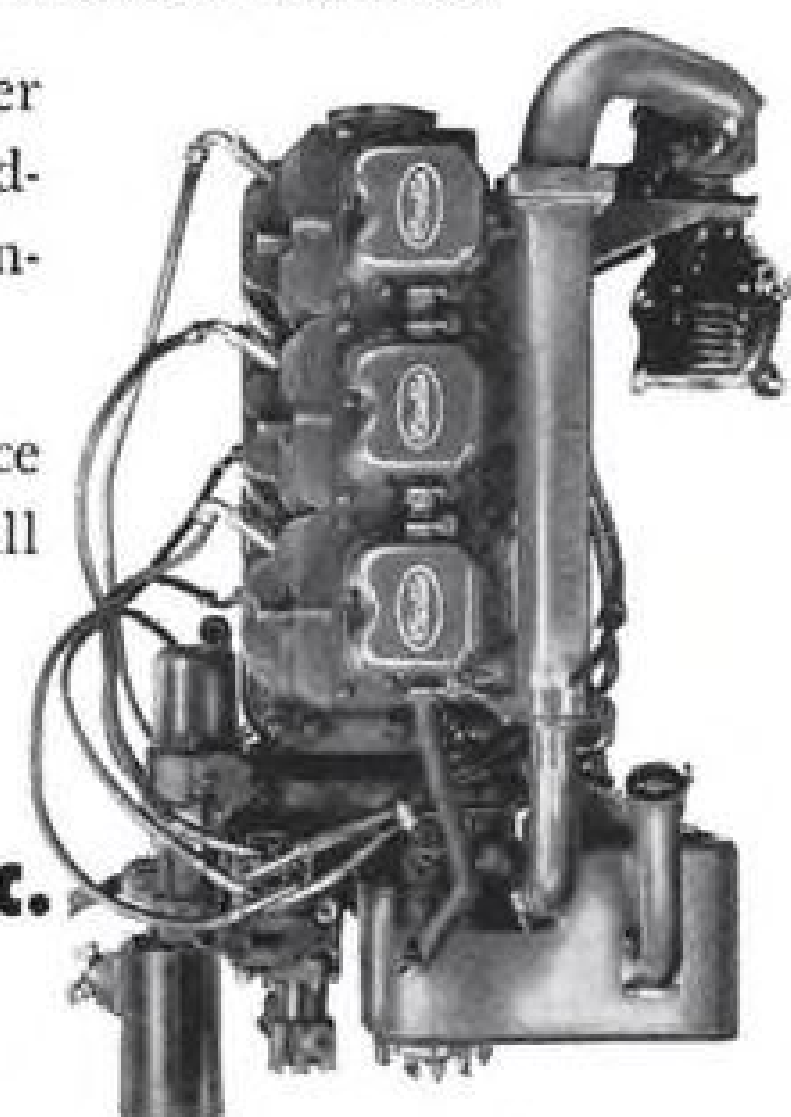
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AVIONICS

Sperry Cutoff Monitors A-12 Autopilot

- Irregular conditions bring unit into play.
- Tests over, device is in limited production.

By Philip Klass

Sperry Gyroscope Co. has disclosed the inner workings of a device which will automatically disengage the A-12 autopilot in the event of a malfunction which would apply a sharp pitch-axis maneuver to the airplane.

The automatic cutoff has completed its prototype development and inflight service tests and is now in limited production.

► **What It Does**—The Sperry cutoff is designed to disengage the A-12 under either of two irregular conditions:

• **If the autopilot suddenly develops an "uncalled-for" pitch-axis control signal;** i.e., when the airplane is not pitching up or down.

• **If the airplane starts to change its pitch attitude and the autopilot fails promptly to develop a counteracting control signal to re-level the airplane.**

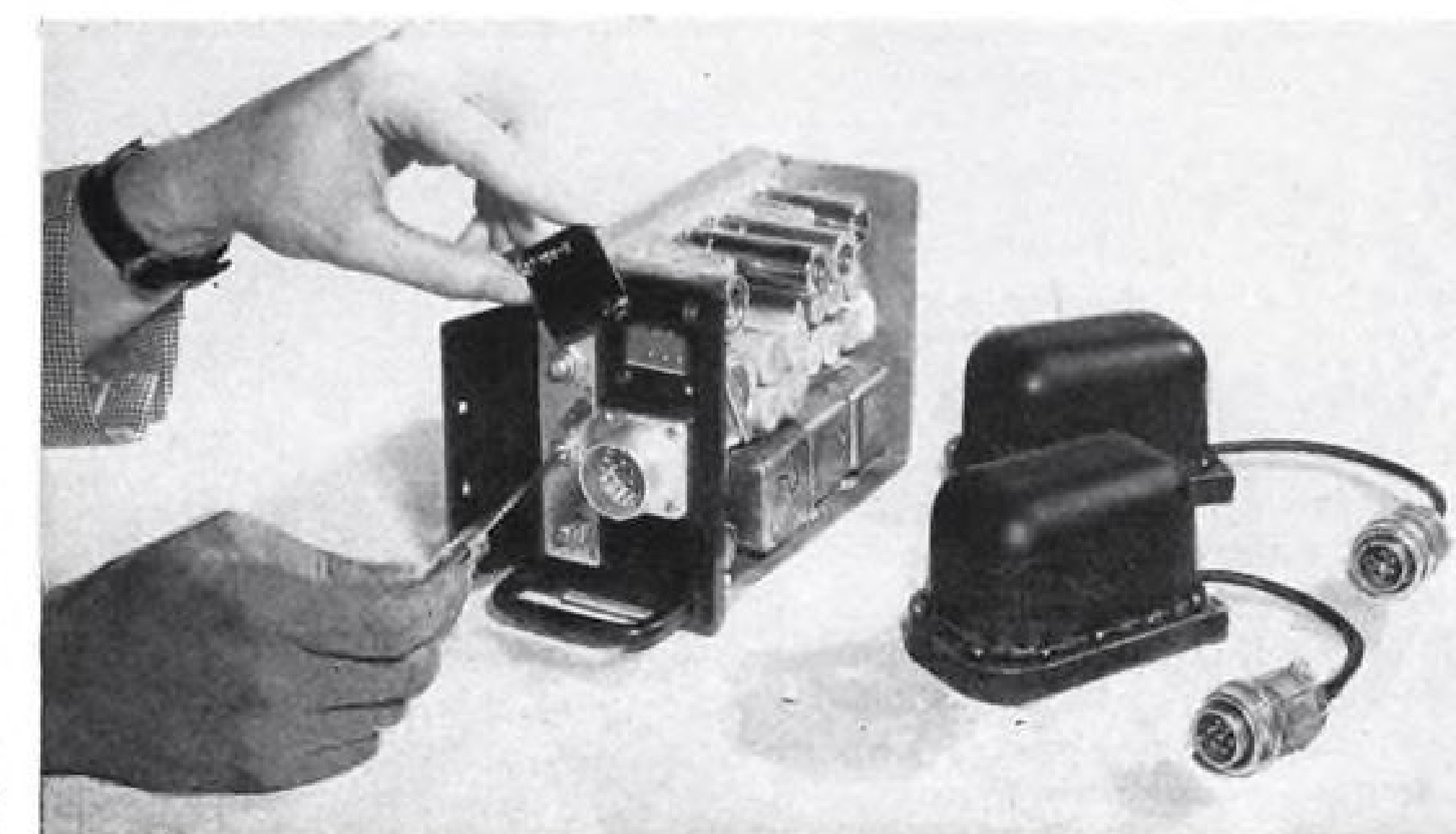
The airplane's pitch axis is considered by designers the most critical and will be the first to get cutoff protection. However, the devices developed both by Sperry and by Lear (AVIATION WEEK Sept. 1, p. 42) can be applied to all three airplane axes if desired.

► **The Need**—Although military aircraft have used autopilots without automatic cutoffs for years, some of the airlines feel the need for increased protection. Certain types of autopilot malfunctions can put a low-flying airplane into a dangerous attitude before the human pilot can manually disengage the autopilot. This has probably hindered airline acceptance of autopilot approach couplers for instrument landings.

Development of automatic cutoff, started at Sperry in 1945, was spurred by several airline accidents in recent years where the finger of suspicion pointed to the autopilot, although its guilt couldn't be proved.

► **Effectiveness Demonstrated**—Sperry gave this writer a graphic demonstration of the operation of the new cutoff, using an analog computer equipped with a highspeed recorder, which Sperry has set up to simulate a four-engine airliner.

Sperry normally limits the maximum servo output torque on an airliner in-



AUTOPILOT CUTOFF consists of amplifier (left), two small accelerometers (right).

stallation so that the servo cannot deflect the elevator sufficiently to put more than a one-G incremental (additional to normal gravity) load on the plane. The servo used in the analog computer demonstration had no such arbitrary limit so that the simulated airliner pulled more Gs than could an actual airliner with limited servo output.

With the cutoff disconnected, Sperry's Dr. George Arthur introduced a sudden (0.2-sec. rise time) autopilot malfunction. Within a second the recorder showed the airplane was pulling 1.8 incremental Gs and has nosed up almost 15 degrees. On an airliner, this could cause serious passenger injuries.

Dr. Arthur then connected the cutoff and introduced the same simulated fault. The cutoff disengaged the autopilot so quickly that the airplane pulled only 0.15 Gs and nosed up only 1½ degrees.

► **Three Components**—The Sperry cutoff consists of three components:

• A small amplifier containing four vacuum tubes and two relays.

• Two linear accelerometers, so located and connected that they measure angular acceleration about the airplane's pitch axis. (One is located in the airplane's nose and the other in the tail; their output signal windings are connected in series-opposition to cancel out signals resulting from vertical accelerations of the airplane.)

► **How It Operates**—Because the Sperry cutoff uses accelerometers, there is a popular misconception that it won't disconnect the autopilot until the airplane has begun to "pull vertical Gs."

This is not the case. The accelerometers provide essentially a "justification" signal used to determine whether the autopilot has good reason to apply a voltage to the servo motor.

The small amplifier continuously compares the autopilot-generated voltage applied to the servo motor with the voltage generated by the accelerometers. If either signal exists without a corresponding signal from the other, the amplifier "concludes" that something is wrong and instantly disengages the autopilot, except under conditions to be discussed later.

For example, suppose that the autopilot amplifier suddenly develops a signal which would cause the servo to apply up-elevator. The airplane should at that instant be pitching downward and the accelerometers should be generating a proportional "pitching down" signal. These two signals are compared within the cutoff amplifier. If they are equal and opposite (in polarity), they cancel, and the autopilot remains engaged; if not, the autopilot is instantly disengaged.

► **Usefulness in Turbulence**—The accelerometer signal is particularly useful during flight in turbulent air, according to P. Halpert, head of Sperry's flight control engineering department. Sperry is a proponent of "tight" autopilot control, which means applying sufficient and rapid corrective elevator motion to prevent any appreciable departure of the airplane from level flight.

In turbulent air, frequent applications of sizeable corrective signals may be necessary with a "tight" control autopilot. These can be safely applied, Hal-

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WORKOUT on analog computer simulates autopilot fault occurring in gusty air.

per points out, as long as the accelerometers confirm that such signals are needed to maintain the airplane in level attitude.

To demonstrate the stability of the A-12 in gusty air, and the fact that the accelerometer signal prevents the cutoff from falsely disengaging the autopilot in extreme turbulence, Sperry made another simulated run.

Approximately every two seconds the airplane encountered a $\frac{1}{2}$ (incremental) G simulated bump, equivalent to a 30 ft./sec. gust. Gust sharpness or rise time was varied between 0.1 to 0.5 sec. The autopilot maintained the airplane

level within better than one degree at all times; at no time did the cutoff disengage the autopilot.

► **Won't Catch All**—The Sperry cutoff will not respond to those autopilot malfunctions which cause a very slow airplane pitching maneuver or "drift." (The same is believed true of the recently announced Lear F-5 cutoff.) The reason in Sperry's case is that the cutoff must be made to "ignore" command maneuvers introduced by the human pilot.

When the autopilot is performing its stabilization tasks, its signal to the servo is of opposite polarity to that generated by the accelerometer, because the autopilot is opposing the maneuver being measured by the accelerometers. When, however, the human pilot introduces command maneuvers through his pedestal controller, the servo signal is of such polarity that it adds to, rather than cancels, the accelerometer signal.

► **De-Sensitized**—Sperry's solution is to de-sensitize the cutoff amplifier so that it will ignore a small error voltage (algebraic sum of servo and accelerometer signals) but will respond to a large error voltage which would cause (or indicate) a sharp, sudden maneuver. Command maneuvers are normally introduced much more slowly than autopilot stabilization maneuvers. Hence com-

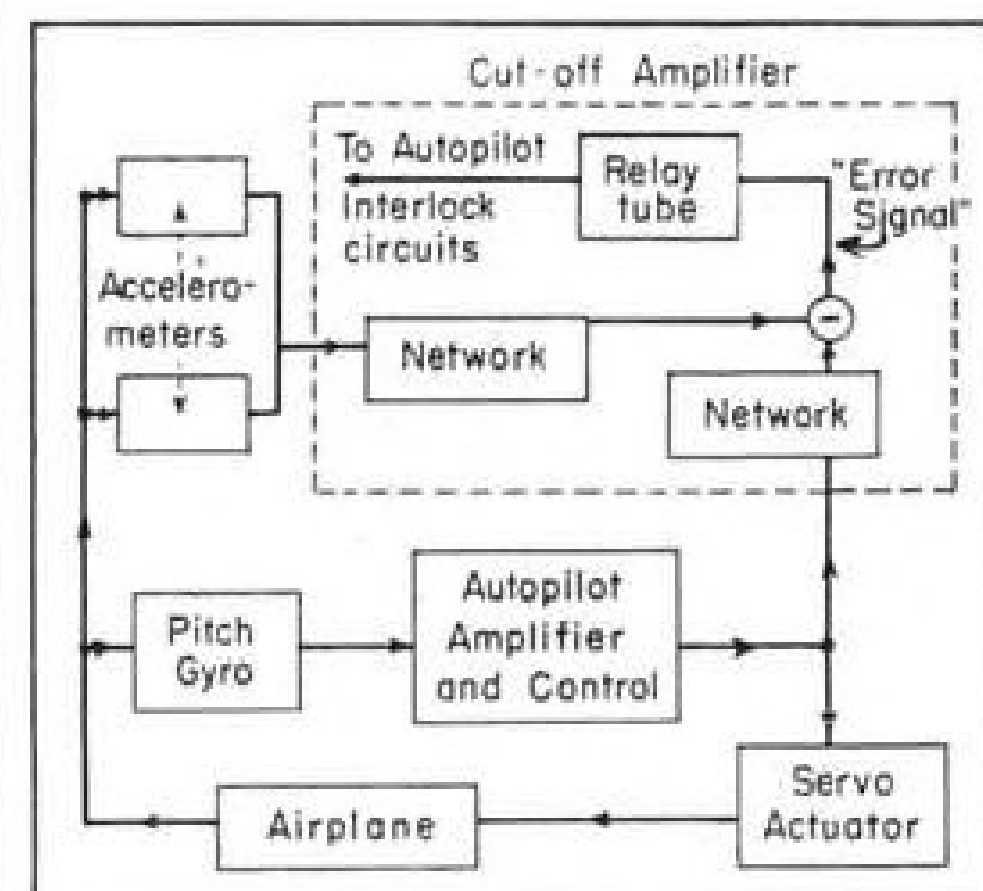


DIAGRAM shows automatic cutoff's relation to autopilot and airplane.

mand maneuvers give a small servo voltage (and thus error voltage) to which the cutoff amplifier won't respond.

Sperry is currently analyzing the report and equipment involved in an American Airlines DC-6 incident last summer in which the plane went into a dive before the cutoff operated to disengage the autopilot (AVIATION WEEK Aug. 18, p. 64). Conflicting statements within the report make conclusions difficult, but it is possible that the autopilot malfunction initially caused a slow pitching maneuver which the cutoff first interpreted to be a command maneuver.

Cutoff amplifier sensitivity which will permit normal pilot command maneuvers is determined for each type of aircraft by flight tests. This sensitivity is then set into the amplifier front panel by means of tap-switches.

► **Matching Networks**—Under stabilizing (non-maneuvering) autopilot operation, the accelerometer signal voltage must be "shaped" so its magnitude is always equal to the autopilot servo voltage for any amplitude and frequency of airplane pitching. An integrating network is designed to take care of this function.

Another network furthers this signal matching by advancing the phase of the autopilot servo voltage within the cutoff amplifier.

► **Accelerometers**—Each of the two identical accelerometers consists of a linear mass-spring device which uses magnetic damping to give a 16-cps. natural frequency and a 0.6-0.7 damping factor. The accelerometer element drives a small 2-phase synchro.

By mounting one accelerometer in the nose and the other in the tail, Sperry gains a long moment-arm or "amplification." This gives a high signal-to-noise ratio and eliminates the need for close matching of the two accelerometers used. Sperry says any two accelerometers can be paired up without special selection.

► **Easy Maintenance**—Sperry has designed the amplifier with an eye to easy maintenance. Significant internal amplifier voltages can be measured from the front panel through an access door which exposes sockets into which voltmeter probes can be inserted.

► **Reliability**—Sperry has eliminated one source of failure by substituting hair-springs for sliprings and brushes in the synchro used in each accelerometer. This eliminates the possibility of accelerometer signal interruption under severe vibration or turbulence. However, if the signal from either of the accelerometers should be interrupted or lost for other reasons, the cutoff will disengage the autopilot.

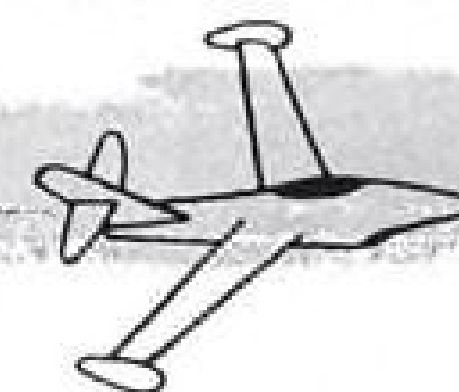
The use of vacuum tubes in the Sperry cutoff raises the question of what

(Advertisement)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.



Everything is laid on the line at a Whittaker control panel meeting... everything from price to policy.

The meetings are held every Friday morning. A score of shirt-sleeved men fog the room with cigarette smoke as they talk their way through the week's problems, and when they adjourn they've got the answers. The sessions are conducted by Vice-President Glenn Whitaker and moderated in final decision, and with dry humor, by Executive Vice-President Don McLennan.

Backed by records and experience, the men on the panel say exactly what they think, with no holds barred. Sometimes discussion develops into debate and edges toward argument. But the net result is a continuing check and balance of the Whittaker program. That's the purpose of the panel—to bring top-level thinking before the group and coordinate it for the benefit of both Whittaker and the customer.

All departments of the valve concern are well represented: management, engineering, test lab, production, tooling, cost accounting, production control, field engineering, outside production, contract administration, scheduling, liaison engineering.

I sat in on a meeting that discussed, among other things, the pricing and delivery of a newly-designed valve. Each man knew the prototype engineering had been approved by the customer, each had studied the design via a route sheet passed around within the previous ten days.

Such top men as Art Birdsall, vice-president, production; Joe Globig, vice-president, engineering; Lloyd Blethan, secretary-assistant treasurer, and their assistants, gave their ideas on time/cost breakdown, explained all problems they foresaw, pointed out good and bad features as far as their departmental responsibilities were concerned.

Typical comments:

"Well, they want the valves yesterday... if we can use the same body casting as the 'WB-007-3½' we can cut down time and cost... production tooling won't be ready but maybe the prototype shop can handle the first ten... these actuators are set, that'll give 'em a cost break... how about that butterfly? We set on that?... okay then, if they'll let us lump those first two orders together we can meet their schedule and save 'em money..."

Chaos? Not a bit. Each idea is belted around and discarded or fitted into place with a verbal shoe-horn until a satisfactory composite

answer is achieved.

Not all questions before the panel concern new valves, of course. Cost accounting may point out that costs for certain items have gone down because of volume production, and that Field Engineering has requested a price cut for the customer. This is granted. Then, too, other discussions may reveal the necessity for increasing a price.

Cumulative queries for new valve types may bring a lengthy discussion on policy—whether or not to produce. Competitor price trends may come up for careful analysis, or emergency orders are discussed in an attempt to solve the immediate need of some customer who is really in a bind for valves.

Frankly, I was surprised to learn that Whittaker doesn't charge all the traffic will bear when its valves—originally turned down for less expensive units—are later sought frantically to meet an emergency.

They know exactly what a design will cost in given production numbers. They figure it right down to the line with a fair profit. If someone else gets the job for less, that's all right. But if there's a jam-up somewhere and premium prices must be paid for parts, the company still rides on its original quotation. It's happened frequently.

The session left me with several impressions:

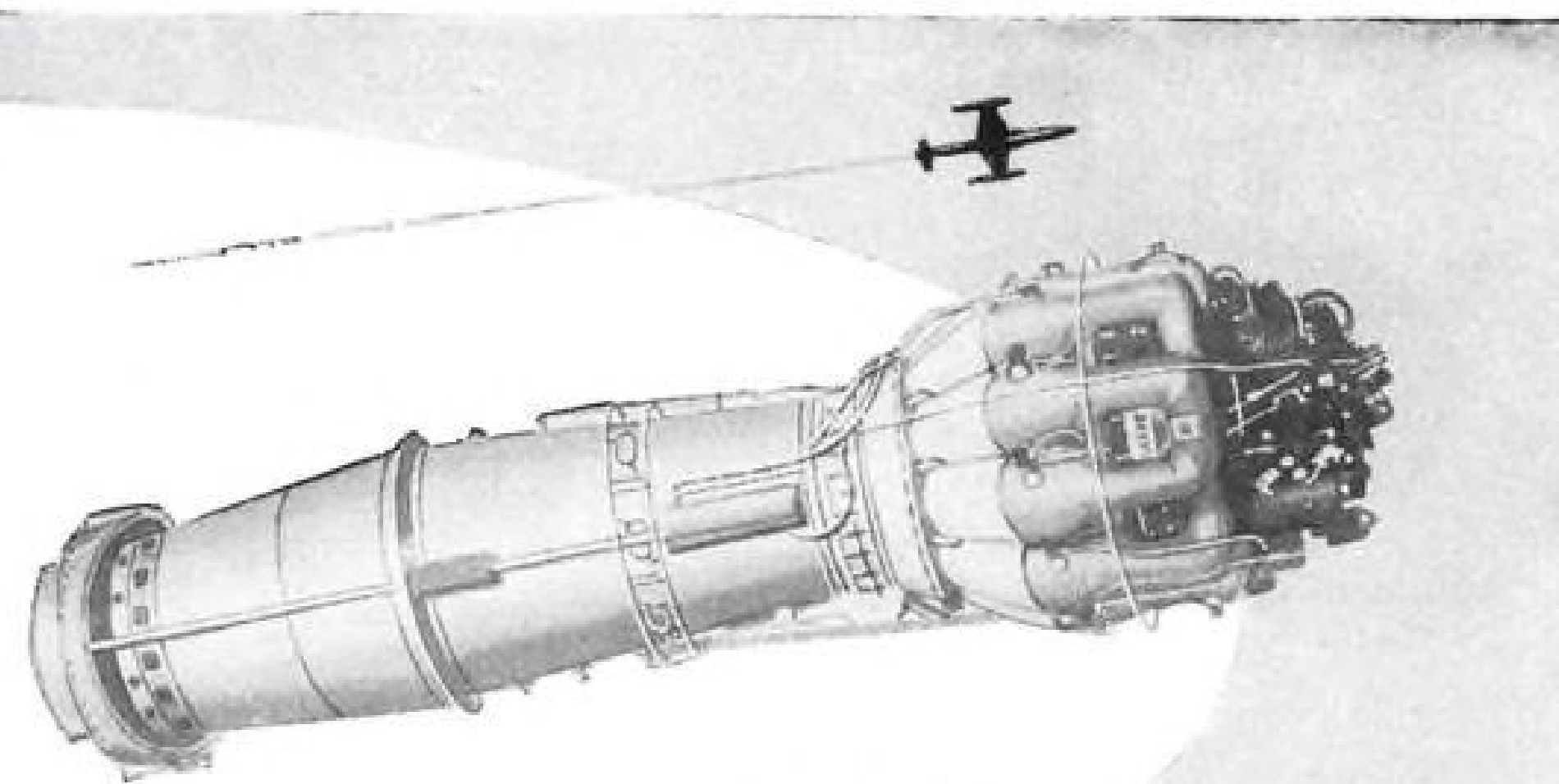
Field engineers really battle for their customers.

Production may scream like a wounded eagle but problems always will be juggled some way to meet a deadline.

Engineering, not at all standoffish in ivory tower fashion, recognizes the problems of other departments and works earnestly to cooperate.

Whittaker, as represented by the control panel, is careful and analytical, with solid pride in the past and an eager eye on the future.

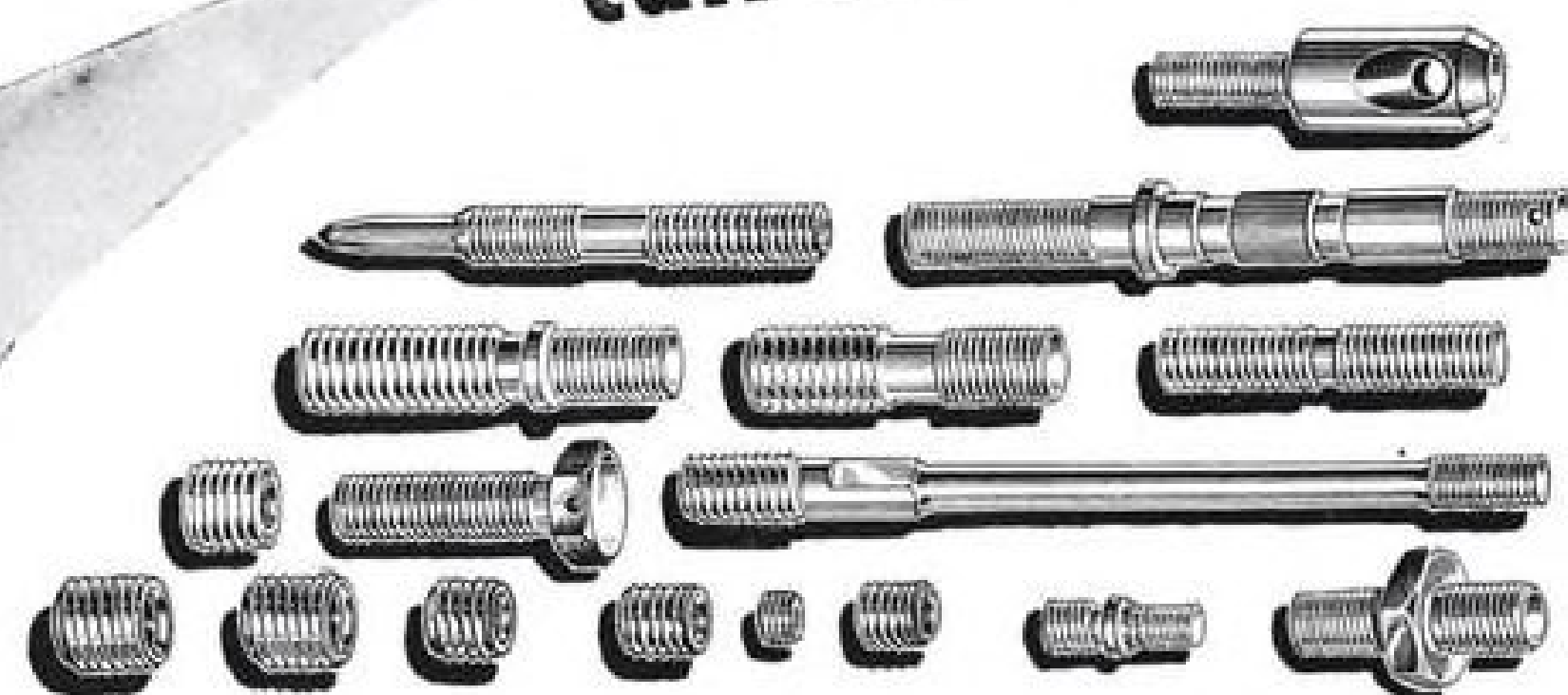
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happens when one of the tubes fails. Sperry says it has designed its cutoff amplifier circuitry so that any tube failure, or serious deterioration in tube performance will cause the autopilot to be disengaged. A cursory examination of the amplifier circuits confirms this statement. Sperry says its engineers worked many months to develop circuitry which would disengage the autopilot when the cutoff failed.



New Sensing Switch

Thompson Products Electronics division has added to its line of sensing switches a new model which permits rapid switching of two independent radio-frequency circuits at frequencies up to 250 mc. The new double-pole, double-throw Model CA-31 provides switching rates of 15 to 31 cps. and could be used, for example, to provide accurate time sharing between two antennas.

Driven by a 115-volt, 380-to-1,000 cps./a.c. motor, the switch has a characteristic impedance of 52 ohms; insertion loss of 1.0 db. maximum, and a 2.0-to-1 voltage standing wave ratio.

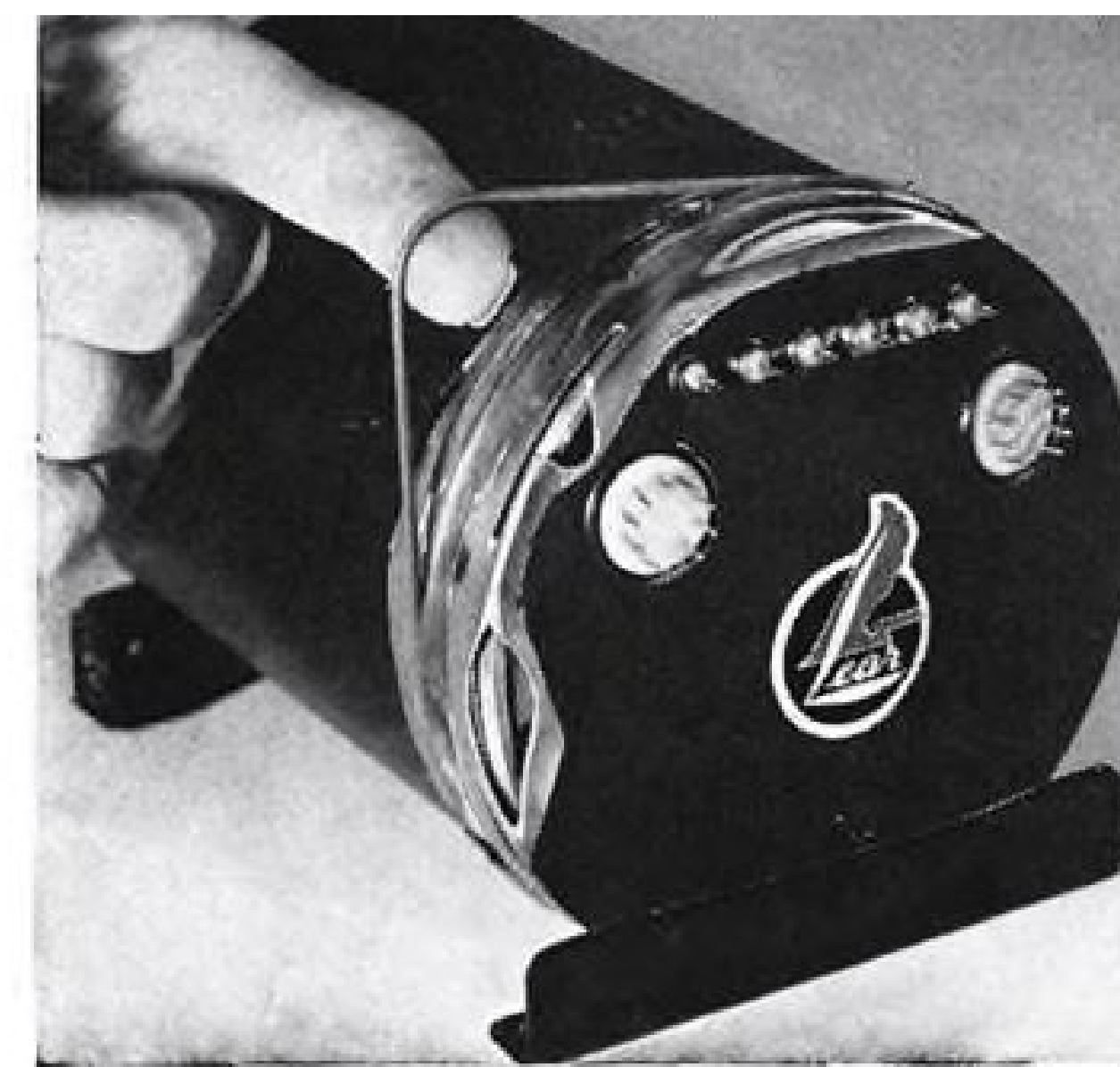
Thompson Products, Inc., Electronics division, 2196 Clarkwood Rd., Cleveland 3, Ohio.

Light-Fingered Mike

A new electronic micrometer for nearly pressureless measurement, designed for use in research, development and performance testing of diaphragms and bellows used in flight instruments, is claimed to give direct measurements as fine as .00002-in. without exerting any pressure on the subject.

Visual indication is given on contact and before pressure is exerted, by means of an electronic circuit, said to be sensitive to five-millionths of an inch displacement at the mike tip. Measuring unit consists of a highly accurate micrometer screw, the maker says.

The Carson-Dice Model W electronic micrometer is made by J. W. Dice Co., 1 Engle St., Englewood, N. J.



Courtesy Lear, Inc.



in instruments where reliability is imperative

SILASTIC* works

where other materials fail

To assure maximum service life and accuracy, engineers at Lear, Incorporated, planned to protect their new vertical gyro-mechanism from corrosion by housing it in a completely inert and dehydrated atmosphere.

Sealing the housing, however, proved to be more easily said than done. Despite the most elaborate precautions, solder and flux fumes often penetrated the joint and contaminated the delicate mechanism. Once sealed, it was impossible to reopen the case without loss of the expensive cover and harness.

To both of these problems a simple and ingenious solution was found. A thin O-ring of Silastic molded to fit snugly under the cover flange is used to exclude the

corrosive fumes generated in soldering a metal strip over the entire joint. The Dow Corning silicone rubber O-ring is not damaged by soldering temperatures. And, the gyro-mechanism is just as accessible for repairs as the contents of a hermetically sealed can of coffee. Lear also uses a large ring washer of Silastic at each end of the housing to serve as resilient, shock-absorbing cushions for the apparatus at stratospheric temperatures.

And that's just one of hundreds of examples of how Silastic is used to improve the performance of products ranging from cable to traction motors, from domestic steam irons to aircraft.

*T. M. Reg. U. S. Pat. Off.

For more information
about the properties or
fabricators of Silastic, mail
this coupon today or phone
our nearest branch office.

Dow Corning Corporation, Dept. D-24, Midland, Mich.

Please send me:

- ☐ Silastic Facts 10a with new data on properties and applications of all Silastic stocks and pastes.
- ☐ "What's A Silicone?", your new 32-page booklet on silicone products and applications.

Name _____ Title _____

Company _____

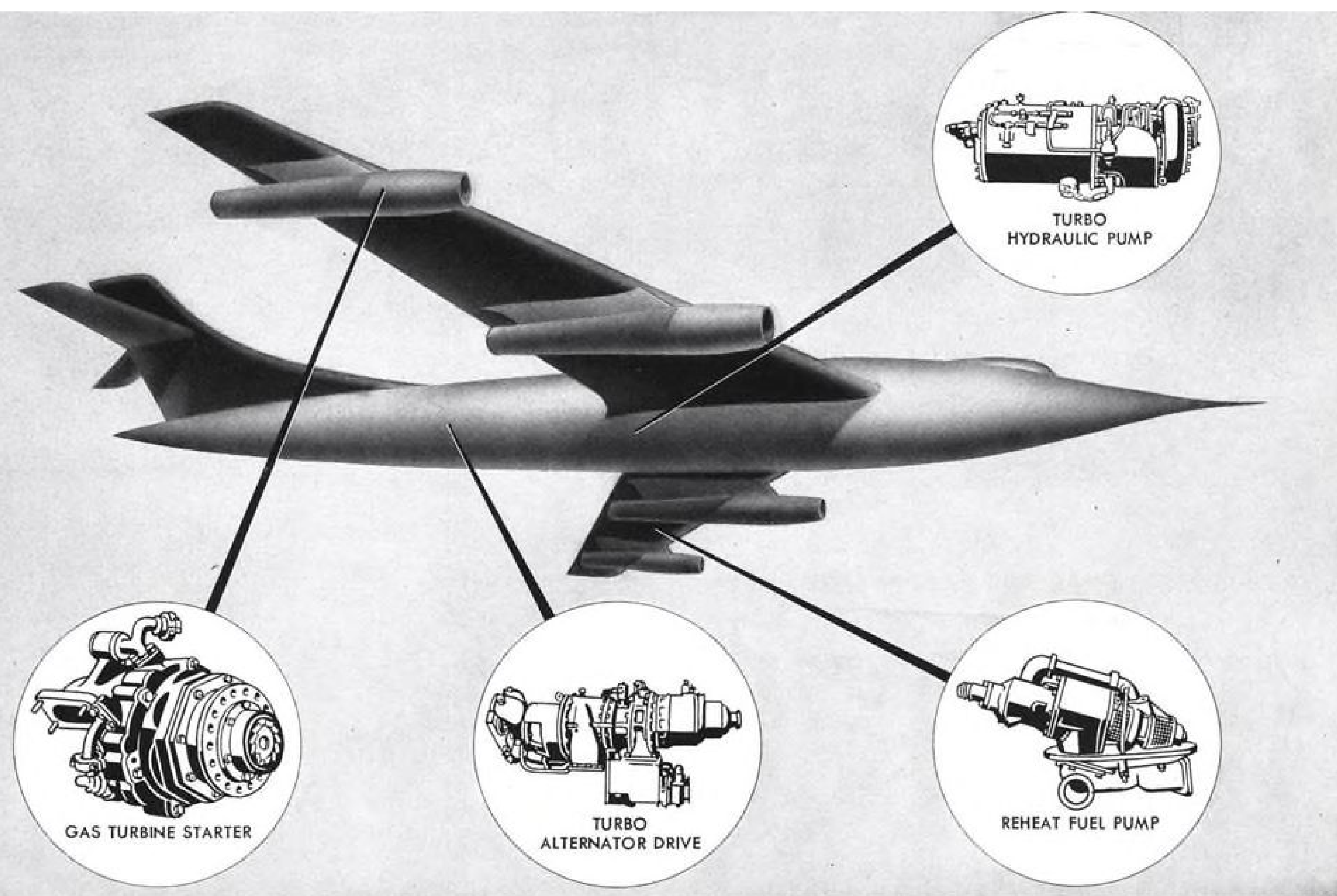
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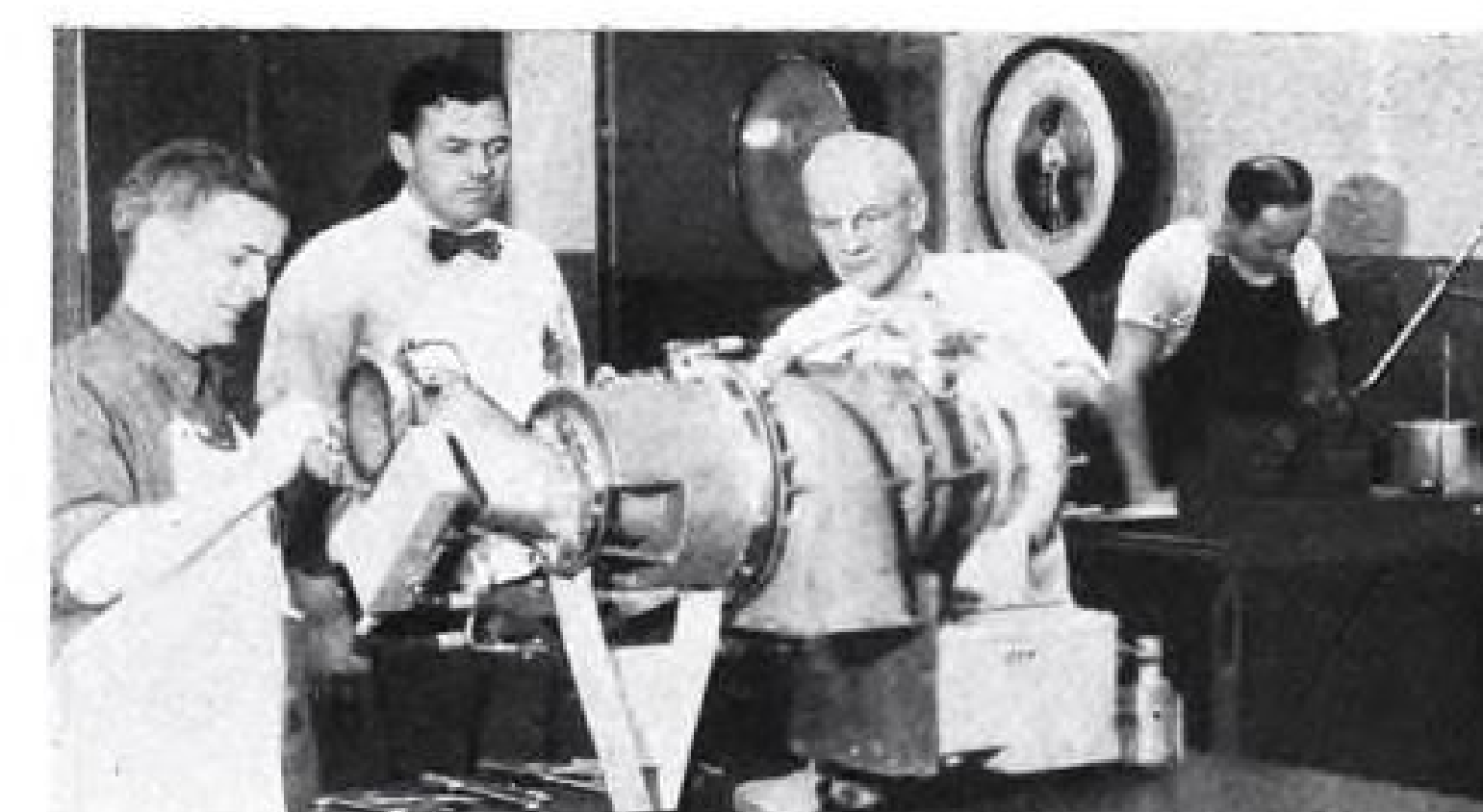


MIDLAND, MICHIGAN

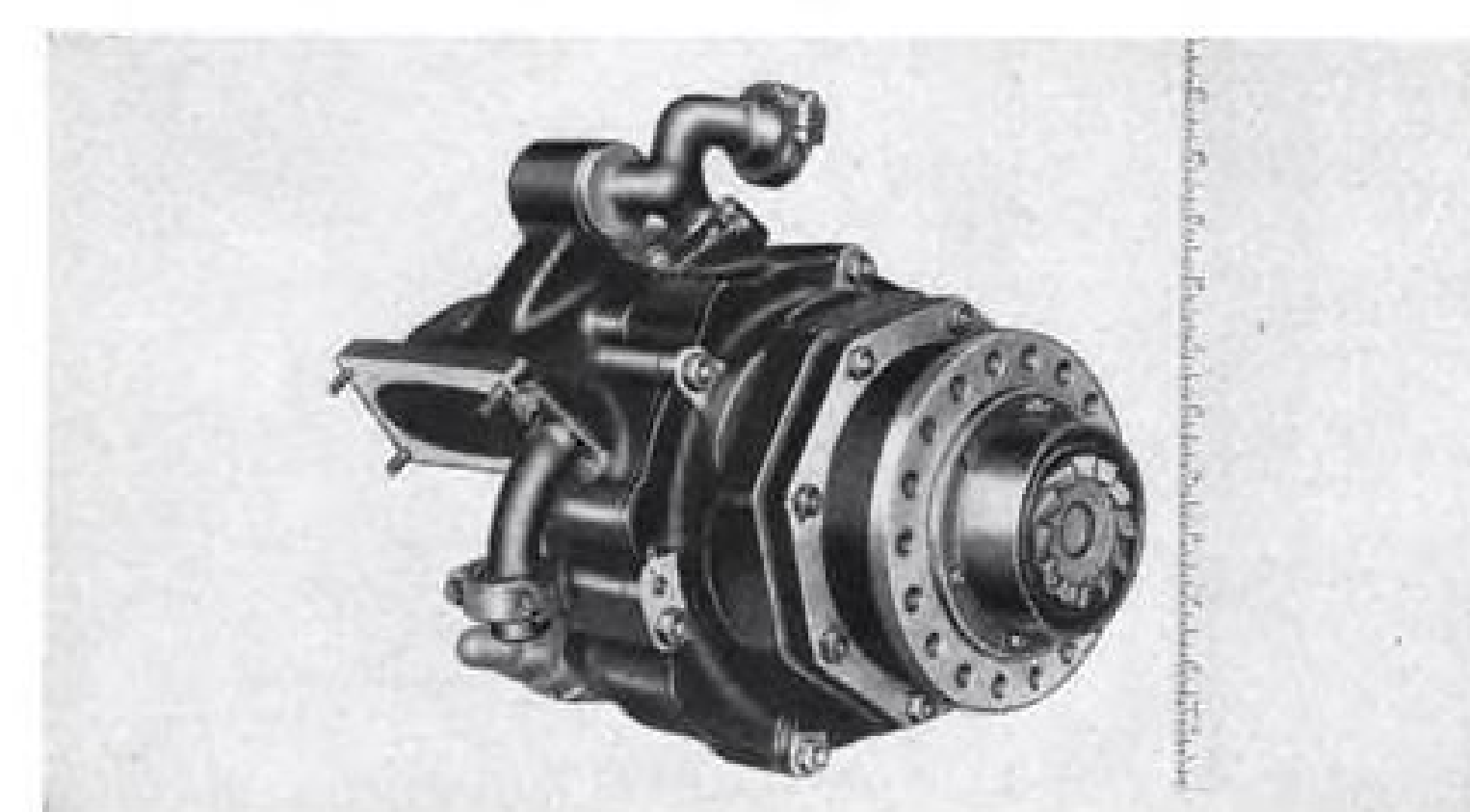
Atlanta • Chicago • Cleveland • Dallas • New York • Los Angeles • Washington, D. C. • In Canada: Fiberglas Canada Ltd., Toronto • In England: Midland Silicones Ltd., London



TURBO HYDRAULIC PUMPS bleed air from jet engine compressor to supply hydraulic power for entire airplane.



TURBO ALTERNATOR DRIVES bleed air from jet engine compressor to supply electric power for entire airplane.



GAS TURBINE STARTERS operate on expanding gases from solid or liquid propellants to give fast starts, without ground power.



REHEAT FUEL PUMP bleeds air from jet engine to supply extra flow of fuel for afterburner operation.

New G-E Accessory Equipment for Jet Aircraft

Saves Weight, Space, Maintenance Time

Units Can Be Designed For Any Size Airplane

DESIGNED FOR JET AIRCRAFT, new aircraft accessory turbines produce reliable auxiliary power under all conditions. Each product in the line features a high power-to-weight ratio and occupies a relatively small space. All are self-contained and can be easily removed for maintenance.

RANGE OF APPLICATION for these turbines is unlimited. They can be designed for the smallest fighter or the heaviest bomber. However, each individual airplane determines the detailed specifications that the drives will be designed for. It is important, therefore, that consideration of the drives be given when airplane design is beginning.

THE NEW LINE of turbine-driven auxiliary power at the present time includes: (1) air turbine-drives for alternators and turbo-hydraulic pumps which can be conveniently located anywhere aboard the airplane, (2) air turbine-driven reheat (afterburner) fuel pumps which allow climb rates of thousands of feet per

minute, and (3) gas turbine starters which start engines within seconds, without ground power.

OTHER ACCESSORY TURBINE PRODUCTS are now in the design stage. In developing these new aircraft accessory turbines, G-E engineers are applying the knowledge of 35 years of developing and building aircraft turbines. This experience plus the manpower and know-how of General Electric is at your disposal to help solve your auxiliary power problems.

For more detailed information contact your nearest General Electric Aviation Specialist. *General Electric Company, Section 210-63, Schenectady 5, N. Y.*

GENERAL  ELECTRIC

GET THESE NEW, FREE BULLETINS

For more detailed information about new G-E Accessory Equipment for jet aircraft, clip this coupon and send to General Electric Company, Sect. A 210-63, Schenectady 5, N. Y.

For: ☐ Reference Purposes ☐ Immediate Project
☐ GEA-5815 Accessory Turbines for Jet Aircraft
☐ GEA-5870 Air Turbine Drives for Jet Aircraft
☐ GEA-5871 Aircraft Afterburner Fuel Pumps
☐ GEA-5872 Aircraft Gas Turbine Starters

Name (Please print)

Position

Company

City Zone State



EXPERIENCE. . . G.E. has been developing and producing aircraft turbines since Dr. Moss developed the first turbosupercharger (1918).



TESTING. . . Accessory turbines are tested under simulated operating conditions. Shown above is turbopump altitude chamber.



SERVICE. . . G-E service shops are strategically located for aircraft gas turbine and accessory equipment overhaul.



Designed for dependability

... tested (and re-tested) for precision

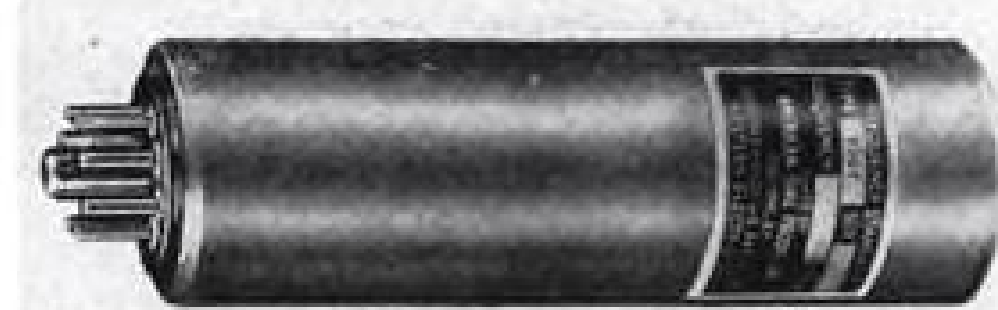
KOLLSMAN devises, develops and manufactures high-precision Aircraft Instruments and Controls • Miniature AC Motors for Indicating and Remote Control Applications • Optical Parts and Optical Devices • Radio Communications and Navigation Equipment

While our manufacturing divisions are engaged largely in defense pro-

duction, the Kollsman Instrument Corporation welcomes the opportunity to apply its research experience to the solution of problems in instrumentation and control.



KOLLSMAN INSTRUMENT CORPORATION
ELMHURST, NEW YORK SUBSIDIARY OF GLENDALE, CALIFORNIA
Standard COIL PRODUCTS CO. INC.



Frequency Standard Has High Accuracy

A plug-in frequency standard with a 400- or 500-cps. output and accuracy of one part in 50,000 at operating temperatures of 15 or 35°C (or one part in 5,000 from -65 to 85°C) has been announced by American Time Products, Inc. The new type 2007 contains a tuning fork, subminiature double triode vacuum tube, and associated circuitry. It is hermetically sealed and weighs less than 10 oz., according to the manufacturer.

American Time Products, Inc., 580 Fifth Ave., New York 36.



► **EAL To Use Microwaves**—Eastern Air Lines is constructing a microwave communications link to connect a remote VHF transmitter-receiver installation near Washington, D. C., to its airport station. Scheduled for operation early in 1953, the link will use Motorola microwave equipment and Wilcox Electric VHF equipment. The link will be an Aeronautical Radio, Inc. (Arinc) licensed facility and will have dual microwave equipment with provision for automatic switchover in event of operational failure.

► **Tube Failures Still High**—Defective vacuum tubes represented 60% of all irregular (non-scheduled) replacements made by one of the largest airlines during the first eight months of this year, A. W. Rebard of Douglas Aircraft Co. told a recent RTCA meeting in Buffalo. Only tube failures in communications equipment (not in autopilot, fuel quantity indicator, etc.) were included in the analysis which counted 1,150 defectives. "Reliability of the tube is progressing very slowly," Rebard concluded.

► **Microwave Manual**—Useful addition to an engineer's reference shelf is the 134-page microwave equipment manual announced by DeMornay-Bonardi, Inc. The manual contains a section devoted to microwave fundamentals, including useful conversion tables and graphs; a section describing test procedures and set-ups for measuring and calibrating microwave equipment; and a catalog of DeMornay-Bonardi's microwave equipment which includes waveguides, oscil-

lator units, waveguide switches, phase shifters, impedance meters, etc. Copies are available on request. (3223 Burton Ave., Burbank, Calif.)

► **New GE Approach Coupler**—General Electric has delivered to Navy BuAer experimental models of its newly developed ILS approach coupler for operation with GE's G-3 autopilot (used on Navy's F3D, F9F-5P, F9F-6P and A2D). Device provides automatic switchover from constant altitude control when glideslope is intersected as well as other new automatic features.

► **Transistorized Missile**—Example of industry interest in transistors is the report that one guided missile manufacturer has "transistorized" a major portion of his missile's avionics equipment on an experimental basis to illustrate potential size and weight savings. Present limit on transistor operating temperatures is a roadblock to their use in production missiles.

► **Transients**—Million-dollar Douglas electronics lab at Tulsa which will test bombsight, fire control and other avionics equipment for Douglas-built B-47s is now in operation. . . . Minneapolis-Honeywell has announced three new types of insulated thermocouple wires; one is usable in temperature range of -20 to 225°F; another can be used in ambient temperatures up to 2,000°F. . . . Sperry Gyro has received USAF orders for approximately 8,000 Gyrosyn compasses, 2,800 directional gyros, and 700 automatic pilots.

► **Radar a Must for Jets?**—Airborne surveillance radar, particularly for storm warning, is a "positive necessity" for jet transports, M.G. (Dan) Beard told the Sidney, N. Y., Engineers Club recently. Beard, chief engineer of American Airlines, described the operational uses of airborne radar to the group of Bendix Scintilla engineers.

► **Seek New Microwave Detector**—The National Science Foundation has announced 52 basic research grants, including one to Northwestern University for "Theoretical and Experimental Studies of a New Type of Microwave Detector." Several grants were also made for studies in solid-state physics, to provide more knowledge of transistor principles.

► **Gaveco Becomes Gavco**—General Aviation Equipment Co., manufacturer of avionics equipment, has dropped the "Equipment" from its name to become General Aviation Co., Inc.

► **Magnetic Research Corp.**—A new company, Magnetic Research Corp., which will specialize in research, de-

RYAN RATES

its RATE OF CLIMB INDICATORS

with

BOWSER TEST EQUIPMENT

Photo shows Ryan indicators under test in Bowser standard Utility Cabinet.

Ryan Industries of Detroit supplies USAF with rate of climb indicators which must meet rigid test specifications under conditions of high altitude and extreme temperatures.

Standard Bowser test units perform this all-important testing job for Ryan. Indicators are tested at temperatures from -67°F. to +160°F., at altitudes varying from sea level to 50,000 feet.

Rapid pull down time after each test run enables Ryan to deliver **more** of these vital instruments to USAF . . . each pre-tested under accurate flight conditions.

Why don't you take advantage of long **continuous** experience? Consult Bowser, the pioneer.

PROGRESS REPORT . . .
Three more high altitude Walk-In test chambers are currently under construction in Bowser's enlarged plant.

BOWSER TECHNICAL REFRIGERATION, Terryville, Conn.
Send information on test equipment checked:

- | | |
|--|--|
| <input type="checkbox"/> High Temperature | <input type="checkbox"/> Fungus Resistance |
| <input type="checkbox"/> Low Temperature | <input type="checkbox"/> Rain and Sunshine |
| <input type="checkbox"/> Temperature Shock | <input type="checkbox"/> Sand and Dust |
| <input type="checkbox"/> Humidity | <input type="checkbox"/> Immersion |
| <input type="checkbox"/> Altitude | <input type="checkbox"/> Explosion Proof |
| <input type="checkbox"/> Walk-In Rooms | <input type="checkbox"/> Vapor Tight |
| | <input type="checkbox"/> Special Engineering |

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Company _____

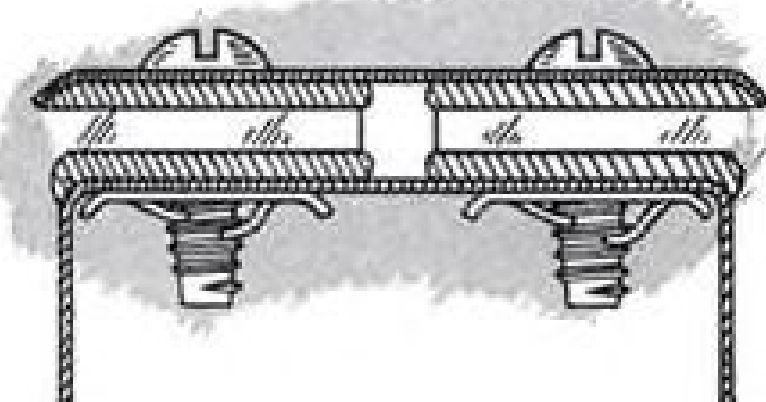
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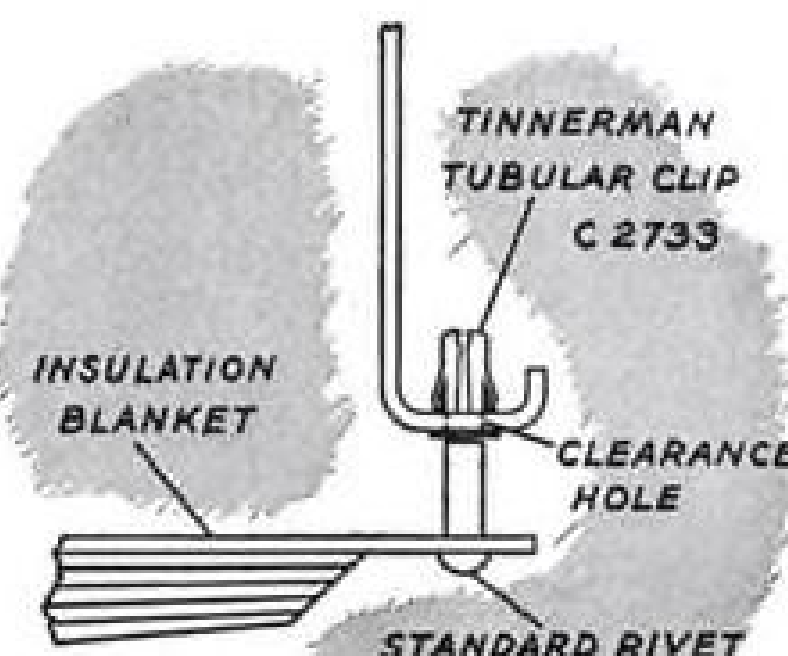
BOWSER
TECHNICAL REFRIGERATION
DIVISION BOWSER INC.
TERRYVILLE • CONN.

How Vibration-Proof TINNERMAN FASTENERS

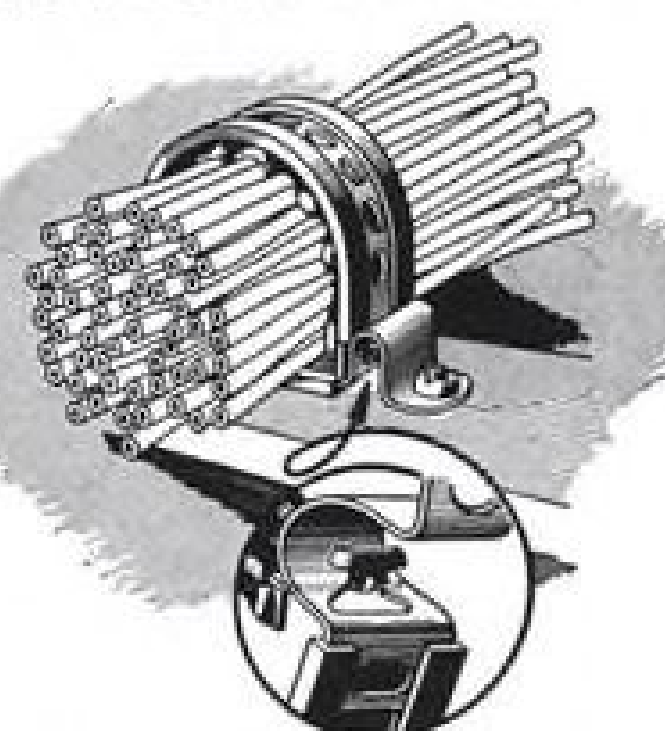
SAVE • WEIGHT
• ASSEMBLY TIME
• MATERIALS HANDLING



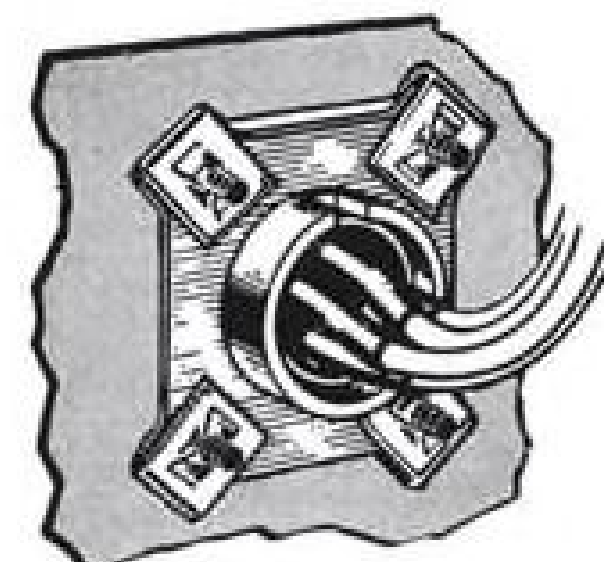
Kaman Aircraft Corp., Windsor Locks, Conn., found Aircraft Flat Type SPEED NUTS give a larger bearing surface, eliminating flat washers and nuts—reducing weight up to .31 lbs.—saving .15 man-hours per hundred fasteners; only one part to handle means faster, easier attachments, less materials handling!



Piasecki Helicopter Corp., uses Tubular SPEED CLIPS on "Flying Workhorse"—making spectacular 71% assembly savings...73% weight savings! Now specify hundreds of SPEED NUTS on H-21 Army Transport and Airforce Assault Helicopters and on Navy HUP-1 craft!

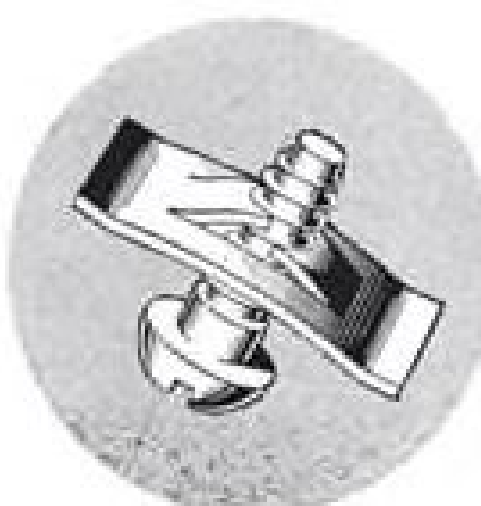


The Glenn L. Martin Company, Baltimore, Md., "Leads the Way to Multi-Million Dollar Savings" with the new TINNERMAN Electrical Harness Clamp! They found an 18¢ saving per clamp for 1500 installations on the new P5M-1 Marlin, a huge savings in terms of the thousands of planes needed in America's defense!



Globe Corp., Aircraft Div., Joliet, Ill., after testing many types of fasteners for use on their Jet Powered Aircraft Target, KD2G-2, found SPEED NUTS ended vibration loosening problems and provided an average time savings of 48% per application over other methods!

Samples available. Write Tinnerman Products, Inc., Dept. 12, Box 6688, Cleveland 1, Ohio. Distributor: Air Associates, Inc., Teterboro, New Jersey.



TINNERMAN
Speed Nuts
FASTEST THING IN FASTENINGS

velopment, and production of magnetic devices has been formed by Hugo Voerdemann and associates, all formerly with North American Aviation. Magnetic devices will include amplifiers, voltage and frequency regulators, pulse generators, frequency changers, and low-level signal converters. The announcement lends credence to earlier reports that NAA has plunged heavily into mag-amplifier development for use in its new automatic intercept system. (Magnetic Research Corp., 318 Kansas St., El Segundo, Calif.)

► **SADIC Goes to Work**—Consolidated Engineering Corp.'s new analog-to-digital computer, SADIC, has gone into use at White Sands, N. M., Proving Ground to transcribe missile test results. University of Southern Calif. and the Navy test station at Point Mugu have SADICs on order, Consolidated reports.

► **Collins Sells First Transceiver**—First order for Collins Radio's newly announced 144-channel HF transceiver (AVIATION WEEK Sept. 15, 1952, p. 48) has been received from Lear, Inc.

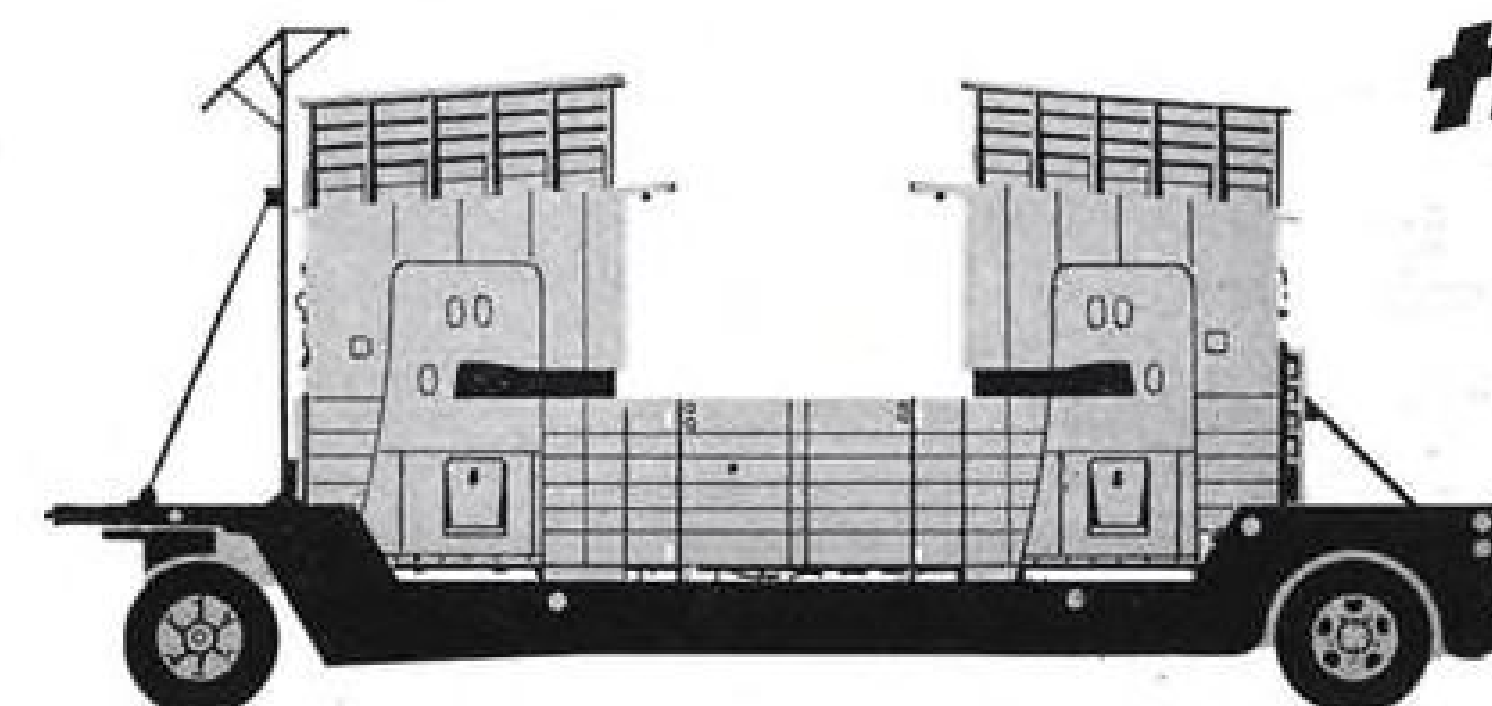
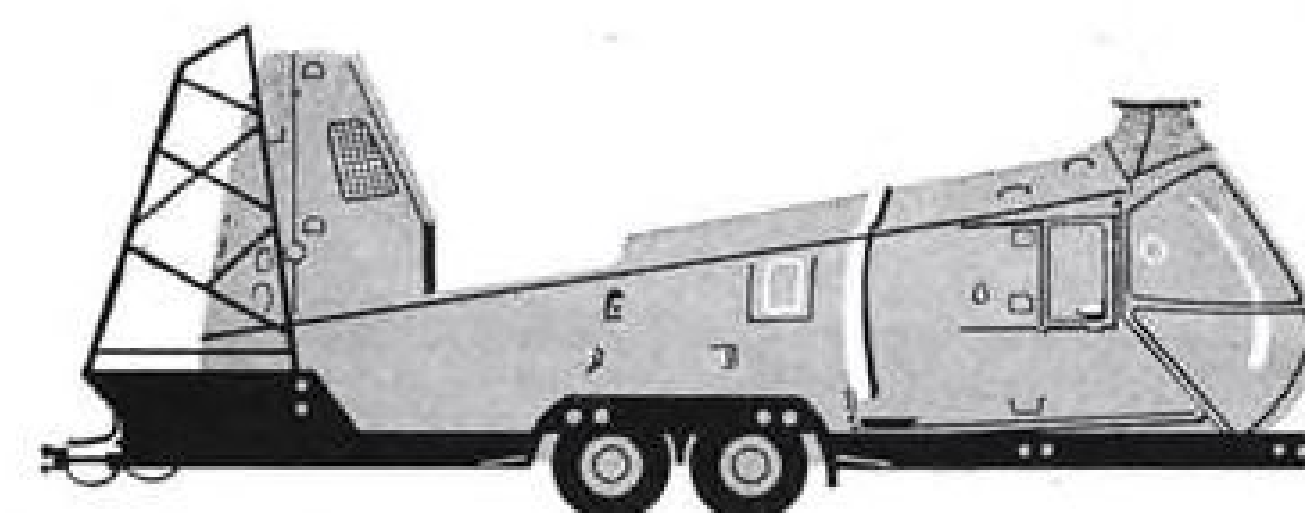
► **New Avionics Components:**
• Temperature-stable capacitors said to have only an 0.8% change in capacitance from -80 to 20C are available in new line known as Stabalex D. (Industrial Condenser Corp., 3243 N. Calif. Ave., Chicago 18, Ill.)

• New molded capacitor. International Resistance Co. has added a new line of low-value (0.22 to 2.2 mmf) molded capacitors. IRC says the units have "exceptionally high Q" and a maximum variation of 20% from rated capacitance. Units are same size as IRC's type BTS resistor (13/32 long x 1/8 in. dia.) and the company says they meet JAN-C-20A temperature coefficient and humidity requirements. (401 North Broad St., Philadelphia 8, Pa.)

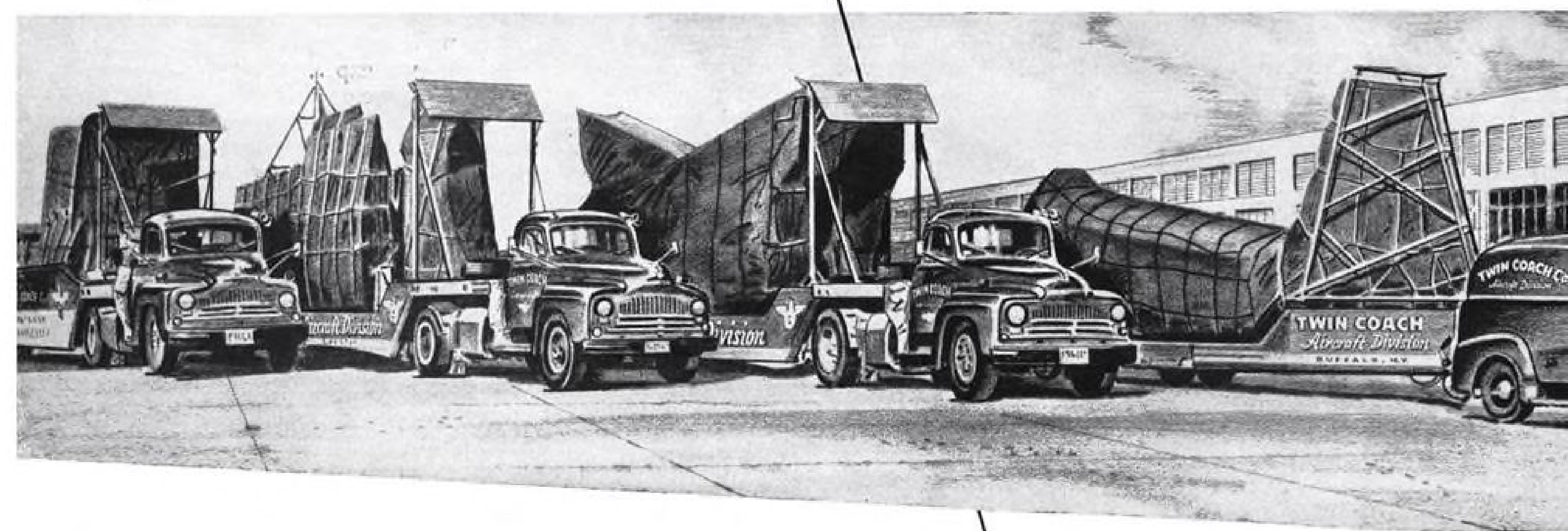
• Ultra-sensitive relay in a small hermetically sealed, plug-in type container has 9- and 15-milliwatts sensitivity in SPST and DPDT styles, respectively. Known as the Series 4000, relays are available in coil resistances up to 50,000 ohms, with either silver or palladium contacts capable of handling 1 1/2 and 3 amp. respectively. (Advance Electric and Relay Co., 2435 No. Naomi St., Burbank, Calif.)

• Precision carbon-film resistors are now available in two lines, one reported to be stable to 0.01% under all environmental conditions, is sealed in helium-filled glass envelope. The other, a less expensive unit, sealed in a ceramic tube, is called "much more stable than varnished resistors under high humidity and temperature conditions" by the manufacturer. (Chase Resistor Co., 9 River St., Morristown, N. J.)

—PK



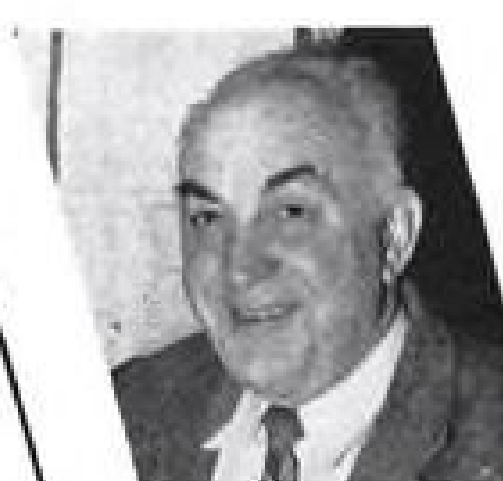
*the aircraft carriers
that never put to sea...*



TWIN COACH maintains its own aircraft carriers—a large fleet of modern over-the-road units for shipping complete assemblies.

These company owned and operated vehicles, and specially designed carrying devices, are tailored for individual jobs... eliminate stresses and strains on precision-made parts. This assures prime contractors that assemblies built by Twin Coach arrive undamaged—on time.

This smooth efficiency is typical of Twin Coach Aircraft Division plants. It enables prime contractors to set and hold tight production schedules. Modern facilities, modern equipment and experienced manpower make Twin Coach a dependable source for every type of major airframe assembly.



John Cudmore, traffic manager, has been shipping aircraft assemblies since the days of wood and fabric construction. He is a veteran of 26 years in the aircraft industry.

A-5980



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Aircraft Division BUFFALO, N. Y.

TWIN COACH PRODUCTS:

AIRCRAFT ASSEMBLIES • MOTOR COACHES • TROLLEY COACHES • SUPER FREIGHTER CARGO TRUCKS
• FAGEOL GASOLINE AND PROPANE ENGINES • FAGEOL-LEYLAND DIESEL ENGINES

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Specify FR Pipe Connectors

Advantages of FR Pipe Connectors

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- Standard on 14 types of jet aircraft

For Details write FLIGHT REFUELING INC., Danbury, Conn.

15 YEARS CONTINUOUS RESEARCH AND DEVELOPMENT ON PRESSURE FUELING SYSTEMS AND EQUIPMENT

FINANCIAL

Beech Corp. Billings Triple in Year

The year's sales were \$91 million, compared to 1951's \$33 million, but taxes put brake on company's net.

New postwar peaks in sales and earnings were recorded by Beech Aircraft Corp. for its 1952 fiscal year. Total sales for the year ended Sept. 30, 1952, reached \$90.9 million, nearly three times the \$32.8 million in billings for the 1951 fiscal year. Income before taxes for the current period reached \$4.9 million, or some 3.5 times greater than the \$1.4 million reported in 1951. Taxes, however, reduced 1952 net income to \$1,692,754, or slightly more than twice the net income of \$737,424 shown for the 1951 fiscal year.

A review of Beech's historical record reveals that the company's 1952 showing surpassed billings of every year, except one, even during the war period. The exception was 1945 when sales aggregated \$121.8 million. Net income after taxes for 1952, however, was exceeded in 1943, 1944, 1945 and 1948.

This is nothing more than a reflection of narrowing profit margins throughout the industry and the heavy toll exacted by taxes.

► **Effect of Taxes**—Beech's profit margin on sales before taxes was 5.34% for 1952 compared with 4.3% in 1951, showing an improvement in earnings productivity. However, profit margins, after taxes, contracted to 1.86% for 1952, declining from the 2.24% indicated for 1951. As a matter of contrast, in 1943 and 1944, when sales approximated the 1952 experience, pretax profit margins averaged 8.7% and 8.5% respectively. After taxes, the profit margins, while reduced to 2.5% and 2.4% respectively, were higher than the 1952 showing.

Earnings for the 1952 fiscal year were equivalent to \$2.82 per common share on the 599,865 shares outstanding comparing with only \$1.23 per share for 1951. Total dividends declared for the 1952 fiscal year aggregated \$1.05 per share as against only 80 cents per year during 1950 and 1951.

Once again a quarterly dividend rate of 25 cents a share has been resumed and follows the pattern prevailing during 1949 and 1948. (The new quarterly rate was established on Oct. 7, 1952, when an extra dividend of 20 cents a share was also declared.)

► **Beech's Business**—The large sales vol-

ume of 1952 was established through the deliveries of Beechcraft Bonanzas, Model 18 twin-engine transports and Twin-Bonanzas.

A large percentage of these deliveries represented the reconstruction of Beechcraft planes built prior to and during World War II, for the U. S. military services. In addition, the company, as a major subcontractor, built a large number of droppable wing tanks, napalm bomb tanks, ailerons for the Boeing B-47, wings for Lockheed trainers and fighters, and jet engine starting units.

Design and experimental work on new models were reported as being carried on aggressively while production volume on the past "stand-bys" continued.

The engineering design of the T-34 single-engine trainer was reported to be practically completed. "Great steps" were indicated in connection with the design of the T-36A twin-engine trainer, the prototype of which is expected to fly early in 1953.

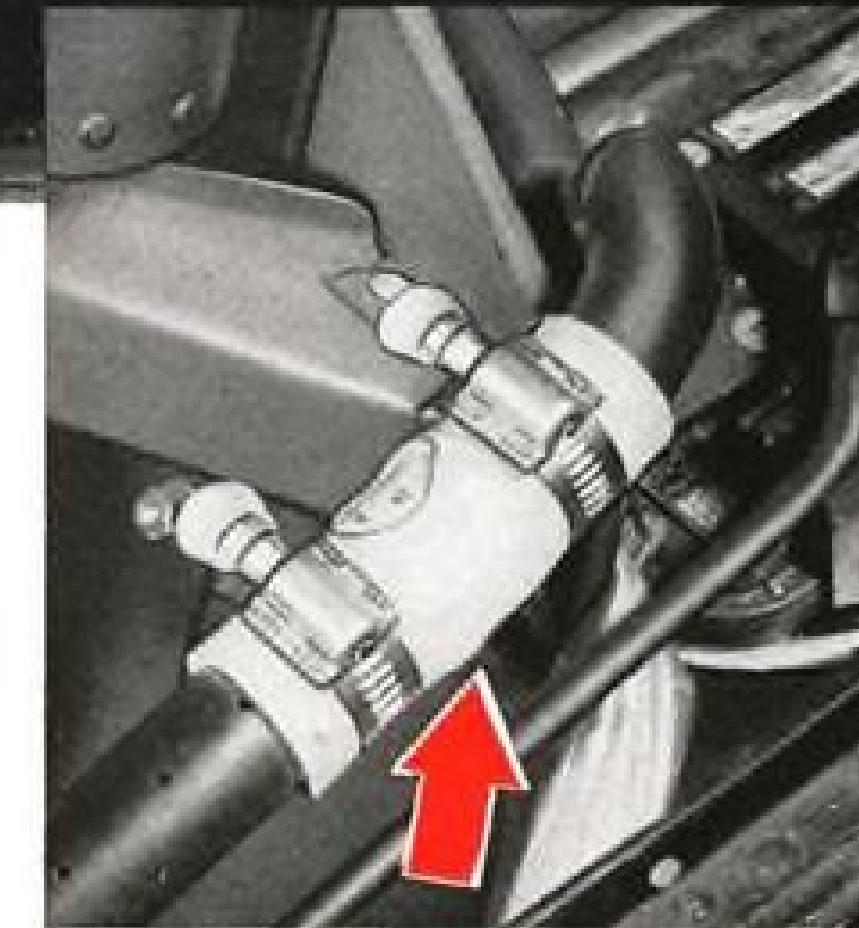
In order to provide for the production of the T-36A series, a new assembly building is now being constructed for this purpose on the west side of the company's flying field and is expected to be ready for occupancy about March 1953. This construction is being largely financed by a chattel mortgage loan of \$1 million, thus avoiding dilution of the equity.

The company's net worth position reached a new all-time peak at Sept. 30, 1952, amounting to \$10,251,992, or \$17.09 per share. This compared with \$8,919,157, or \$14.87 per share, a year earlier.

To facilitate financing its expanding operations, Beech, on June 30, 1951, arranged a revolving credit of up to \$20 million under the V-loan program. This credit expires July 1, 1953, and \$13 million had been borrowed at Sept. 30, 1952. The V-loan agreement was amended on May 1, 1952, to permit the loan of a special fund up to \$1 million to finance the new assembly building now under construction. At last reports \$700,000 of this fund was drawn down.

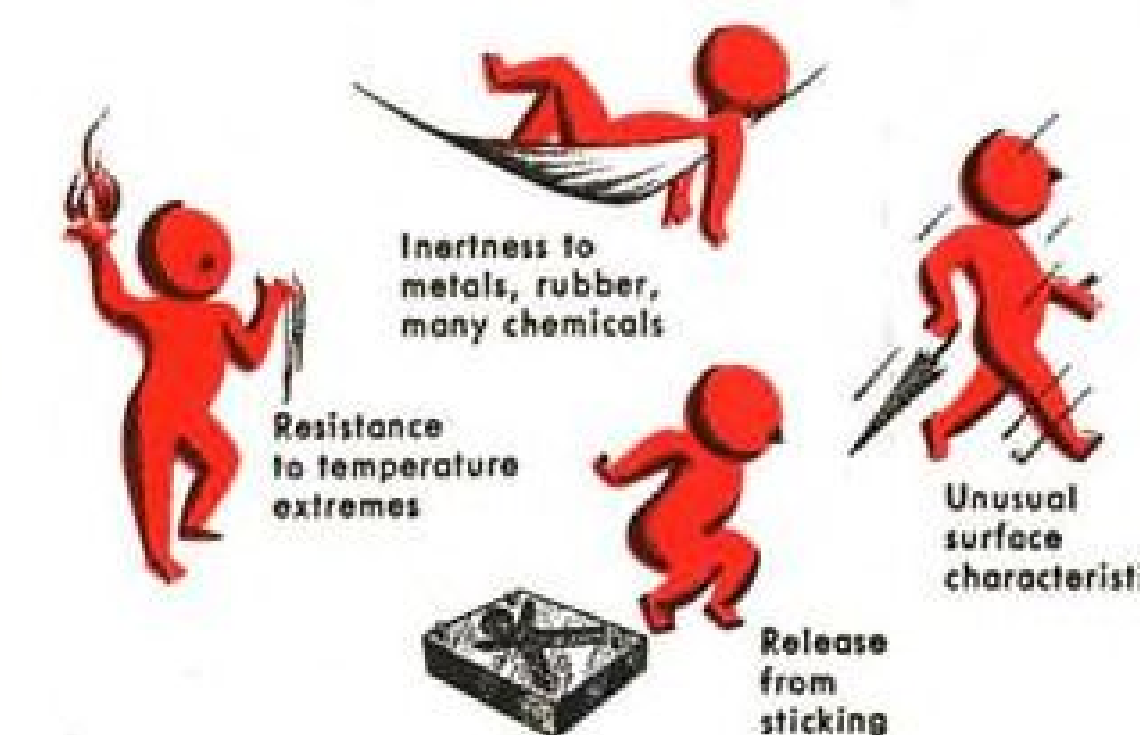
The V-loan program provides needed funds to finance the large inventories required for production schedules. For example, at Sept. 30, 1952, inventories,

G-E SILICONE RUBBER PAYS OFF



G-E silicone ducting connects tubing carrying hot air to cabins and de-icing systems in the F-86 Sabre Jet. Its temperature resistance (-85 to 500 F) provides a high safety factor. Connection shown made by Aeroduct, Inc., for North American Aviation, Inc., from G-E silicone rubber SS-15.

THE FOUR BASIC PROPERTIES OF G-E SILICONES



IN JET PLANE APPLICATIONS

The amazing ability of General Electric silicone rubber to withstand extremes of temperature pays off by making possible long-lasting jet plane parts with a safety factor far greater than any ordinary rubber can provide.

Capable of withstanding 450 F for long periods, G-E silicone rubber is ideal for fire-wall seals and ignition cable shields in jet engines, as well as for hot-air ducting. And because it stays flexible at -85 F, it provides a reliable sealing material for the doors and windows of high-altitude aircraft.

Typical industrial applications for G-E silicone rubber include spark plug boots and ignition sleeves that stand up indefinitely under high engine heat and deteriorating oils. Seals, gaskets, washers and bushings made of G-E silicone rubber offer unusual temperature resistance, chemical inertness and excellent insulating and dielectric properties.

Where can you use G-E silicone rubber?

Have you investigated G-E silicone rubber lately? It's three times as strong and costs much less than earlier varieties. Send coupon today for a new booklet telling how you may take advantage of its unusual properties in your business.



General Electric Company
Section 132-7B
Waterford, New York

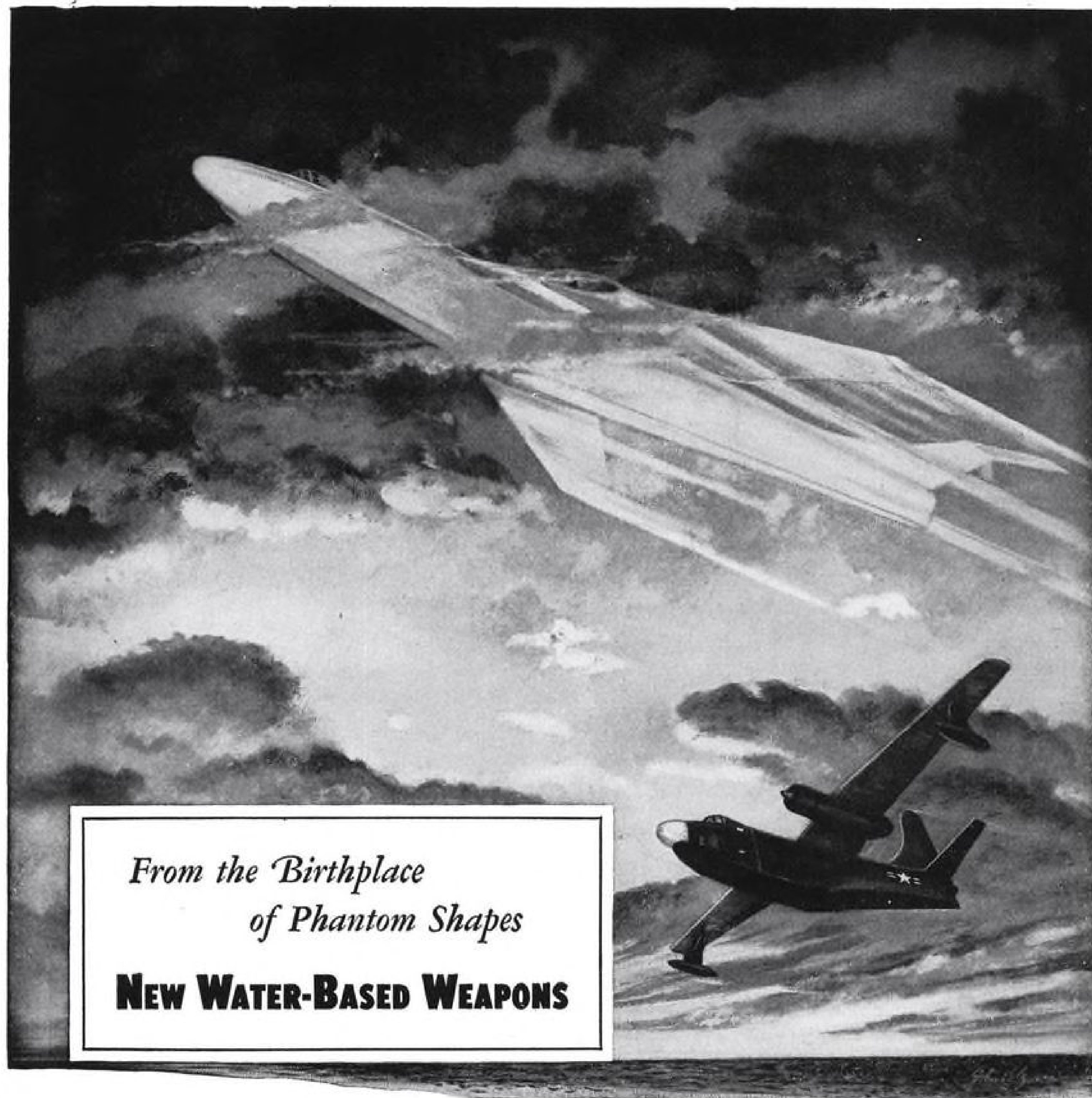
Please send me, free, your new booklet,
"Imagineering with G-E Silicone Rubber."

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Firm _____
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City _____ Zone _____ State _____

(In Canada, mail to Canadian General Electric Company, Ltd., Toronto)

G-E SILICONES FIT IN YOUR FUTURE

GENERAL  ELECTRIC



Seaplane research is bringing new phantoms to life in Stevens Tech's towing tanks, testing ground for the U. S. Navy Marlin's advanced hull design.

Bringing such advancement as the Martin M-270 experimental hull, delicately instrumented models prove today's dreams for tomorrow's air-sea power at the Experimental Towing Tank, Stevens Institute of Technology.



NORTHEAST*

First in New England Skies

Northeast started operations in August, 1933, with only two secondhand, tri-motored Stinsons, three mechanics, three pilots and a total capital of \$10,000. During the 5 months of that first year, Northeast carried 1,904 passengers, flew 239,000 passenger miles. . . . Nineteen years later, during the first five-month period of 1952, Northeast carried 130,034 passengers and logged 25,042,324 passenger miles with a proud fleet of fast, dependable Convair-liners and DC-3's. . . . In the early days, the airline showed typical Yankee tenacity in its unswerving determination to bring commercial air travel to the New England area, overcoming such obstacles as airports which were merely local pasture lands staked off to show the level areas, and, except for Boston, totally lacking in radio and navigational aids, weather bureaus, or facilities for night flying. . . . As improvements were gradually brought about, Northeast Airlines grew and prospered until now its flights extend from New York to Montreal and to 33 cities in the New England states. Like other successful airlines, Northeast depends upon Bendix* Radio equipment.

*REG. U.S. PAT. OFF.

*Relies on

Bendix
most Trusted name in **Radio**

VHF Transmitters • H. F. Transmitters • Radio Control Panels • Antennas • Indicators • Automatic Radio Compasses • Marker Beacon Receivers • Announcing Systems • VHF Communication and Navigation Receivers • Inter-Communication Systems • H. F. Receivers • Ground Controlled Approach Landing Systems • VHF Omni-Directional Range Systems.

LETTERS

Soaring Recognition

Your recent coverage of the World Gliding Competition at Madrid, although good, failed to convey the true picture.

First, in fairness to those industries and governments, it should be mentioned that the Soaring Society of America did enjoy support from several industries who provided funds and radio equipment.

It should also be mentioned that the Mississippi Aeronautics Commission provided transportation for Dick Johnson, his crewman, Earl Bailey, and the sailplane, RJ-5. We believe an equal support from other state governments would have made a large difference in the outcome of the competitions.

You might have mentioned also that Johnson damaged his ship on a landing on the first day of competition. Due to high winds, three sailplanes were completely washed out of the meet on that day. Johnson lost two flying days as a result of this mishap.

Your readers probably would have better appreciated the elegance of the RJ-5 aerodynamics had you reported the results of the last day's competition. This was a race to a point some 80 mi. from takeoff. Johnson in RJ-5 flew the course in 1 hour 8 min. MacCready flew this course in 14 min. more than Johnson in a Schweizer 1-23C and Wills, the winner of the competition, took 19 min. more than Johnson to fly the course.

However, your magazine did bring out the dire need of a complete staff in such a competition. In any future foreign contest, we should have a competent full time meteorologist, our own retrieve cars, an interpreter for each team, and several craftsmen for repairing damage and maintaining the sailplanes. Had we a good craftsman at Madrid, Johnson would not have lost the two flying days he did.

Above all though, we have learned a lot from our experience at Madrid and we assure your readers that we now know how we could do a better job at the next competitions.

AUGUST RASPET,
Chairman Scientific Committee
Soaring Society of America
Mississippi State College

Your recent article on the World Soaring Championships was very good and quite accurate. However, by way of giving credit where credit is due the following points should be clarified:

1. Mr. Jon Carsey of Dallas is the Soaring Society of America president. Mr. Paul Schweizer is the secretary.
2. William Beuby and Shelly Charles placed sixth—not fourth—in the two-place category. And they flew a German-designed, Spanish-built Kranich II that the latter country graciously loaned, at no cost, to the underprivileged U. S. team.
3. Stanley Smith, flying a Schweizer 1-21, was not in last place but 31st in a

field of 40. He and Richard Johnson lost valuable points while grounded due to inadequate ground support, which, as you pointed out, was a U. S. shortcoming and not the responsibility of the Spanish organization.

4. Most of the two-seater sailplanes were Kranich IIs (prewar design). The Germans entered two Condor IVs, two Kranich IIIs and a Mu 13E (all brand-new designs).

To many of us in motorless flying, who are professionally better known in somewhat faster and noisier aspects of aviation, the neglect, indifference and even opposition that gliding and soaring receives in this country are extremely regrettable. Without going into the problems of domestic gliding and high-performance soaring the sources of support for the various teams at Madrid are quite revealing.

As you stated, some nations were represented by their military members, some by complete or partial government grants of money, services and/or equipment to their civilian organizations, and the remainder enjoyed substantial assistance by their industries and individuals—as was the case with the British team.

We were the exceptions. Government (including military), industry and individuals were quite surprised to see the meagerness of the U. S. organization in other than the actual aircraft department, which was equal to the best. In contrast to this was the common comment in Madrid that several nations were in the championships, and beautifully equipped, only because of U. S. aid.

Not the least of the problems in American soaring is the matter of gaining press recognition. Although considerable space is devoted to unfounded or insignificant foreign gliding records or events, the best efforts in this country, including world's records homologated by the F.A.I., are rarely released in print.

As an example, a few months back AVIATION WEEK devoted a column or so to a lightplane altitude record of some 27,000 ft. The same issue, in two lines, stated that a sailplane in California attained 42,000 ft. Apparently, by your emphasis, it's of little importance for an aircraft without power-plant to attain 15,000 ft. more altitude than a powered aircraft.

WALTER SETZ
108 South Carol Blvd.
Upper Darby, Pa.

From a Navigator

I think that to most of our members, AVIATION WEEK is known as one of the most independent and up to date aviation papers in the world. With the recent publication of your article on Seaboard & Western's operations (by George Christian) I feel that . . . you have rendered airline navigators a great service. I thank you in the name of the President and the members of IANC for the publication of the article. . . .

FRED WIRTH, Navigator
International Airline Navigators Council
59 West 46th Street
New York 19, N. Y.



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If you have at least 3 years experience in fatigue testing you should write to:

HUGHES

Aeronautical Engineering Division

Culver City, Los Angeles County, California

F-94's Yaw

AVIATION WEEK recently reported that F-94s have "an extreme yawing condition" and pilots report "considerable difficulty" staying on course during tracking.

Those of us who are enamored of the F-94 Starfire series want to set the record straight. C. L. (Kelly) Johnson, Lockheed chief research engineer who directed F-94 testing, says yawing never was a problem in the A and B models and was for awhile a minor concern in the C. Johnson points out that yawing or snaking conditions are not uncommon in high speed jets but as yet, unlike some craft, the F-94C (1) has required no artificial stabilizers, (2) measures yaw in tenths of a degree and (3) suffers no loss of firing accuracy therefrom.

RICHARD L. BEAN
Publicity Manager
Lockheed Aircraft Corp.
Burbank, Calif.

From an NACA Group

... Most of us here at the laboratory have access to your publication. Many people subscribe in a group as we do and put circulation slips on them. I assure you when the magazine appears each week, there's a yell of—NEXT!

Through AVIATION WEEK we keep in contact with what's new, as we here don't have too much contact with industry. ...

I might add that we miss our dearly beloved Chief Pilot, Herb Hoover, who was killed in the B-45 crash.

STABILITY & CONTROL BRANCH
Flight Research Division
National Advisory Committee for
Aeronautics
Langley Field, Va.

Praise

... I wish to compliment you on the excellent service your magazine provides for both the individual and his company in their dealings with the aviation business.

The statement about a current rumor, "I read it in AVIATION WEEK," is usually reliable proof of the truth of the rumor ...

M. B. RUFFIN
Government Contract Division
The Magnavox Co.
Fort Wayne 4, Ind.

As we would like to reprint the article by Philip Klass entitled, "Old Voltage Problem Gets New Answer," which appeared recently in AVIATION WEEK, we would greatly appreciate receiving your permission to do so.

P. G. CALDWELL,
Advertising and Sales
Promotion Dept.
Apparatus Sales Division
General Electric Co.
Schenectady 5, N. Y.

Keep up the good fight in your editorials—let the axe fall where it may—the truth hurts and shall prevail.

C. O. BRANDT, Manager
Chico Municipal Airport
Chico, Calif.

AVIATION WEEK, December 22, 1952



The American Brass Company, Waterbury, Conn., reports

Plant layout speeded

with Kodagraph Autopositive Paper

THE engineering and drawing reproduction departments of The American Brass Company must keep pace with the constant plant-layout demands of ten manufacturing divisions. And here's how Autopositive Paper saves time and dollars in this work.

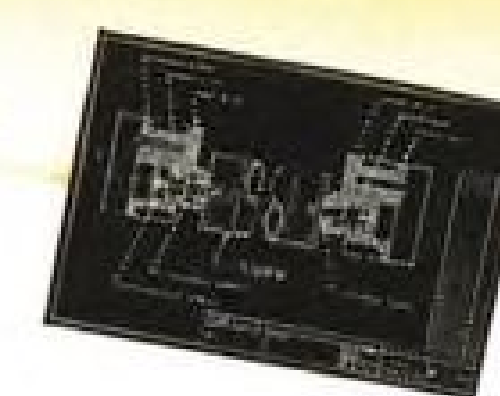
First, paper cutouts of machines and equipment are pasted in position on a whiteprint of the proposed layout. From this opaque pasteup, a positive reproduction on Autopositive Paper is made *directly*. There's no negative step, no darkroom handling with this revolutionary photographic intermediate material. Just exposure in a

standard whiteprint machine... processing in standard photographic solutions.

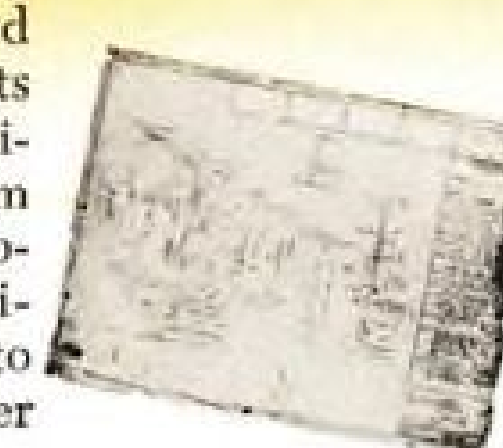
Then, the Autopositive intermediate—with dense photographic black lines on a durable, evenly translucent base—is used to produce the desired number of prints. These are sent to the branch involved to be studied and returned with comments.

This procedure may be repeated half a dozen times until complete agreement is reached on the final layout. And every time revolutionary Autopositive Paper saves time and dollars!

Other important uses of Kodagraph Autopositive Paper at American Brass



... to reproduce the blueprints and direct-process prints which the various divisions receive from vendors. The Autopositive intermediates are then used to produce any number of shop prints.



... to reclaim old, soiled, or worn drawings. Autopositive Paper intensifies line details... drops out smudges, creases—delivers intermediates which produce clean whiteprints and blueprints.



... to speed print service to all departments. Autopositive reproduces production reports, parts lists, documents of every type. And opaque originals can be copied as readily as translucent ones.

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"THE BIG NEW PLUS" in engineering drawing reproduction

Learn how Kodagraph Autopositive Paper is simplifying routines in thousands of concerns. Write today for a free copy of "New Short Cuts and Savings" for interesting facts about companies you know... and a revolutionary new product you should know.

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Gentlemen: Please send me a free copy of your new illustrated booklet, "New Short Cuts and Savings."

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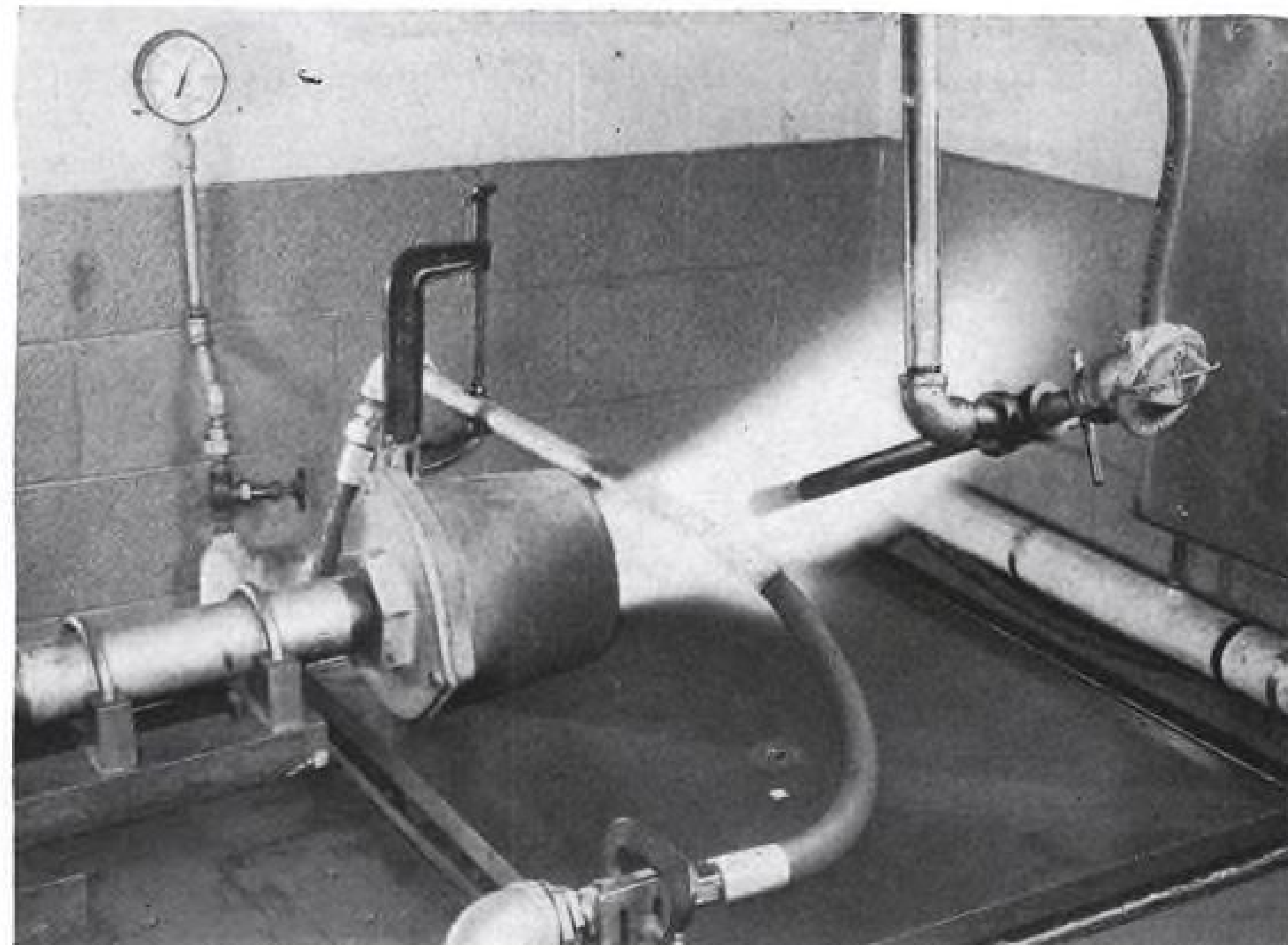
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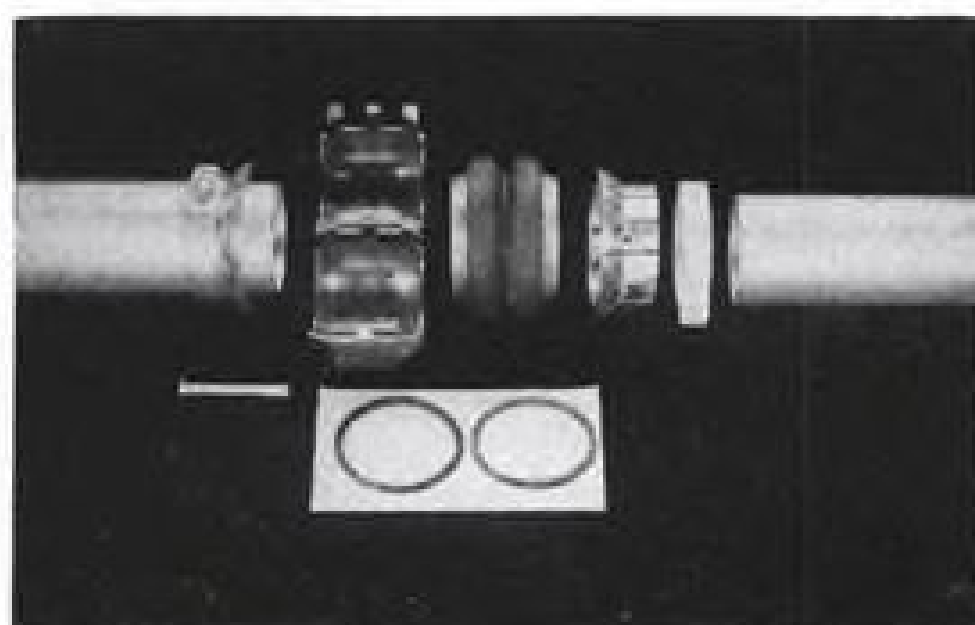
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EQUIPMENT

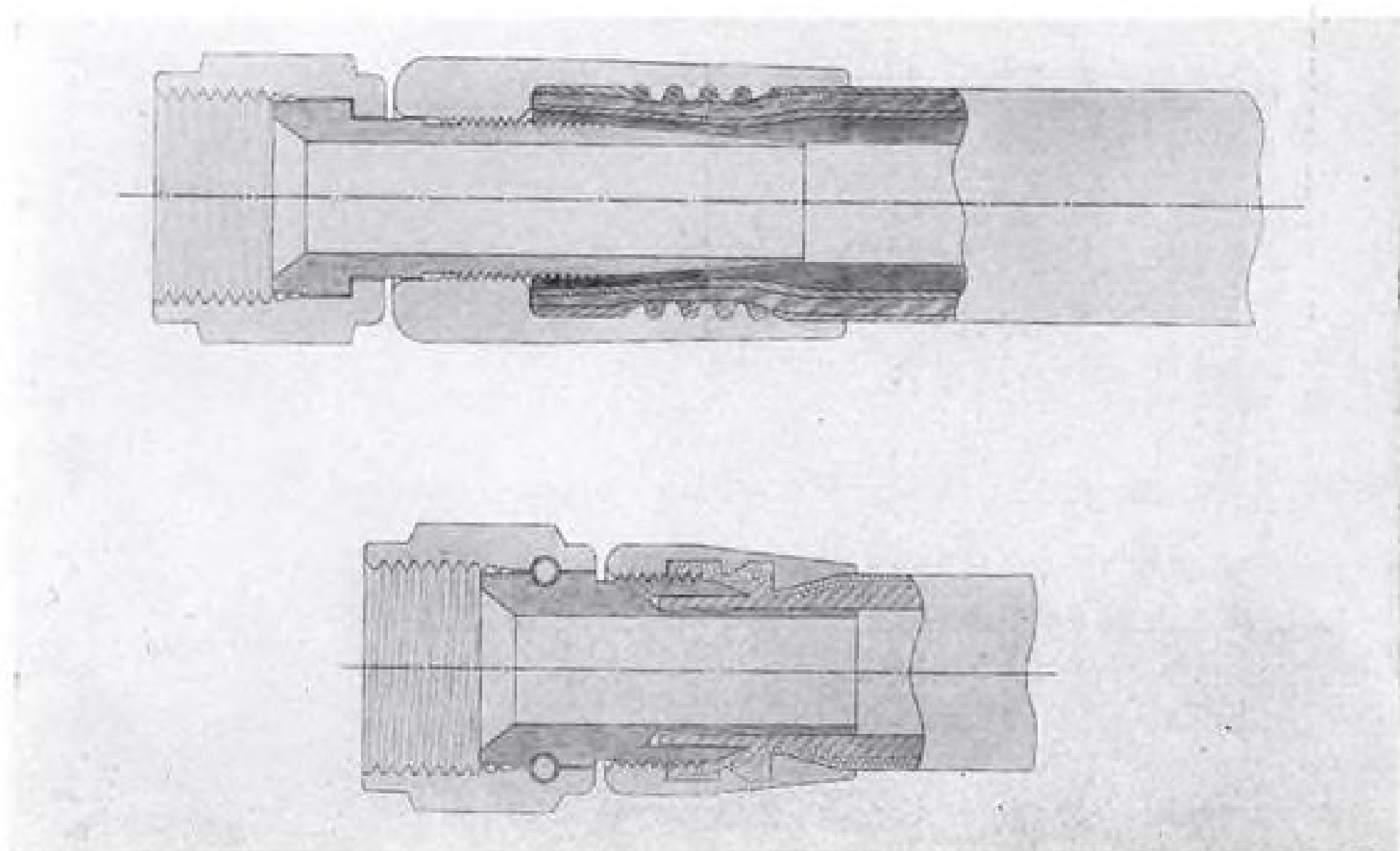
Flexible Hose Survives Trial by Fire



FIRE RESISTANT Aeroquip double braided hose withstands 2,000F torch flame while carrying 1 gpm. of SAE 20 oil at 1,700 psi.



FLEX JOINT for rigid tubing will find application in the B-47, where it will accommodate fuel lines to the Stratojet's 20-ft. wing deflections.



NEW FITTING (bottom sketch) bites into hose inner tube, forming seal against positive and negative pressures. Old-type fitting is on top.

- Aeroquip demonstrates equipment at meeting.
- New joint and fitting are also presented.

By George L. Christian

Jackson, Mich.—A double-wire braided flexible hose that can withstand 2,000F heat and high pressures for long periods of time was demonstrated here at the Air Transport Operators' Conference sponsored by Aeroquip Corp.

The demonstration was conducted by Aeroquip to compare its products' behavior with requirements for propeller-feathering hose, suggested by the Civil Aeronautics Administration representative at the meeting. The representative thought flexible hose in zone 2 (the area between engine cylinders and the fire-wall) should meet these conditions:

- Single-wire braided hose—One minute at 1,800F, 150-psi. pressure, 0.4 gpm. oil flow; followed immediately for 20 seconds at 1,800F, 1,700 psi., 1 gpm. flow.
 - Double-wire braided hose—Four minutes at 1,800F, 150-psi. pressure, 0.4 gpm.; followed immediately for one minute at 1,800F, 1,700 psi., 1 gpm.
- **Test Results**—The single-wire hose met the requirements, except that in the high-pressure part of the test, it failed at 15 seconds, instead of 20.

The double-wire hose far exceeded test requirements. The first part of the test was conducted at 1,860F, instead of 1,800F; in the high-pressure part of the test, the hose remained intact, although scorched, after 5½ min., instead of the required one minute; then the temperature was raised to 2,000F for another four minutes or so. The hose did not fail.

Standard Aeroquip hoses were used in all tests, with sleeve protection around the couplings and adjacent portions. SAE 20 engine oil was used, hose size was No. 10 (¾ in. o.d.), torch was held six inches from the hose and coupling, and flame impingement covered a six-inch length.

The CAA man based his suggested requirements on the belief that one minute was the minimum delay to allow for fire detection and 20 seconds is approximately how long it takes to feather a prop.

► **Tight Fit**—Aeroquip, which claims to

Just 13 CHRYSLER AIR RAID SIRENS

To Alert an Entire City the Size of ATLANTA



IN SECONDS . . . a great city like Atlanta, Georgia, with more than 330,000 people and an area of thirty-seven square miles, can be warned of impending danger. A remote-controlled system of just thirteen Chrysler Air Raid Sirens could do the basic job. Compare this number with the necessary quantity of any other warning device and you will understand the importance of selecting Chrysler . . . the siren sounding the "loudest warning ever heard."

Smaller communities, too, will find the Chrysler Siren ideal for their protection . . . because, thanks to its own individual power plant, the Chrysler Siren can also be operated manually, independent of any system, from a fixed location or from a moving truck or boat.

Powered with its own mighty 180-horsepower Chrysler V-8 Industrial Engine, each Chrysler Siren delivers up to 173 decibels of sound, ranging from a deep-throated roar to a shrill scream. Under favorable conditions this sound carries four miles in every direction from the rotating Siren.

Chrysler Siren Engineers stand ready to assist any community in planning its protection. For additional information on the Chrysler Siren and the protection required for your community, write: Dept. 212, Siren Layout Service, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.



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AIR RAID SIREN

Defense is a vital need, shared by all. Join and assist the Civil Defense group in your area.



have originated the idea of equipping flexible hose lines with detachable, reusable fittings, have come up with a new one—the "Little Gem." Previously, fittings clung to the ends of hoses by compression of the hose. This was not satisfactory with high temperatures, when hose hardened and fittings tended to leak.

The new fitting bites into the hose's inner tube, forming a lip which seals effectively under negative as well as positive pressures. Aeroquip says the new design will maintain its seal until the hose (and in this case the lip) becomes almost completely hard from heat action.

The fitting may also be used with hose compounds unadaptable to compression. It may be assembled and disassembled in the conventional manner.

Aeroquip has also developed a new coverless engine hose which is used with the Little Gem fitting. The new hose consists of an inner tube in which is molded open-mesh piano wire braid.

This is covered with closed-mesh wire braid. Result is a weight saving of up to 40%. Hose is designed for high ambient and fluid temperatures.

In a test, the old-type fitting began leaking at 200 psi. The new type held until the hose burst.

► **Flex Joint**—Aeroquip has under development, and will soon be in production on a novel type of flex joint, the first units of which will go into the Boeing B-47. The Stratojet's 20-ft.

wing deflections need such flexible connections in its fuel lines.

The flex joint can deflect 10 deg. to either side of center and absorb 1/16 in. axial displacement.

Advantages of the joint, according to Aeroquip:

- **No special preparation** of tubing is required. Use of a new-type packing eliminates need for special tubing preparation, such as flaring.

- **Tightening is simple**, only two Allen screws are used, eliminating need for large tools which might be difficult to get into cramped quarters.

- **Joint can withstand 125 psi.**; temperature range is 65F to 160F. Sizes are from 2 to 4 in. o.d.

- **Joint is relatively light.**

► **Hydrauliscopes**—In Aeroquip's electronic lab a Hydrauliscopes was on exhibition. The portable instrument is described as "a highspeed electronic analyzer . . . to indicate and record high-speed pressure phenomena incident to the operation of hydraulic systems." The pressure pick-up is a resistance type.

Aeroquip lists these features for the Hydrauliscopes and its pick-up:

- **Permits accurate** and instantaneous observation of pressure fluctuations on an oscilloscope. Traces may be photographed for a permanent record.

- **Direct static calibration**, linear with pressure and constant.

- **Integral temperature compensation.**

- **Response to high frequency** and high rate pressure changes.

- **High sensitivity.** An element designed

for continuous service at 3,000 psi. will indicate impulses from 0 to 20 psi.

- **Negligible hysteresis.**

- **Elimination of vibration**, jarring and similar effects on adjacent tubing.

Observations are readily obtainable on the Hydrauliscopes which could not be read on conventional hydraulic pressure gauges, because of speed of needle movement.

► **General Comments**—Airlines offered these comments on various hose applications:

- **Fuel injection hose.** American, United and Delta are interested in the use of Aeroquip hose assemblies in fuel injection system lines on the Wright 3350 CA, BD and CD engines. All three airlines will just get R3350s on their DC-7s.

TWA reported the installation works very well. On service test, it has gone through two engine runs successfully and the aircraft is now on its third test run.

Eastern, which assembles the hoses in its hydraulic shop, uses them as jumpers to bring a plane back to its main overhaul base at Miami in case of rigid tube rupture.

Chicago & Southern follows same practice.

Operating pressures of the fuel injection system were quoted as 725-750 psi. with peak surge pressures hitting 2,750 psi.

Aeroquip suggested that using flexible hose instead of rigid stainless steel lines helped damp out these peak pressures to the benefit of the entire fuel injection system.

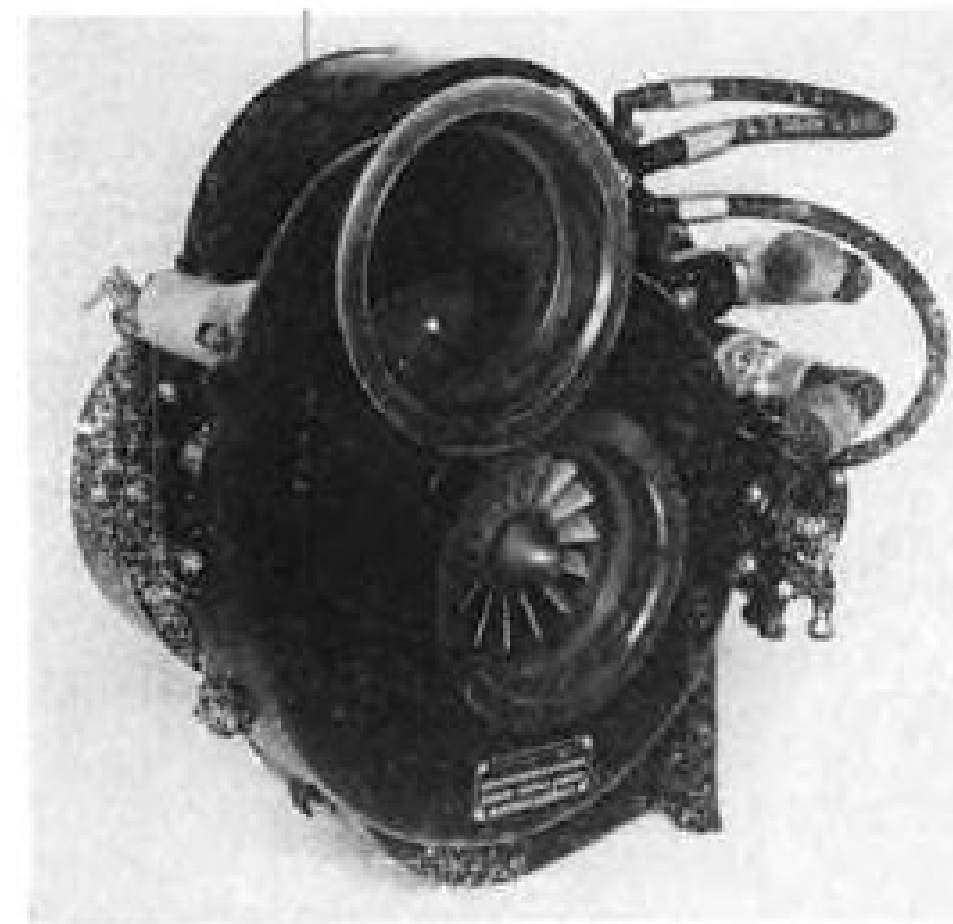
Curtiss-Wright is currently service-testing the flex line installation. All C18CB engines coming off the production line for TWA are flex-line equipped. CW has approved the flex lines as an emergency replacement item for rigid lines.

- **Life rafts.** National has replaced all flexible, braided cable housing assemblies on its life rafts with Aeroquip hose; results are excellent, says the airline. Reason given for change was that braided cable housing sometimes bound, jamming release cable; Aeroquip hose prevents such malfunctions, according to National.

Eastern has had the same results and suggested that Air Cruiser, maker of the life rafts, adopt Aeroquip hose as standard equipment.

- **Electrical & Skydrol uses.** Use of Aeroquip hose as electrical cable conduit in areas where wiring is exposed to Skydrol fluid was suggested. It would also do away with the present difficulty in pulling wires through rubber hose, the conference was told.

Conference chairman was R. C. McGuire, American Airlines. J. Henry Reisner was in charge of arrangements for Aeroquip.



PAA 240s Get New Stratos Supercharger

A new Stratos cabin supercharger is being installed in Pan American World Airways' fleet of 15 Convair 240s. Full order is for 21 units, says Stratos.

The new unit, Model S60-11A, was designed to meet PAA requirements, including these:

- **V-type mounting flange** to expedite installation or removal.

- **Similar duct clamping arrangements** on inlet and outlet of the unit.

- **Exterior supercharger oil lines** have been replaced by internal, drilled passages, except for two lines to the pilot's control solenoid.

Unit also incorporates a "flyball" governor, designed to prevent impeller over-speed.

Major housing configuration changes were made to allow the unit, which supplies 62 lb./min. of air, to be installed on the 1-4-1 righthand drivepad of the Pratt & Whitney Aircraft R2800 engine which powers the Convair 240.

The supercharger was developed from the basic Stratos blower and embodies many of its features. It was flight-tested in less than a week, says the manufacturer. The first newly equipped 240 is in service and the entire fleet should be converted by the end of the year, according to Stratos.

OFF THE LINE

Monsanto Chemical is putting out two new non-flammable hydraulic fluids, OS-40 and OS-45. The former, an organo-phosphate, self-extinguishing fluid meets specs of MIL 5606. OS-45, a high temperature fluid, is available in development quantities at the development price of \$20 a gallon.

Hydraulic pump-driven ground cooling fans on the Convair 340 are very noisy, airline people say. AiResearch may have to isolate the fans to reduce the noise. The company is also studying an improved gearbox for this installation.

INTERCONTINENTAL



... Specialists in the Aircraft Field ...

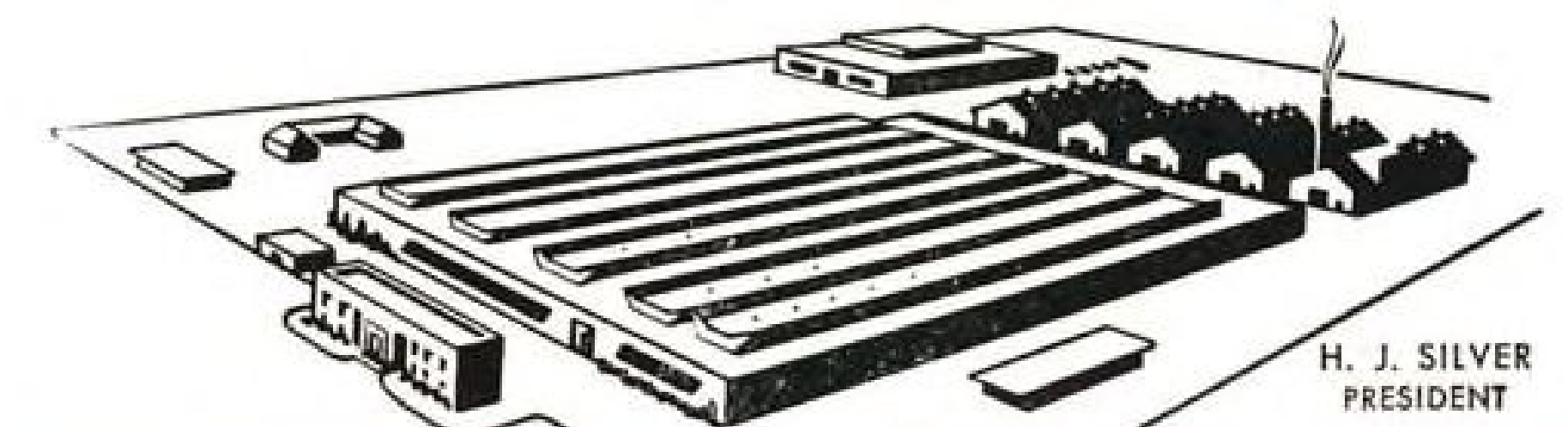
can... tool, produce and deliver parts or assemblies in record time. Let us eliminate your critical shortage problems and enable you to meet your customers' delivery schedules.

with... the background of many years of experience in the aircraft and allied industries, efficient organization and large labor source, no production problem is too hard for us to tackle. Intercontinental is also one of the select few who have been approved for AUTOMATIC SOURCE INSPECTION.

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Write... Today!

Our engineering and production departments CAN solve your problems



INTERCONTINENTAL
MANUFACTURING COMPANY, INC.
GARLAND, TEXAS



THE PROP STICKS THROUGH

Pan American World Airways flies propellers fully assembled to its stations in Europe and the Middle East from its London maintenance base, saving more than 40 man-hours at a clip. The assembled prop is mounted horizontally on a triangular pedestal in the fuselage of PAA's cargo DC-4. Starboard rear window is replaced with a

sheet of aluminum in which a slit is cut to accommodate the prop blade. Another slit is cut in rear loading door to take opposite blade. Boeing 377 props protrude 33 in. on each side, DC-6 props 10 in. on one side. Recent flight tests indicated that the blades sticking out into the airstream did not affect the DC-4's flying characteristics.

STABILITY

IN
EXTREME COLD

IN
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Silicone rubber parts

SUCCESSFUL PERFORMANCE where other materials fail is the record of Arrowhead's many new ArcoSil silicone rubber products.

New silicone compounds and new fabrication techniques developed at Arrowhead now make possible the design of parts which retain flexibility and give long service at extreme temperatures ranging from -125°F. to as high as 700°F. Silicone rubber parts with greater resistance to abrasion and permanent compression set, with ideal dielectric properties and excellent resistance to many oils and chemicals, are constantly being produced to meet unusually severe conditions.

For a solution to difficult design problems investigate the new abilities of ArcoSil Silicone Rubber parts. Arrowhead sales engineers are available in all industrial areas to provide information and engineering assistance.

Write for new bulletins and name of nearest Arrowhead representative. Dept. AS-10.

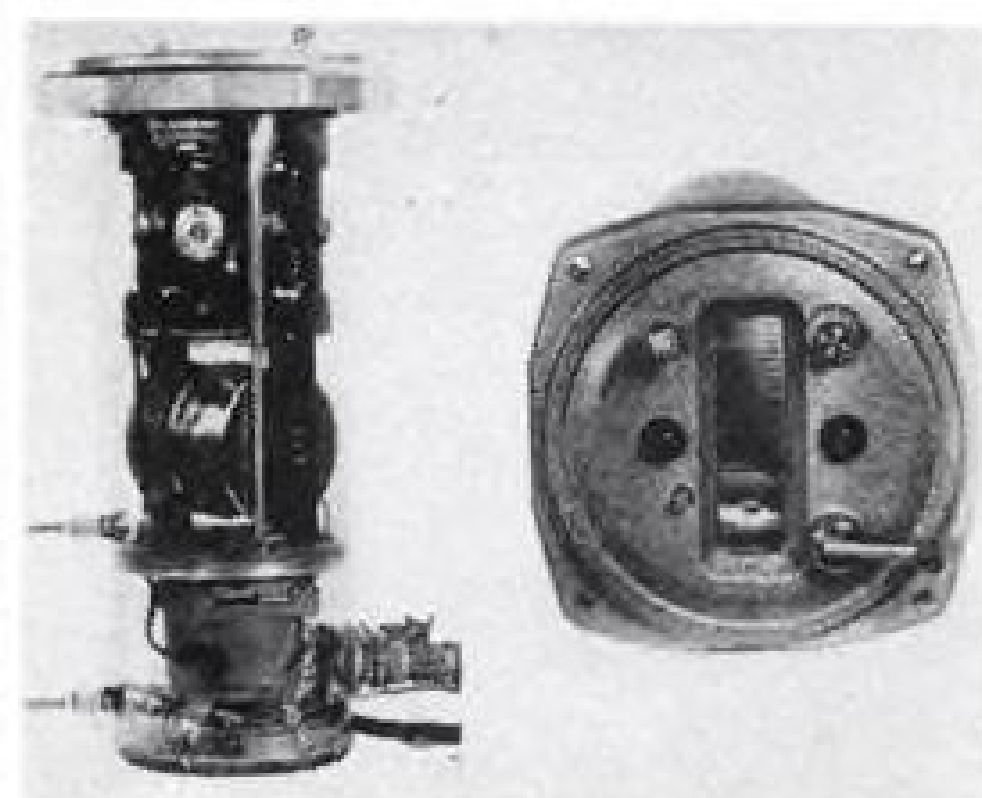
Foremost Fabricators of MOLDED PARTS of complex shapes and/or bonded to metal; EXTRUDED SHAPES of all kinds; SPONGE RUBBER extrusions and sheets; DIE CUT gaskets; RUBBER IMPREGNATED fiberglass.

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FIRST commercial manufacturers of precision "O" rings; PIONEER fabricators of silicone rubber; ORIGINATORS of rubber-fiberglass ducting.

NEW AVIATION PRODUCTS



Unit Measures Slight Pressure Changes

A sensitive pressure-measuring instrument that will respond to the difference in atmospheric pressure caused by a six-inch change in altitude may have important use in aircraft or in applications associated with aircraft.

Developed by Fischer & Porter, the unit is as accurate as the most sensitive mercury manometer known, the firm claims, but is far more rugged and convenient to use. The device, called the Press-I-Cell, is portable (5 in. diameter, slightly over a foot in length), temperature-stable, and is said to be virtually unaffected by vibration or mounting position.

One possible airborne application would be for precision altitude measurement, to give greater bombing accuracy.

To take advantage of its sensitivity, the instrument has an oversize, or over-long, scale to make minute changes in pressure easy to read. Despite the relatively small size of the unit, the scale is 50 ft. long, a tape measure affair printed on 35-mm. film strip.

A 1/16-in. interval on the scale represents only 1/10,000 of the full pressure range of the device. The scale winds back and forth on two sprockets spaced two inches apart, between which the window for viewing is located.

Sprocket movement is synchronized with the action of the pressure follow-up mechanism. This mechanism is actuated by a set of extremely precise metal capsules, heart of the instrument.

Fischer & Porter Co., Hatboro, Pa.

Stubby Drill Chuck

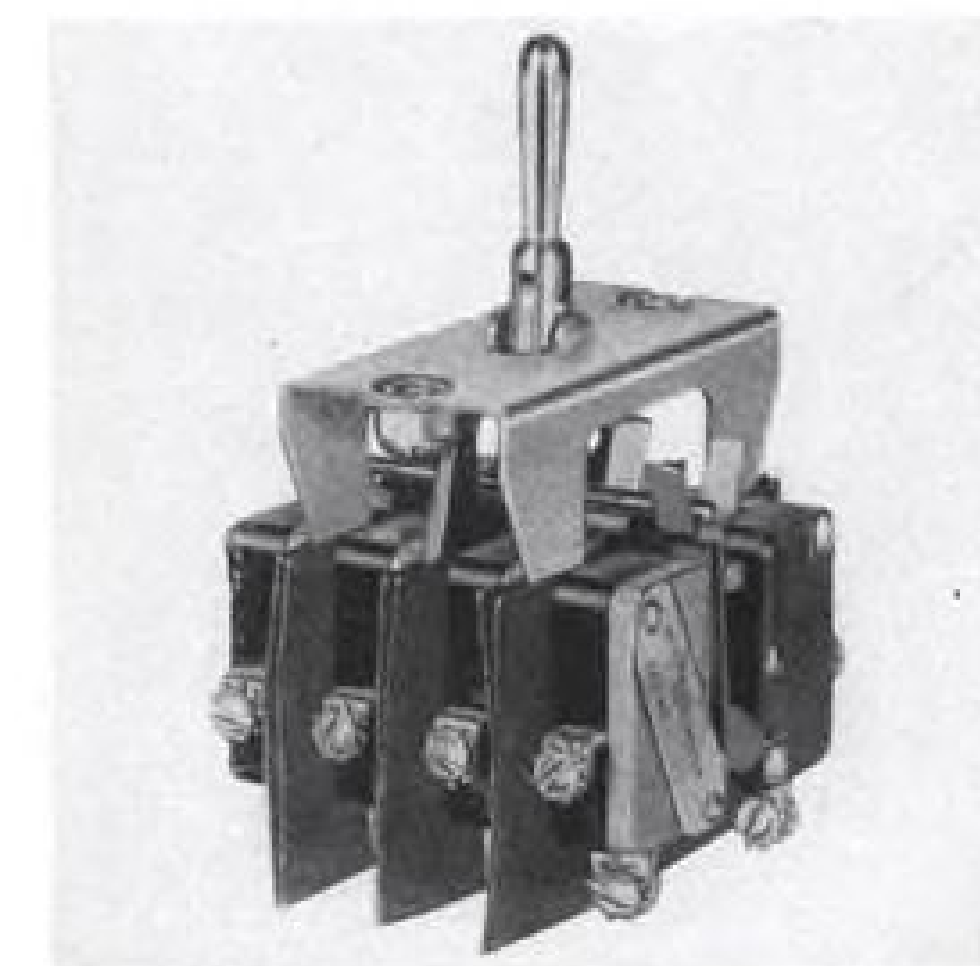
A new drill chuck made by Continental Tool Works greatly increases the total life of drills used in multiple-head presses, the manufacturer states.

Known as the Continental Stub Drill Chuck, it projects a minimum distance from the head to allow use of short

drills in rigid spindles. Continental says the setup increases accuracy of drill work and reduces periodic sharpening. Use of short drills also eliminates the need of bushings and bushing plates.

Positive drive is aided by a U-shaped key in the chuck that fits into notches on the drill shank. The key also is a safety lock that prevents the drill from being pushed under feeding pressure into the collet.

Continental Tool Works, division of Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, 32, Mich.

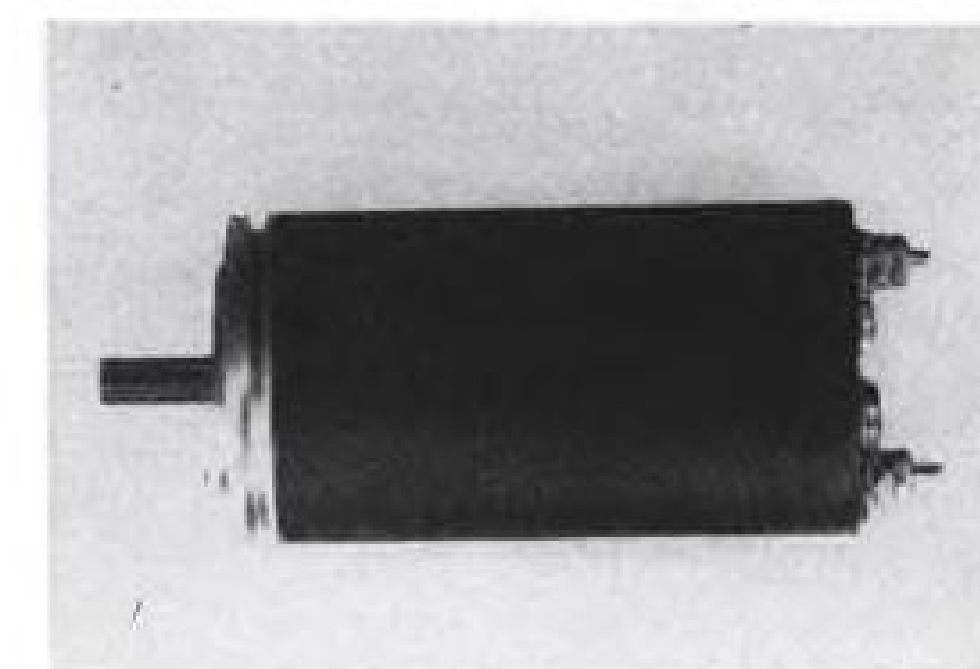


Multiple Switch

New switch assemblies that may include as many as 10 separate switching elements actuated by a single lever are being produced by the Micro division of Minneapolis-Honeywell Regulator Co.

The three-position switches are precision types designed primarily for multiple circuit control in aircraft. Each switching element is rated at 10 amp. up to 250 v. a.c., and will handle 30 v. d.c. inductive loads at 10 amp. at sea level and 6 amp. at 50,000 ft. altitude.

Micro division, Minneapolis-Honeywell Regulator Co., Freeport, Ill.



Servo Generator

A miniature d.c. generator for actuating automatic mechanisms in aircraft control systems has been introduced by Globe Industries, Inc.

The generator has sufficiently high output to provide good sensitivity. It is considered by the firm to be especially useful as a rate device in servo

CONVAIR P5Y Uses

NEW LORD TURBO MOUNTINGS

To Isolate Vibration
of 22,000 Shaft Horsepower

This is the world's first turboprop water-based aircraft (U.S. Navy) flying over San Diego bay. The vibration of 22,000 Shaft Horsepower, the contra-rotating propellers and the gear boxes is isolated from the airframe through the use of 6 Lord Mountings on each of the 4 gear boxes.

Each of the 4 dual engines is also Lord Mounted.

The Navy's new P5Y water-based aircraft is used for long range search-rescue and anti-submarine patrol missions. The world's first turboprop water-based aircraft is equipped with the world's first Lord turbo power plant mounting . . . a typical example of the manner in which Lord experience and research serves manufacturers of aircraft. Lord Engineering capabilities team up with precision manufacture to protect aircraft, to lengthen engine life, to increase crew comfort and alertness by isolating destructive vibration and shock. Regardless of the industry in which you are battling with vibration and shock, it will pay you to call in Lord Engineers.

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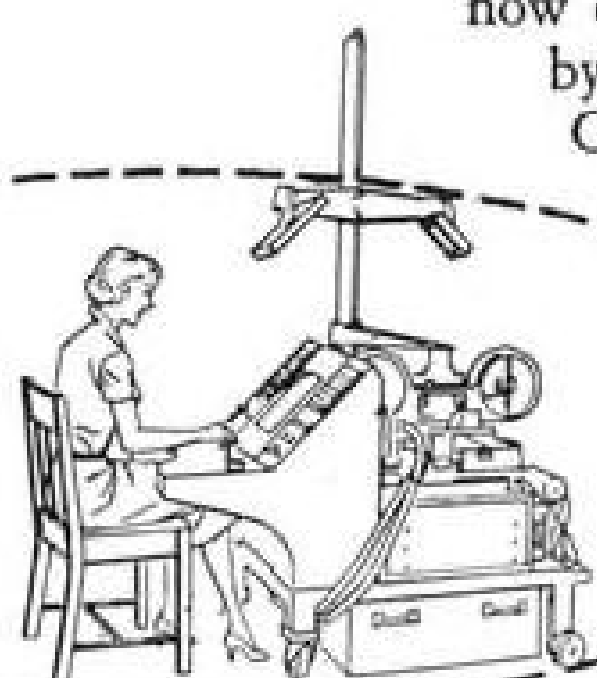
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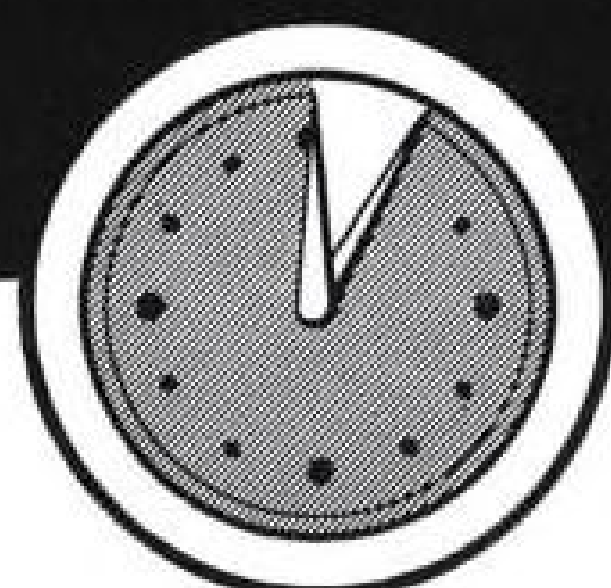


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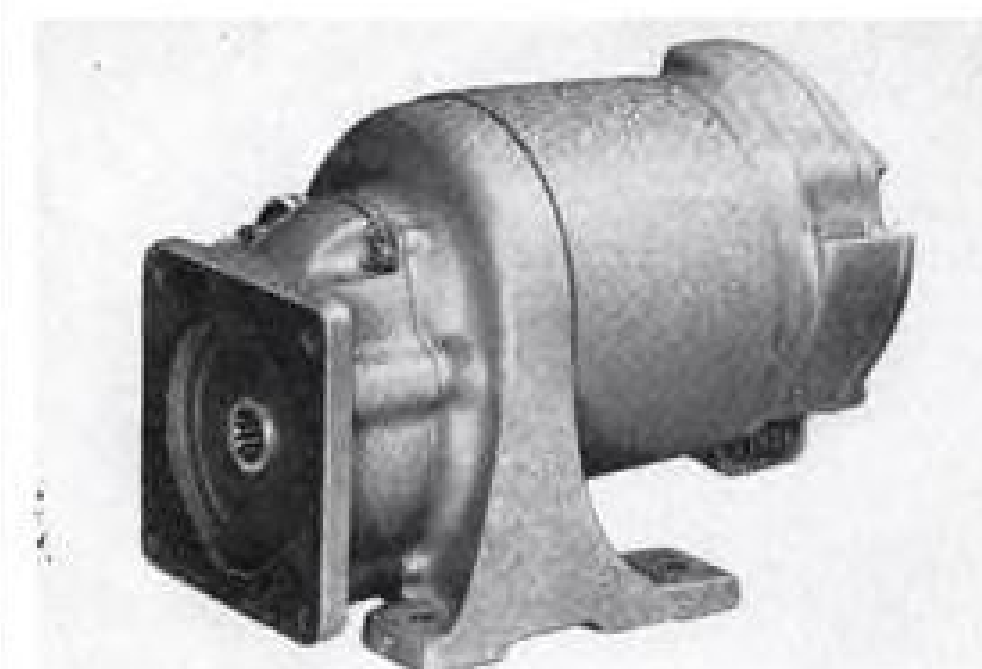
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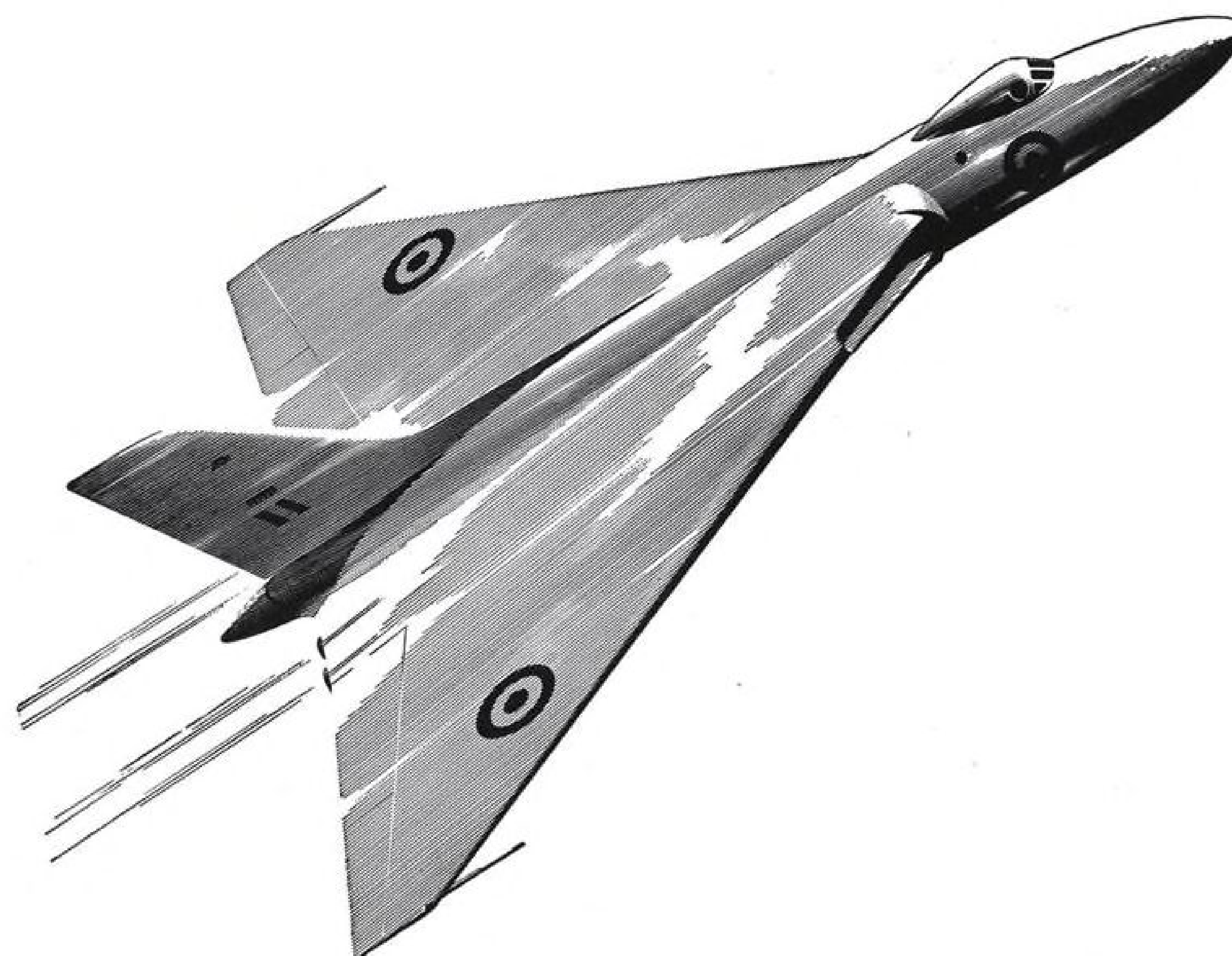
U. S. Electrical Motors, Inc., Terminal Annex., Los Angeles 54, Calif.

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Shortcut and cost saver, to help Piper Cub owners meet CAA Airworthiness Bulletin 52-7-3 requirements, is provided in form of new CAA-approved steel fitting (P/N 13710) and installation kit which avoids need of removing a strut assembly. A&E mechanic's signature is not needed for modification if this kit is used, says maker, M F Corp., 219 North 6 St., Lafayette, Ind.

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AIR TRANSPORT

ATA Rejects UAL Coach Safety Charges

- Airlines to continue their expansion plans despite Patterson's arguments against high-density seating.
- Evacuation tests show coach passengers can escape safely; but United cuts back its DC-4 seating.

By Lee Moore

Air Transport Assn. has rejected a charge by W. A. Patterson, United Air Lines president, that coach seating is unsafe.

ATA president Emory S. Land sent a letter to CAB stating that 10 major airlines—all the scheduled coach operators—have reviewed the present CAA-CAB-airline standard of high-density seating and found it safe and reasonable.

Result is that the airlines probably will continue their rapid expansion of coach service.

United, however, has cut its DC-4 coach seating back to 54, whereas CAB requires DC-4 capacity of at least 64 passengers to justify the coach fare economically. CAB Rates division officials oppose granting United permission to charge a "semi-coach" fare—midway between coach rates of 4 to 4½ cents and "standard" fare of 6 to 6½ cents a mile. A middle fare would confuse the public, the rates officials say, because the difference between coach and standard service already is quite vague.

If Patterson sticks to his order against high-density seating and if he remains as president, United faces the problem of either getting out of the DC-4 coach business or finding a way to modify the planes to meet both the CAB requirements of high-density seating for coach fares and Patterson's ideas on aircoach safety. Since Patterson apparently opposes five-abreast seating in any plane, the problem may be similar with DC-6s.

Two compromise solutions Patterson might work out:

- Abandon day coach but operate off-peak coach service, for which CAB specifies no minimum seating density.
- Re-engineer DC-6 interiors to accommodate 70 passengers with four-abreast seating. American Airlines used five-abreast seating to get in 70 passenger seats, and it is assumed the job of getting the same number in with one less row of seats would present a substantial engineering problem.

If United does stay out of the coach business, CAB observers expect com-

petitor airlines to move in to fill the coach gap on United routes. Even non-competitors, including nonscheduled airlines, may ask special CAB exemption to give coach service on UAL routes. CAB could grant such permission.

United, by stopping coach service, would be bucking an official CAB policy order of a year ago. CAB said in effect the public convenience and necessity requires expanded coach service on all major routes. The Board is not apt to approve United's withdrawal without allowing other carriers to fill the gap.

► **United High-Density Seating**—After telegraphing to CAA and generally publicizing a brief explanation of his decision to cut back coach, Patterson disclosed more detail on his position in a letter to CAA Administrator Charles Horne, with a copy to CAB (AVIATION WEEK Dec. 8, p. 13).

Patterson said his final decision to abandon high-density seating was made after a study of NACA movies of DC-4 fire tests and of Cornell Aeronautical Laboratory tests of passenger evacuation of the same plane. Since he was convinced it was unsafe, Patterson said he had a "moral obligation" to ban the condition. When CAA watches these same movies and analyzes the studies, Patterson said, he believes the administration will agree with him.

"Beyond the test material, we have the opinions of two independent authorities whose views would be most detrimental to our industry if there is not a 'stop, look and listen' attitude toward this campaign toward coach service, which has been going on now for several months," Patterson said. "To us this entire situation is a most serious one. There has been pressure for the expansion of aircoach service. Airlines have been trying to outdo one another in their commitments for expansion of coach service. I feel most sincerely that we in the airline business as well as the regulatory bodies are overlooking that fundamental question of the safety involved in such operation."

Patterson quotes his two independ-



SPEEDY EVACUATION can be carried out efficiently, AA tests show, when crew is trained to give concise orders and enlist aid of passengers.

ent authorities on the subject as follows: "The National Fire Protection Assn. says 'This basis for protection is being seriously upset by high-density authorizations.'"

The association said it originally had expected a maximum DC-6 passenger load of 56, which is now authorized up to 87 persons.

Patterson says "another authority" writes:

"I feel that we are living in a fool's paradise—that when 80 people are barbecued in an air crash or lost at sea there will be very grave repercussions."

A few days later, the UAL president presented the same explanation to ATA members at their annual meeting in Washington. But he ran into severe criticism from such persons as American President C. R. Smith for having moved against coach publicly without consulting the industry first.

Others, including National sales vice president Walter Sternberg, took issue with Patterson's facts. They claimed he could not substantiate his allegation that coach evacuation was unsafe. They said the Cornell tests showed passengers could get out of a DC-4 coach in 90 sec.

► **Airline-Government Studies**—The airlines, CAB and CAA have based their coach safety conclusions on at least eight studies. The latest is an American Airlines test of evacuation techniques on a Convair 240.

This test resulted in the following recommendations:

- Develop key word-phrase instructions for crew and volunteers to use in telling passengers how to use escape facilities. Correct choice of words determined through tests is vital to speeding up correct passenger action, they discovered.
- Standardize color of escape aides, such as the foot and hand loops on the escape slides.
- Recruit able-bodied crew and passengers on wings and ground to keep the evacuation moving.
- Improve child handling techniques. An adult should carry a child, they recommend.
- Make women remove high heels, if possible, before going out.
- Make lower exits in future transport types. The higher the step-down from over-wing exits, the slower the passengers move out.

Another summary of evacuation test results is presented in a recent paper by Dr. Barry King, chief of CAA's Aeromedical Design Branch.

This paper draws on eight previous reports of various studies and tests by CAA, CAB, airlines and Military Air Transport Service. It includes lessons learned during the just-completed American Airlines Convair test.

Here are Dr. King's main conclusions:

- Crew survival is the key to proper emergency evacuation. Present crew knowledge and equipment for crash protection insure "a high probability of survival of one or more cabin attendants."
- Crew training is vital.
- Basic crew drill plan: 1. Open an exit and get passengers started out of it; 2. Give or shout concise instructions for use of other exits; 3. Keep them moving through your own exit; 4. Shout similar instructions to other exits; 5. Pick volunteer aides and instruct them; 6. Instruct the passengers directly.
- Escape devices: Rigid stair or ramp is the best escape device. Some types are being developed. An escape slide is next best. Over-the-wing exits are best handled by telling the passenger to put his foot through first, then his head.

Cornell Denial

Cornell University Aeronautical Laboratory has issued a denial in specific de-

Revolt Hits CAA Safety Office

A revolt, smoldering for months in the ranks of CAA's Office of Aviation Safety against OAS director Ernest Hensley and his deputy, William Davis, flared at a recent meeting of the Air Carrier division regional chiefs in Washington. Persons attending the meeting informed AVIATION WEEK that charges that CAA's personnel morale has been declining steadily since the Rentzel administration were made directly to CAA Administrator Charles F. Horne.

The CAA employees "went over the head" of Davis, who was supposed to be conducting the meeting, and asked that the Administrator be brought in to discuss the controversy personally.

Question which provoked the flareup was a decision Davis attributed to the Administrator to establish a 24-hr. Air Carrier inspector watch at Newark Airport, presumably to satisfy recent congressional criticism.

► **Order Rescinded**—After Administrator Horne heard the inspectors' objections to the order, he rescinded it, AVIATION WEEK's informants said. Spokesman in the protest was named as Leonard W. Ashwell, deputy chief of the Air Carrier division, who has been taking active leadership in the division since his appointment as deputy was announced Sept. 25 by Hensley. E. B. Franklin still holds the post of chief of the division.

CAA sources predict that Ashwell, an aggressive former Marine pilot, is moving up rapidly in the Washington organization and may shortly replace

tail of certain news reports about the Cornell study of passenger evacuation from a DC-4 aircoach.

The study they made was used by United Air Lines along with motion pictures of the evacuation as the basis for UAL president W. A. Patterson's decision to cut the number of passengers carried in the United DC-4 aircoach 66 to 54.

Dr. C. C. Furnas, director of the laboratory, said his statement was to correct the public record on the results the laboratory had reported on the tests and the role of the laboratory in the tests.

The Cornell statement said that the measured times for evacuations in the tests were "very substantially less" than those reported in the press release (3 to 3½ min.).

Dr. Furnas further stated that Cornell engineers made no statements, intimations or implications as to escape possibilities, or any "extrapolated opinions" in the report, such as were indicated in the press release, nor statements or intimations about the functioning of CAB or CAA.



Leonard W. Ashwell

Hensley, unless an even bigger job is opened up for him.

Meanwhile, CAA regional sources advised that a movement was afoot to centralize the Air Carrier division of OAS in Washington as an answer to criticisms of the variety of regional decisions on air carrier problems in the several areas. Proposal eventually would mean a fixed policy for all air carriers on various safety regulation problems, instead of the varying regional interpretations which have been a frequent sore point between industry and CAA. While some Washington sources agree this centralization would be a good thing, no indications for a definite time-

table for it taking place were offered.

Hensley was not at the meeting at which the flareup came, although he normally would have presided. It was stated at the meeting that Hensley was at Oklahoma City's CAA office, "catching up on his flight time."

► **Commerce Patrol**—Meanwhile, other Washington sources speculated that the new incoming Commerce Secretary, Sinclair Weeks, may take a more active hand in straightening out the CAA top organization than his predecessors. These sources predicted that there was little chance for Horne to hold on to his job, although one industry organization, Aviation Distributors and Manufacturers Assn., recently passed a resolution at a Florida convention asking for Horne's retention.

The CAA Administrator reports to the Secretary of Commerce and has virtually no independent authority. In recent years, however, it has been practice of the Secretary to give the Administrator virtually a free rein in his agency.

Washington sources predict that the economy-minded incoming Commerce Department head may take drastic action at CAA to trim the unwieldy layer of unproductive administrative employees that gradually has been inserted over the heads of the more efficient working level CAA employees.

Arguments at the Washington meeting against the 24-hr. watch at Newark were based on the theory that it was merely a political gesture and that the inspectors would be better used at times of higher traffic frequency. Also, it was pointed out that there were many other airports which would require such an arrangement if set up for Newark.

One other objection to the proposal heard in industry is that it would mean greater "police" activity for CAA against the industry, instead of the "co-operative" approach toward CAA-industry relations CAA likes to talk about.

► **Ashwell Transfer**—Ashwell was transferred into Washington from San Francisco last spring about the time of the last Office of Aviation Safety reorganization. He had been chief aviation safety advisor of the CAA's international region. He came to Washington as chief of the Scheduled Operations branch of the Air Carrier division, OAS, and moved up to the deputy division chief post in September.

A graduate of the University of Washington and of the U.S. Navy Flight School, Ashwell returned to CAA in 1946 after serving six years in the Marine Corps during World War II. He left active duty as a lieutenant colonel. He previously had served with CAA from 1937 to 1940, mostly on the West Coast.

The question of just how much support Ashwell has in the CAA hierarchy and where it lies has been a lively topic

of speculation within CAA ever since he came to Washington. The recent conference is not the first time that he has "spoken out in meeting" in aggres-

sive terms, seldom heard in CAA sessions when a speaker is talking to persons with higher Civil Service rating than his own.

In-Flight Refueling for Airlines

System may be used by 1960; it already has been proved reliable and safe in extensive military tests.

By Irving Stone

Commercial airlines may begin in-flight refueling within the next seven years, taking advantage of experience piled up by the military to start the operation as a highly refined procedure for larger payloads and greater safety.

Airline thinking now schedules aerial refueling of domestic commercial flights for somewhere between 1957 and 1960, roughly coinciding with the estimated introduction of jet transports in the United States.

In-flight refueling already is being used with ease and safety by military jet aircraft. The Navy and Air Force are using both the Boeing Flying Boom system and the drogue-and-probe operation of Flight Refueling, Inc.

Col. David C. Schilling commanding officer of the 31st Fighter-Escort Wing of the Strategic Air Command who has pioneered the procedure for the Air Force, is convinced of its benefits.

"You can start on a long overwater flight with complete confidence," he says. "Day or night, it's now considered a routine detail, and the pilot doesn't have to 'sweat it out.'"

► **Reliability**—Flight refueling systems already have proved reliable and safe in tests. Republic Aviation, in laboratory trials on components for its F-84G aerial refueling installation, cycled these parts with dirty fuel more than 100,000 times to prove reliability. Lab tests have shown that there's no danger from fire as a result of static generation at the breakaway point between the tanker and the receiver plane. Fire can't be maintained at the flight speeds that refueling takes place.

Schilling points out that making contact between tanker and receiver literally is a cinch. There never has been an accident in the numerous contacts that have been made.

Training a tanker crew for the refueling operation is simple. A whole series of tanker men can be checked out successively in a single flight, and a group has been given as many as 500 contacts a day.

► **Safe, Too**—From here on out, it looks as though refueling system improvement will be in the nature of detail refinement—aimed mostly at simplification. Simplification in the past has resulted in the elimination of safety gadgets, be-

cause it was found that many of these weren't necessary.

Yet safety remains the procedure's ace. In addition to its prime dividend of allowing a plane to take off with a minimum of fuel and a maximum of payload, it's much safer to refuel in mid-air than to come down, refuel, taxi and take off again, Schilling believes. He estimates that 60% of accidents are due to situations involving the landing, taxiing and takeoff phases.

Safety in the in-flight operation already is considered good enough to warrant commercial aerial refueling, according to American Airlines' chief engineer Dan Beard.

► **Economic Aspect**—For airlines, economics will be the controlling consideration. Mid-air refueling isn't likely to come into use domestically before the jet transports arrive because there isn't enough transcontinental traffic to support one-a-day, non-stop, coast-to-coast flights by the major airlines. The one stop on cross-country flights now is made merely to pick up enough payload to make the trip pay off.

With the advent of jet transports here, the greatly shortened cross-country time may generate enough traffic to warrant the non-stop flight. This, in turn, would warrant mid-continent refueling to allow takeoff with little fuel, big payload.

To promote the economics of mid-continent, mid-air refueling and overwater refueling as well, it's likely that there will be available a flight-tanker service at advanced points. The airlines could purchase fuel aloft, according to Walter Siner of Flight Refueling, Inc.

Schilling doesn't feel that it will be necessary to refuel "on instruments," because the weather condition usually comprises a strip sufficiently narrow for a jet to go above or below it to make contact. If mid-air refueling is applied to commercial piston-powered planes, airline thinking is that two or three alternate tanker bases may be required to service them. Unlike jets, they may not be able to climb above the unfavorable condition at any one point.

Schilling summed up his opinion of the status of mid-air refueling in answer to a question posed by AVIATION WEEK: "What single feature of the procedure requires most improvement now?" His answer: "Give us more tankers."



There was no time to stop, see? She comes running out from behind this parked car right under my wheels. Her hair is in pig-tails, and with the sun shining on it, she might have been *my* kid. We got her to the hospital. It took 3 pints of blood to bring her around. All I have to do is remember the sound of those screaming tires—and I know

why I'm giving blood."

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- ☐ Was this information given through Plant Bulletin or House Magazine?
- ☐ Have you conducted a Donor Pledge Campaign in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?

Remember, as long as a single pint of blood may mean the difference between life and death for *any* American . . . the need for blood is *urgent!*

Airline Captain Teaches AF Pilots

Capt. Charles F. Blair of Pan American World Airways, who was the first man to fly a single engine plane (a converted North American F-51) over the North Pole on a flight from Norway to Alaska, is teaching navigation to USAF pilots.

Blair has been appointed by the Air Force as consultant to teach its fighter pilots his simplified system of "packaged" celestial navigation which makes it practical for a pilot to do his own navigating.

Working with key fighter personnel of the 31st Fighter Escort Wing, Albany, Ga., Blair is increasing the number of fighter pilots who are checked out as navigators. Obvious advantages are that fighter pilots will have a method of checking radio navigation aids should there be doubt of their accuracy or if they fail. And the system will permit mass fighter movements across regions of the world where radio navigation aids still do not exist.

Southern Airways Renewal Is Urged

Southern Airways will get renewal of its certificate to February of 1957 if Civil Aeronautics Board upholds the initial endorsement by Examiner F. D. Moran of Southern's progress in traffic development.

The CAB examiner predicts growing industrial boom conditions in southern states served by the airline, but he denies Southern's requests for replacement of trunk airline service through some local points which are now served by Eastern, National and Chicago & Southern.

Average passenger load of Southern increased 39% the first half of this year over the same period a year ago, compared with a 15% average for local service airlines. However, its DC-3 load factor of 29% compared with an industry average of 36%.

Southern's mail pay requirement to break even last year was \$1,750,000—\$125,000 more than Trans-Texas, whose certificate was renewed by the Board this year. Southern's operating expense of 91 cents a plane-mile was lower than the industry average of 93 cents.

Western to Increase Coast Coach Fares

Western Air Lines plans a coach fare increase on the super-competitive Los Angeles-San Francisco run, following the lead of California Central, which took similar action several months ago.

TWA and United are expected to follow later.

The rate increase is scheduled for Feb. 1. It goes from \$11.70, or about 3½ cents a mile, to \$13.50, or about 4 cents a mile—more in line with coach fares elsewhere.

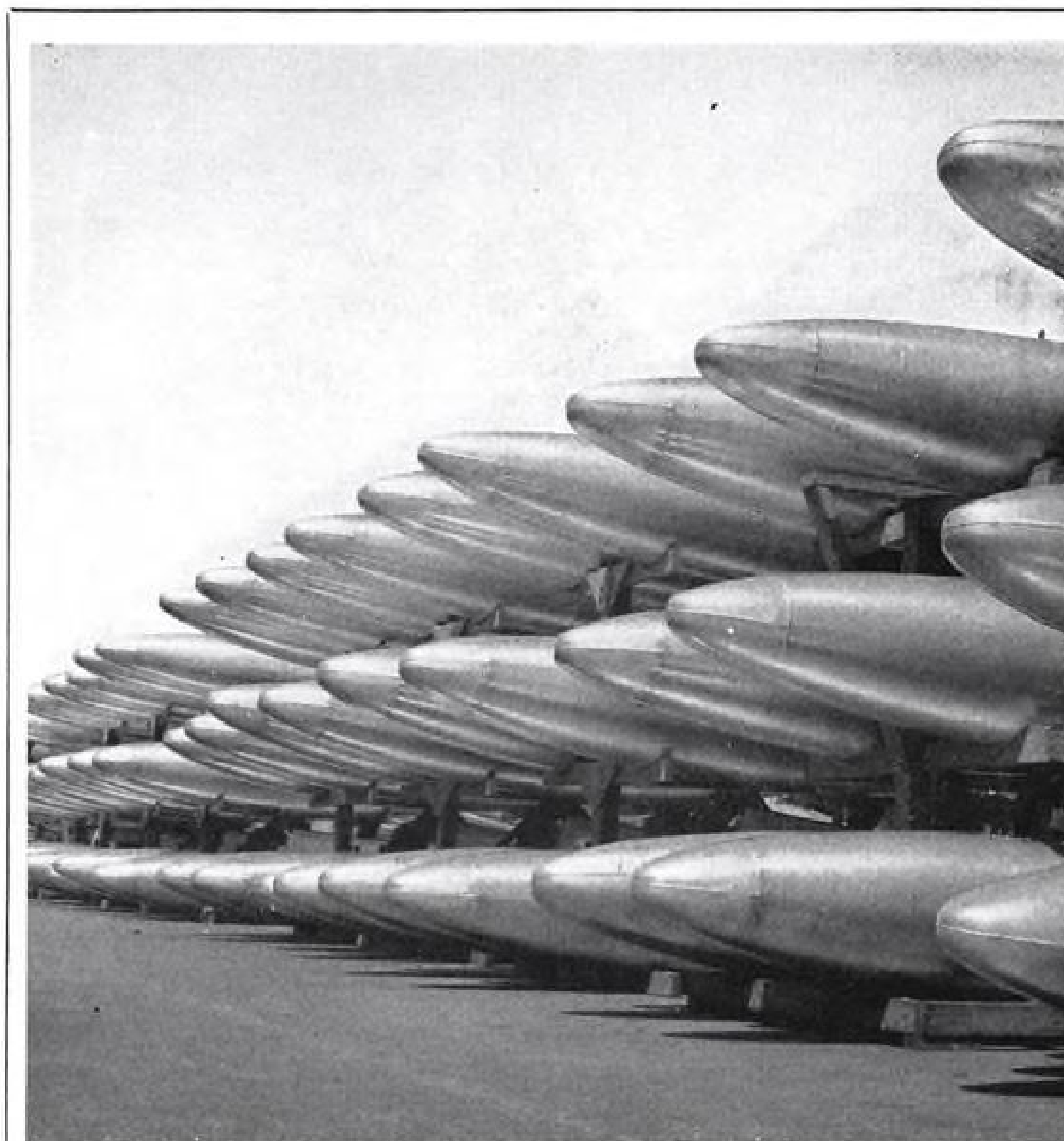
Cal Central blazed the trail on rate cuts some years ago, all the way down to 3 cents a mile—which held until the Korea war inflation. This year, after Cal Central converted to 44-passenger Martin 2-0-2s, the company found it could not make reasonable profits at the 3½-cent-a-mile rate either, and apparently the other airlines are finding the same.

California Central generally has led the other airlines on fare changes because it is a nonsubsidized intrastate carrier not subject to Civil Aeronautics Board control.

Dreyfuss Interiors For Super Connies

Lockheed Aircraft says Wright Turbo Compound engines will give its new Super Constellation sufficient speed and range to make it worthy of being designated the "first truly nonstop trans-Atlantic plane."

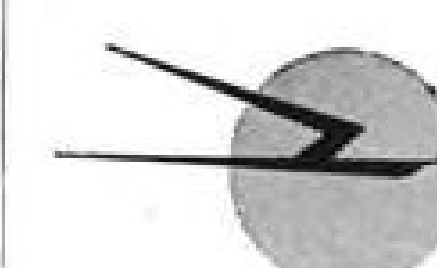
The Super Constellation will be pow-



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ered by R3350-30W engines and will be constructed for conversion from a 47-passenger luxury transport to a standard 63-seat airliner or a 94-passenger tourist plane.

Industrial designer Henry Dreyfuss partitioned the fuselage into several cabins for greater privacy, reduced noise through a baffling effect of the fuselage bulkheads. He installed seats facing the windows in the airliner's lounge; decorated the cabins with murals and custom etching; laid out full-deck mohair rugs; doubled the lavatory facilities from two to four, and moved the galley aft near the rear loading door from its traditional position between the forward and main cabins.

Orders for the Dreyfuss-designed Super Constellations by Eastern Air Lines and 10 foreign firms total 72. Eastern and Trans World Airlines already are operating 24 Super Connies without Dreyfuss interiors and powered by standard Wright R3350 engines.

PAA's Hawaii Coach Gets Heavy Play

In the first five days of Pan American World Airways' new Stratocruiser tourist service to Hawaii beginning Dec. 3, the carrier sold seats to 783 passengers, and advance bookings up to Christmas indicate the load factors will run at least 80%.

The new tourist fares are approximately 25% less than first class, with one-way price from either San Francisco or Los Angeles \$125 and roundtrip \$225. Fares are plus 15% tax.

The new U.S.-Hawaii service marks the baptism of Boeing Stratocruisers in tourist service. They carry 81 passengers, compared with 53 on first-class hops. The upper deck was remodeled to hold 74 seats and the lounge seats seven. The Stratocruisers formerly were used on luxury President flights. Long racks to hold hats, coats and luggage replace berths. The track-mounted aerotherm seats are arranged two on one side, three on the other.

Tourist passengers have to purchase their meals; baggage allowance has been reduced from 55 lb. to 44 lb.; they do not get free overnight bags nor are the traditional leis presented upon arrival in Hawaii.

The carrier has placed DC-6Bs in the service to South America, where the Stratocruisers formerly had been employed.

New Terminal

A new six-story administration building under construction at San Francisco International Airport is reported capable of handling 3 million domestic and international passengers yearly, with ex-

pansion possible to take care of 10 million passengers a year.

It will replace the present structure, designed to take care of 550,000 passengers a year but handling 2 million now.

The new structure, which is expected to be completed in a year, will have 80,000 sq. ft. of ground floor area. The control tower will be 123 ft. above the first floor.

Charter Snafu

• IATA agreements strand many GIs in Europe.

• Lower Christmas fares illegal for member lines.

The booming business of flying American GIs home for Christmas has caught the international airlines in seasonal controversy.

The problem: Does the International Air Transport Assn.'s cartel fare agreement allow airlines to offer cut-rate charter fares to groups of soldiers for their Christmas pilgrimage home—or must the soldiers pay normal fares?

► **Soldiers Caught**—The question about applicability of the agreement to GI



PHOENIX CONTROL TOWER

An eyecatcher at Phoenix Sky Harbor Airport, Ariz., is this modern 100-ft. tall tubular control tower which cost \$92,000. Weight is 75 tons. The tower is part of a modernization program at the field which cost \$849,000 and included a new airlines terminal building.

groups caught a dozen airlines and thousands of soldiers in the middle. Test case in the public eye is the plight of 55 men of the 322nd Signal Battalion in Darmstadt, Germany, because they complained to a syndicated columnist. They had arranged a cut-rate charter with Sabena Belgian Airline. But, they claim, Pan American World Airways caused Sabena to cancel the charter by pointing to a \$50,000 fine allegedly applicable to violation of the controversial IATA resolution.

The uncertainty arises from the wording of a recent IATA resolution (No. 180/045, issued Sept. 19 and effective Oct. 1, this year) stating in part: "A member may perform air transportation by chartering an aircraft . . . provided that charter agreements may be made with one person on behalf of a group, whose principle aims, purposes and objectives are other than travel and where the group has sufficient affinity existing prior to the application for charter . . . to distinguish it and set it apart from the general public . . ."

► **IATA Roads**—The aim of the IATA resolution was to prevent scheduled airline members from cutting fares below the agreed rate by soliciting informal groups to sign up for "charters, which are not subject to the published fare minimums."

Pan American also cites a letter from CAB to U. S. and foreign trans-Atlantic airlines last April, calling attention to practices considered by CAB as illegal under sections of the Civil Aeronautics Act.

"Such practices involve the advertising of 'charter' flights between specific points," the CAB letter stated, "and the solicitation and sale to individuals on an individual-fare basis of space on such 'charter' flights."

A Pan American spokesman says his company interpreted this letter as warning against the Christmas-charter type solicitation. So, he says, Pan American promoted its aircoach schedules among U. S. servicemen abroad, instead of going into the "charter-arrangement"-type solicitation of this business, which PanAm could have done ably and willingly enough if the company had considered it legal.

► **Nonsked Chance**—The Air Force has now investigated the plight of the soldiers and decided that if there is a question of legality of scheduled airline soldier-charters, the simplest way to avoid the problem is to bring in non-scheduled airlines, who are not members of IATA.

None of the soldiers who planned charters and are now cut off will be "stranded," an Air Force spokesman said.

Pan American is bringing over 1,000 GIs home on regularly scheduled flights,

the company reports. And Sabena, KLM, BOAC and others are flying GI passengers on both scheduled and charter flights.

SHORTLINES

► **Chicago & Southern Air Lines** starts 57-passenger Constellation service Jan. 10 to Haiti via New Orleans, Dominican Republic and Puerto Rico, each weekend.

► **Commerce Department Undersecretary for Transportation J. G. Scott** will introduce his user-charges policy to the (Republican) 83rd Congress next month before resigning. Airways charge probably would be an increased federal excise tax on aviation fuel, as recommended in the government's 1949 User-Charges Report.

► **International Civil Aviation Organization** has voted in the Republic of Korea as its 58th member. ICAO nations fly over 90% of the world's civil air transport.

► **KLM Royal Dutch Airlines** air cargo tonnage the first nine months this year

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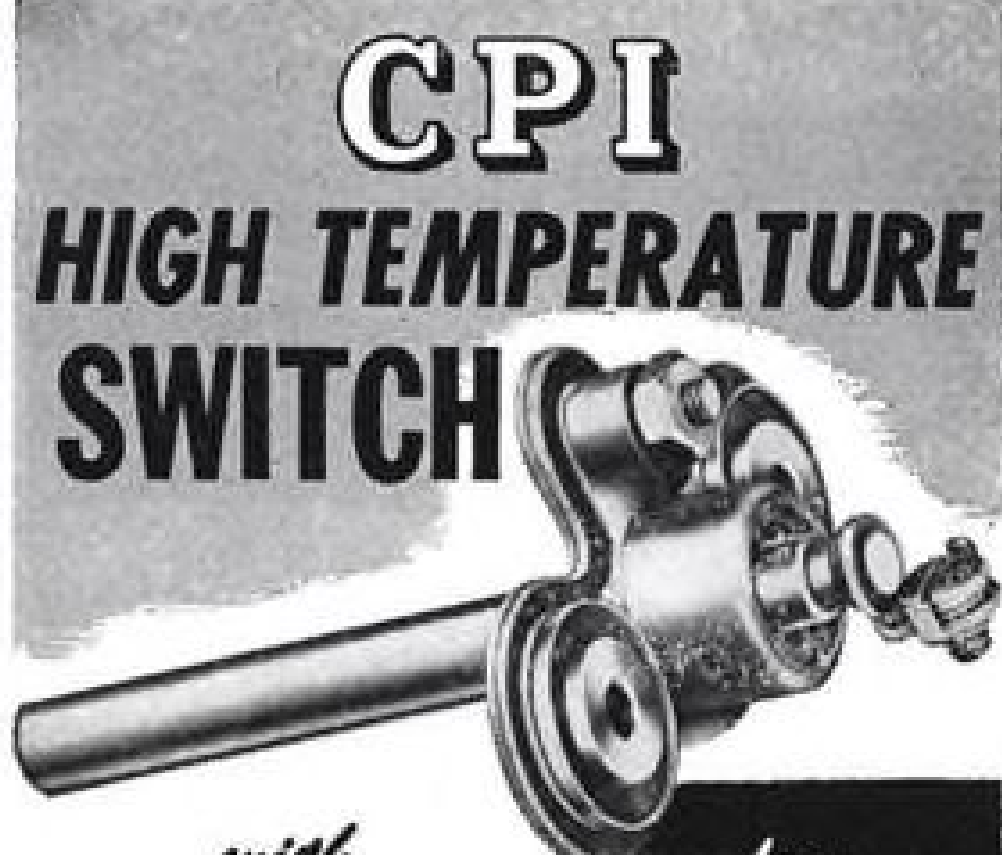
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gained 10% over a year ago to 10,210 tons.

► **Miami International Airport** will spend \$250,000 on six air cargo buildings.

► **Mohawk Airlines** has asked CAB to transfer Colonial Airlines' short-haul, small-city route stops to Mohawk if Colonial merges with another trunk line. Inter-city distances on these routes are even shorter than those of the local service line, executive vice president Robert Peach says.

► **Northwest Airlines** set some kind of a record on a 15-hr., 56-min. Tokyo-Seattle Stratocruiser flight that "arrived in the U. S. before it left Japan." It left Tokyo International at 9:10 a.m. Tokyo Time Sunday, crossed the International Dateline and arrived Seattle-Tacoma three minutes earlier on the same day, West Coast Time.

► **Pan American World Airways** must submit to CAB individual contracts for "free transportation" connected with all promotion projects during the next 12 months. This resulted from CAB investigation of "free" transport given by PAA, allegedly in violation of the Civil Aeronautics Act. PAA immediately lost a deal with Talon Zipper Co. to Air France because of CAB delay in approval—plans now to demand one-day CAB decision on all proposals.

► **Pioneer Air Lines** has transferred its order for five Convairs over to United, making 55 for that airline by 1954. Pioneer already has nine Martin 2-0-2s—first postwar fleet for a local service line. . . . CAB had refused to approve materials priority to Pioneer—an indication the Board would crack down on Pioneer's mail pay rate if the company persisted in this expensive investment.

► **Riddle Airlines, Inc.**, is the new CAB-approved name of Riddle-Aviation Co.—certificated cargo line to Puerto Rico and domestic nonsked.

► **Trans-Pacific Airlines** has official CAB permission to call itself Aloha Airline or TPA Aloha Airline, as it has been doing for two years. TPA keeps also its legal name Trans-Pacific Airlines, however.

► **United Air Lines** November revenue passenger-miles were up 9% over same month last year. . . . Company won a court fight against the California Public Utilities Commission claim that the 30-mi. L. A.-Catalina Island flight is subject to state regulation. "A substantial portion . . . is over the high seas and is not within the State of California," the court ruled.

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COCKPIT VIEWPOINT

By Capt. R. C. Robson



A Pilot Writes to Santa

Dear Santa:

Here is my Christmas list.

• **Approach lights.** You know I have wanted these for years and years. Each Christmas you bring bigger and faster airplanes; people want me to make lower and lower approaches, and I have less time to see where to land. So I'll put this on top of my list and pray hard that the center-line lights will soon be waiting at the airport for me.

• **Runway lights and markings.** For the same reason I need approach lights I need runway guidance. Even if all runways were properly painted it would be a great help. With good lights, especially around the threshold, I believe we all could land more safely.

• **Visible airplanes.** The little flickering candles you gave me for navigation lights many years ago are no good any more, Santa. Even with good eyesight, they can't be seen until it's almost too late. And then all you see is a bunch of blinks and you can't tell which way the opposition is going. Could you get me some powerful, steady ones? Then could you get me a big flasher—like police cars have—to put on top of the rudder? This would make night flying safer. Also, what could you do to make airplanes more visible during the day? Spotting planes when the sun is out is almost an impossibility. I know this is a difficult request to grant, but it sure would be worth an effort.

• **Airborne radar.** With daylight viewing cathode tubes no longer an impossibility, I sure would like to have radar in my cockpit, Santa. Then I could avoid those thunderstorms, the hail and ice, observe the terrain and perhaps someday even get a warning of proximity of other aircraft.

• **Airborne radar beacon.** The ground radar is doing a good job these days, but without positive identification we are handicapped. I'm sure you have some of these on your shelf. Could you bring one with you?

• **Weather observations.** Since people keep saying that we have to fly by these foolish weather minimums, how about a method of making them more accurate? About half the time when I'm told an airport has a 1,000-ft. ceiling, I'm lucky to find 300; or if they say I can't land because it is 200, I can see the field from 2,000.

• **Fireproof airplanes.** Your new airplanes are nice, Santa, but gosh they sure burn easy and quick. Sometimes the pilots don't know about the fire soon enough either. If you could give us better fireproofing it sure would be wonderful.

• **English language system.** I'm sorry, St. Nick, but I still can't read the NOTAMS. When I see BEBOP on the teletype I don't know whether to stay home or go dancing. Same is true of my traffic clearances; "via Purple 4" confuses me. Why can't they say "via Newark?" Taxiway signs in plain English also would be appreciated. All the mysterious little codes used in aviation certainly make life difficult.

Some of the presents you brought me in other years are still in good condition, Santa, and I want to thank you for them. Thermal deicing, steerable nosewheels, VHF radio communications and pressurization are among the nicest gifts I ever received. Some others like the automatic feathering and reversing propellers, also are wonderful, except that sometimes they don't work so well. If you could make these more reliable we would have one of the greatest gifts of all time.

I know you can't bring all these at once, Santa, but gee, I sure would love to have them. Please do the best you can.

A Very Merry Christmas and Happy New Year
R. C. R.

WHAT'S NEW

New Books

Jane's All the World's Aircraft 1952-1953, compiled and edited by Leonard Bridgman, 324 pages, including index, profusely illustrated. Published in the U.S., Canada and South America by McGraw-Hill Book Co., Inc., 330 W. 42d St., N. Y. 36; in Great Britain by Sampson Low, Marston & Co., Ltd., 25 Gilbert St., London, W.1. Price \$22.50.

One of the first reactions on getting a new "Jane's" is to see what news has been dug up on Russian aircraft; there is nothing sensational in this new volume, but then Bridgman sifts his sources carefully.

Mention is made of experiments the Soviet air force reportedly has been making with four-engine TU-4s (B-29 copy) modified to carry a MiG-15 jet fighter under each wing leading edge suspended from a girder-type structure. There is a photo of a hitherto unseen, unidentified single-engine biplane transport apparently designed to operate in and out of small fields.

Immediately noticeable is the fact that Jane's looks slimmer than previous editions. Rising production costs have forced the editor to revise, for example, presentation of basic airline data so as to trim the fat yet keep the meat. The aircraft and engine data sections retain their excellent presentation. There are 573 illustrations, 311 being new. In the aircraft section, the U.S. takes 75 pages, Britain follows with 58 pages.

A new and helpful feature is references in the indexes to all aircraft describing in the preceding six volumes.—EIB

Telling the Market

50-Year Index to ASTM Technical Papers and Reports, 216 pages, available from American Society for Testing Materials, 1916 Race St., Phila., Pa., price \$6.

It is a detailed index to all ASTM technical papers and reports (listing author and subject) dealing with properties and testing of materials appearing in ASTM publications from 1898 through 1950. Included are a number of technical reports not credited to specific authors.

Second Wind for Busy Aircraft is an illustrated brochure describing complete rehabilitation services for executive aircraft handled by the Greenville Overhaul division of Temco Aircraft Corp. Write the division at P.O. Box 1056, Greenville, Tex.

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A MESSAGE FROM THE PUBLISHER

With the coming of the New Year, Aviation Week will have a new Publisher, Robert W. Martin, Jr. For the task of leading Aviation Week into new and larger areas of service, he is exceptionally well qualified. Bob has been associated with me from the beginning of Aviation Week, serving in many capacities, and has been intimately identified with every phase of the magazine's development. Moreover, he has a long record of experience with aviation gained prior to his association with Aviation Week. Bob has many friends in aviation, all of whom, I am sure, wish him well in his new responsibilities.

Aviation Week's spectacular success has been described by some as a publishing phenomenon. As the founding Publisher of Aviation Week, I would like to take this occasion to review briefly the history and growth of Aviation Week — and to point out that the great measure of success which has come to this journal is the very reason for the appointment of a new Publisher.

Aviation Week made its first appearance on Monday morning, July 7, 1947 — scarcely a propitious time, as some told us, for a new publishing enterprise devoted to aviation. The confusion and depression which enveloped aviation immediately following World War II seemed enough to discourage even some of the most daring.

But, it seemed clear to us that aviation was on the threshold of a new era — another turning point in its history. Technical developments then in progress and on the horizon (some of which have since been advanced) seemed certain to bring a new and brilliant future for aviation. It seemed even clearer to us that if our optimism was to be even partially sustained, the industry would both require and welcome a more comprehensive publishing service than any then available.

Under the stimulus of World War II, aviation has grown into one of the nation's great industries; and, with this growth, it has acquired many new and strange problems. Now the aviation executive's frame of reference must include far more than design and production. Now he must deal with such typical big business problems as labor relations, taxes, finance, diplomacy, and regulation — to say nothing of a flood of new technical developments, such as atomic energy, rockets, high Mach numbers, and avionics, to mention a few. This, we reasoned, called for a new and unique publishing service.

Thus it was that, basing our decision more on faith than on good advice, Aviation Week was born. That our faith has been generously rewarded is now clear.

Behind every successful publishing story lies the loyalty and enthusiasm of the publication's readers. Aviation Week now has the largest circulation of any aviation business magazine — now over 40,000 — paid circulation at a subscription price of \$6.00 a year, the highest in its field. What is more important, the number who renew their subscriptions each year has increased steadily to the current all-time high of 60.5% — the highest renewal rate of all paid circulation aeronautical publications.

Yet Aviation Week has not sought mass circulation. It is not a magazine for the aviation fan. From its beginning, Aviation Week has always insisted that it deliver to its advertisers the most effective audience possible. Through self-imposed controls, subscriptions have always been re-

stricted to persons with a known commercial or professional interest in aviation.

Thus it is no mere accident that 3,249 pages of advertising have appeared in Aviation Week during this year of 1952. This substantial volume of advertising now places Aviation Week among the 20 largest magazines published in the United States.

This spectacular growth in circulation and advertising has been possible only because of an equally spectacular editorial performance. Editor Robert H. Wood has assembled what I believe to be the largest and most competent staff in aviation journalism. Under his direction, this staff works full time and exclusively on Aviation Week. And he has supplemented this staff with an imposing array of on-the-spot correspondents in all U.S. aviation centers, as well as 74 countries overseas, plus the wire services of Associated Press and United Press.

Naturally, I like to think of these facts as representing some measure of Aviation Week's success. To this must be added, of course, the success of the several corollary aviation activities in which our Company is engaged. To mention a few, there is the Airport Directory, now enjoying a record rate of usefulness as a result of its accuracy which, in turn, is a result of the tremendous amount of work put into its airport descriptions. Aviation Week maintains a graduate fellowship at the Massachusetts Institute of Technology for advanced study in the field of Aeronautical Engineering. So far, this fellowship has seen one promising young aeronautical engineer through his graduate work; another one through his first year. Aviation Week is also the donor of the Air Safety Award presented annually by the Flight Safety Foundation.

So it is that Aviation Week, like the field it serves, has become big in its own right; so big, in fact, as to require a Publisher whose full time and attention can be devoted to the task of properly discharging Aviation Week's responsibilities to its readers and capitalizing on its opportunities for greater service.

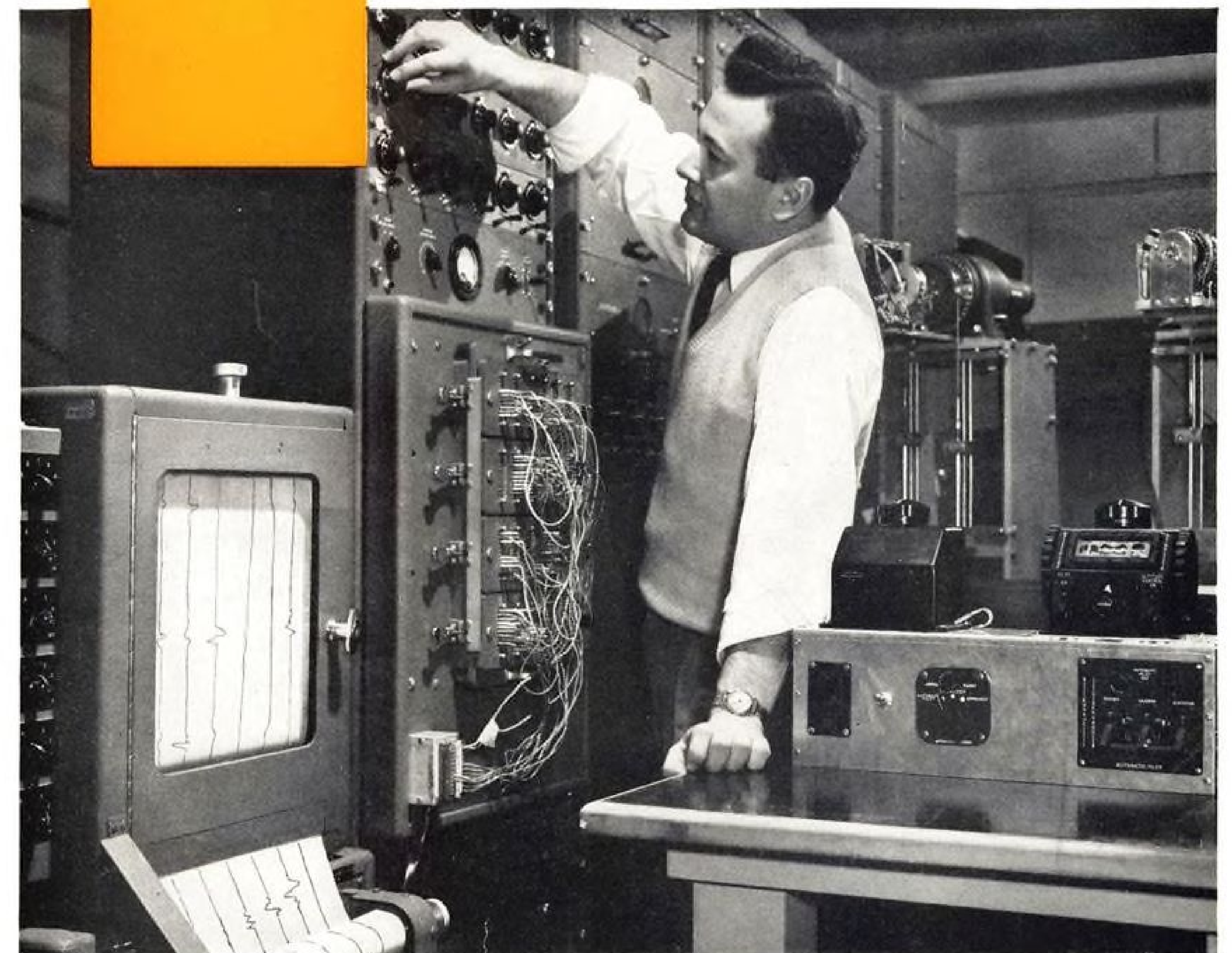
There will be no change in the editorial policies of Aviation Week as a result of this change in Publishers. Bob Martin was selected for the job because he has been familiar with our editorial policies and objectives since we commenced publishing. Whatever success has come to Aviation Week has been the result of its editorial performance.

I would be less than human if I did not say that Aviation Week's success has been a tremendously gratifying experience for me; that to pass the reins to another at this high point has been a difficult and regretful decision. But, I have other tasks to perform, with constantly increasing demands upon my time. So, I have asked Bob Martin to take over Aviation Week because it needs him, and because I want more time to devote to the other McGraw-Hill journals for which I am responsible. They, too, are growing.

Aviation Week will never be out of mind. Nor will it be out of sight. The other McGraw-Hill publications I serve also have many important aviation interests. Consequently, to my many friends in all parts of the aviation field this is by no means a "goodbye."

—Robert F. Boger.

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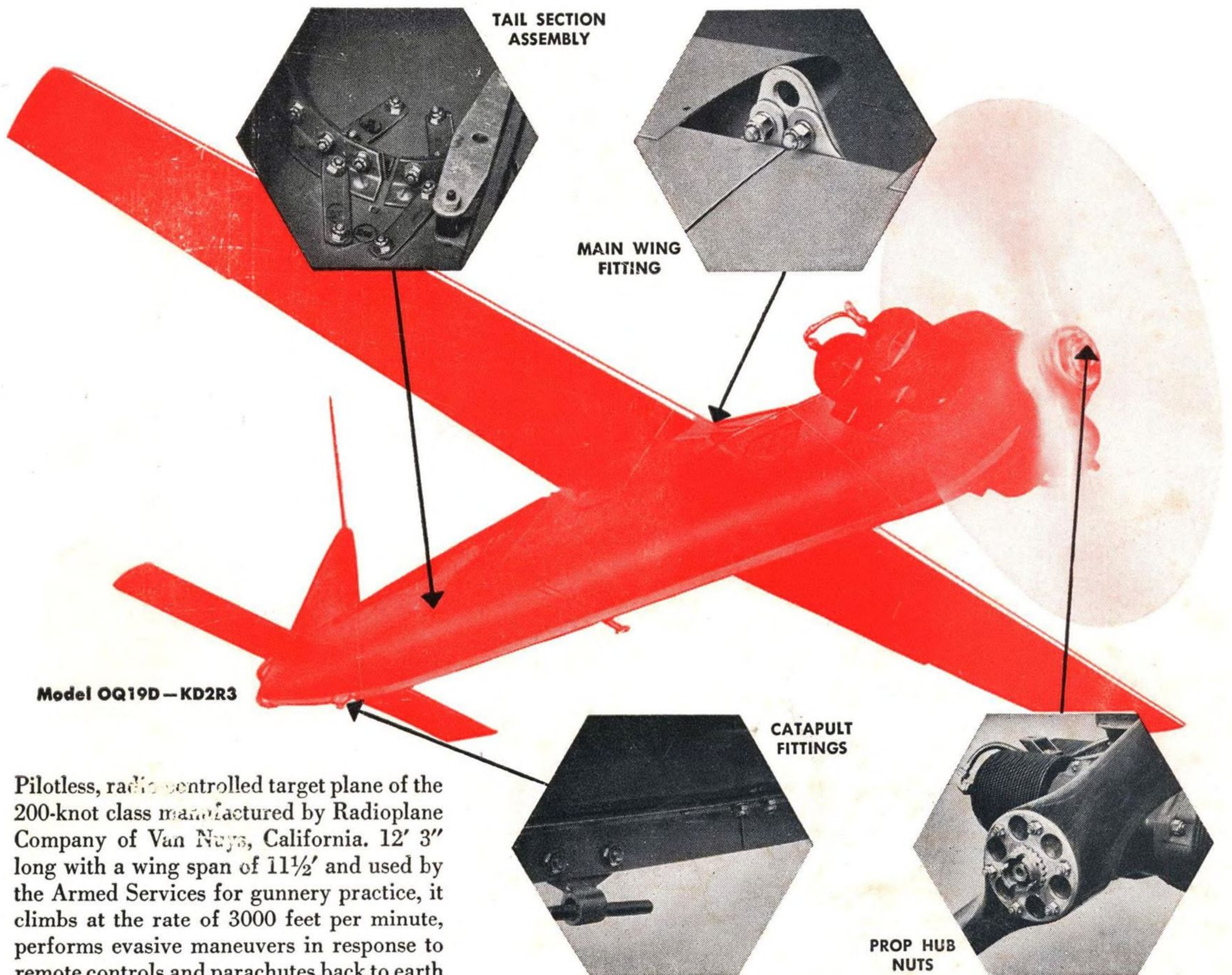
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