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JAN. 3, 1955

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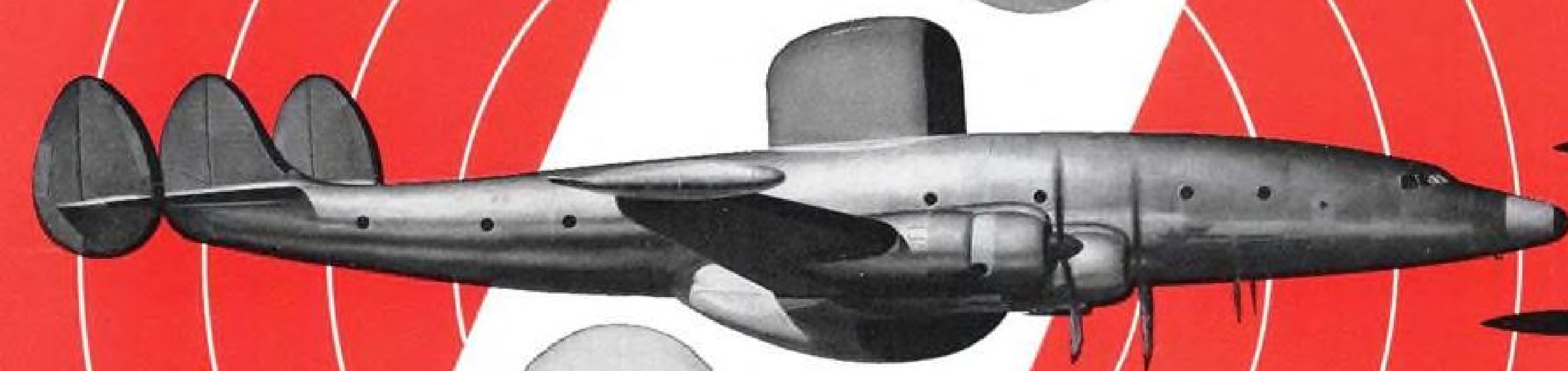
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Aviation Week

JANUARY 3, 1955

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Table of Contents on Page 8

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AVIATION WEEK, January 3, 1955

NORTH AMERICAN HAS BUILT MORE AIRPLANES THAN ANY OTHER COMPANY IN THE WORLD



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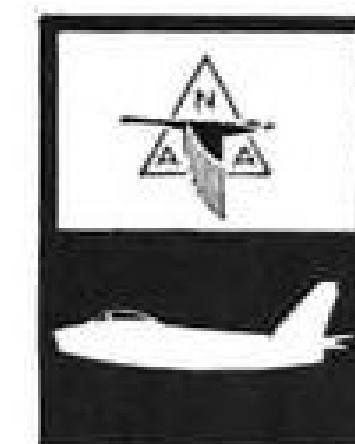
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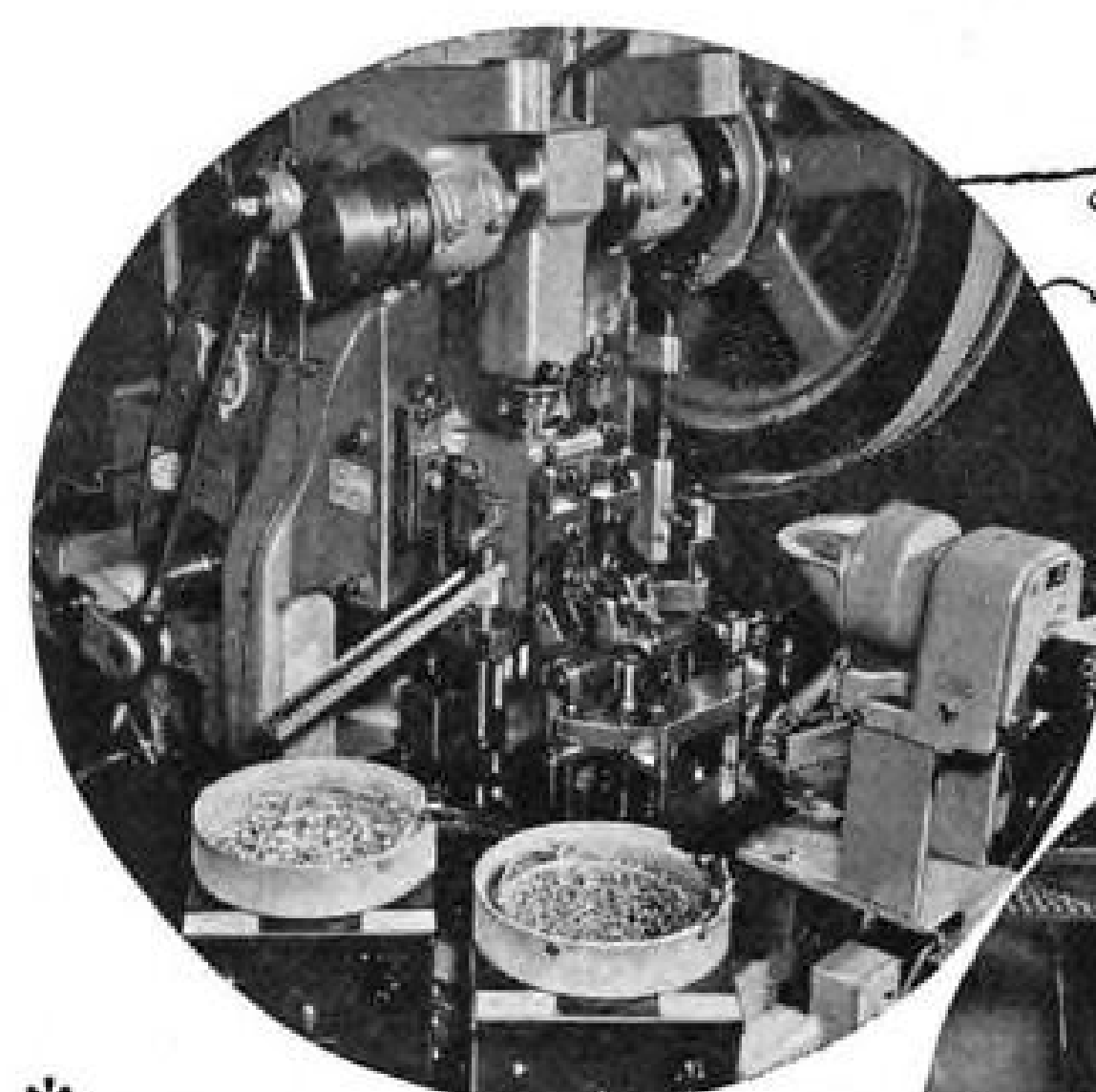
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French Ramjet Claims Speed Record for Climb

Leduc 021 ramjet research aircraft, designed by French engineer Rene Leduc, reportedly has climbed at an angle of 50 deg. at a speed of 652 mph., claimed by the French as an unofficial world's

speed record for climbs. The craft's bulbous fuselage contains the large ramjet powerplant. The pilot sits inside the transparent compartment projecting ahead of the intake in the nose of the fuselage.

Domestic

Turbojet engines for vertical-takeoff aircraft and powerplants equipped with thrust reversers will be tested by General Electric Co. on a 4,500-acre trial site purchased near Peebles, Ohio.

Aircraft atomic reactor has been built and placed in operation by Convair Division of General Dynamics Corp., reports John Jay Hopkins, chairman and president of the parent company.

New flight simulators duplicating performance characteristics of the Douglas C-118A, Lockheed C-121D and Convair C-131 are being built for USAF by Curtiss-Wright Corp.'s Electronics Division at Carlstadt, N. J. Total orders for the three simulators: \$6,391,206.

Jet fuel contract has been awarded Socony-Vacuum Oil Co. by Trans-Canada Air Lines for its fleet of 22 turboprop Vickers Viscounts. The agreement calls for more than 2.5-million gallons of JP-4 in 1955 and 3-million in 1956 and 1957.

Ford Aircraft Engine Division, Chicago, reports employment has leveled off at 10,000 following switchover in production from Pratt & Whitney R4360s to P&W J57 jets. Company reports J57 production is "on schedule," with contracts extending into 1957.

Northrop Aircraft Inc., Hawthorne, Calif., says it delivered more pounds of

airframes and spares during 1954 than in any previous 12-month period in its 15-year history.

Hugh de Haven, founder of Crash Injury Research, was cited for his pioneering work in transportation safety Dec. 21 at a luncheon in New York's Wings Club marking his retirement from Cornell University Medical College.

Lightplane exports totaled 30 aircraft at a combined value of \$357,330 during November, bringing overseas shipments during the first 11 months of 1954 to 447 units at \$6,585,270, reports Aircraft Industries Assn.

Airfreight industry will quadruple its tonnage during the next five years and reduce rates 25%, forecasts A. R. Bone, Jr., western regional vice president of American Airlines.

United Air Lines DC-7 set a speed record of 2 hr. 27 min. last week on a Seattle-Los Angeles flight, bettering the previous mark by 9 min. Scheduled time on the route: 3 hr. 15 min.

Army helicopter competition for a high-performance, four-place utility aircraft brought out contenders from about nine companies. The copter will be between Army's present three-place utility craft and the Sikorsky H-19 that carries 8-10 passengers plus a crew of two. Invitation for bids set Jan. 1 for a decision, but officials of some participating firms now doubt that a winner will be picked before spring.

Financial

Cessna Aircraft Co., Wichita, reports net earnings of \$2,175,473 for 1954, highest in the company's history. Sales totaled more than \$45 million and exceeded those of 1953 by \$1.5 million. Backlog Nov. 30: approximately \$33.5 million.

Kaman Aircraft Corp., Bloomfield, Conn., will pay a 10-cent dividend Jan. 15 to more than 2,000 stockholders of record Dec. 31, the first payment declared by the helicopter manufacturer. Kaman's directors expect to continue dividends on a quarterly basis.

International

British Overseas Airways Corp. Stratocruiser flipped over, caught fire and exploded Dec. 25 seconds after it touched down at Prestwick, Scotland, on a London-New York flight. Most of the eight survivors out of 36 persons aboard were in the transport's nose, blasted free of the burning fuselage by the explosion.

First quantity delivery since World War II of Japanese-built planes has been made by Toyo Aircraft Corp. The company turned over four Fletcher FD-25As to the Cambodia air force.

Complete Britannia airframe has been delivered to Britain's Royal Aircraft Establishment for fatigue tank tests. Bristol Aeroplane Co., builder of the turboprop transport, sent the airframe in five sections.



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The Aviation Week

January 3, 1955

Headline News

Red Airpower Threatens Islands.....	13
Hughes, Radioplane Grant Pay Increases	15
Airline Traffic, Safety Set Record.....	15
Stapp Plans Supersonic Sled.....	15
Aircraft Industry Backlog: \$14.8 Billion	16
NACA Forms New Flight Safety Group	16
Budget Bureau Backs ACC's Role.....	16
Air France Blames 'Politics' for Losses	18
Local Service Route to Switch to Trunk	18
Basic Airpower Debate Shapes Up.....	21
Swiss Design Short-Field Fighter.....	24
Airport Council Wants Lower Costs.....	26
Stits Tests Folding-Wing Lightplane.....	28
Wilson Revises Small-Firm Policy.....	28

Production Engineering

Tiptanks a Scrap Gift to Enemy?.....	34
--------------------------------------	----

Equipment

Remote Packs for Hydraulic Power....	48
--------------------------------------	----

Avionics

When Is Customer a Competitor?.....	56
-------------------------------------	----

Air Transport

Everything Higher in '54 But Profits..	71
IATA Airlines Make Big Gains in 1954.	72
Board Sets Feeder Yardsticks.....	72
NBAA to Take New Look at Policies..	73
Best PAA Year.....	73
Airlines to Get Military Mail.....	73
CAB Reopens Three International Rates	76
CAB Blames Storm for Braniff Crash..	76

Editorials

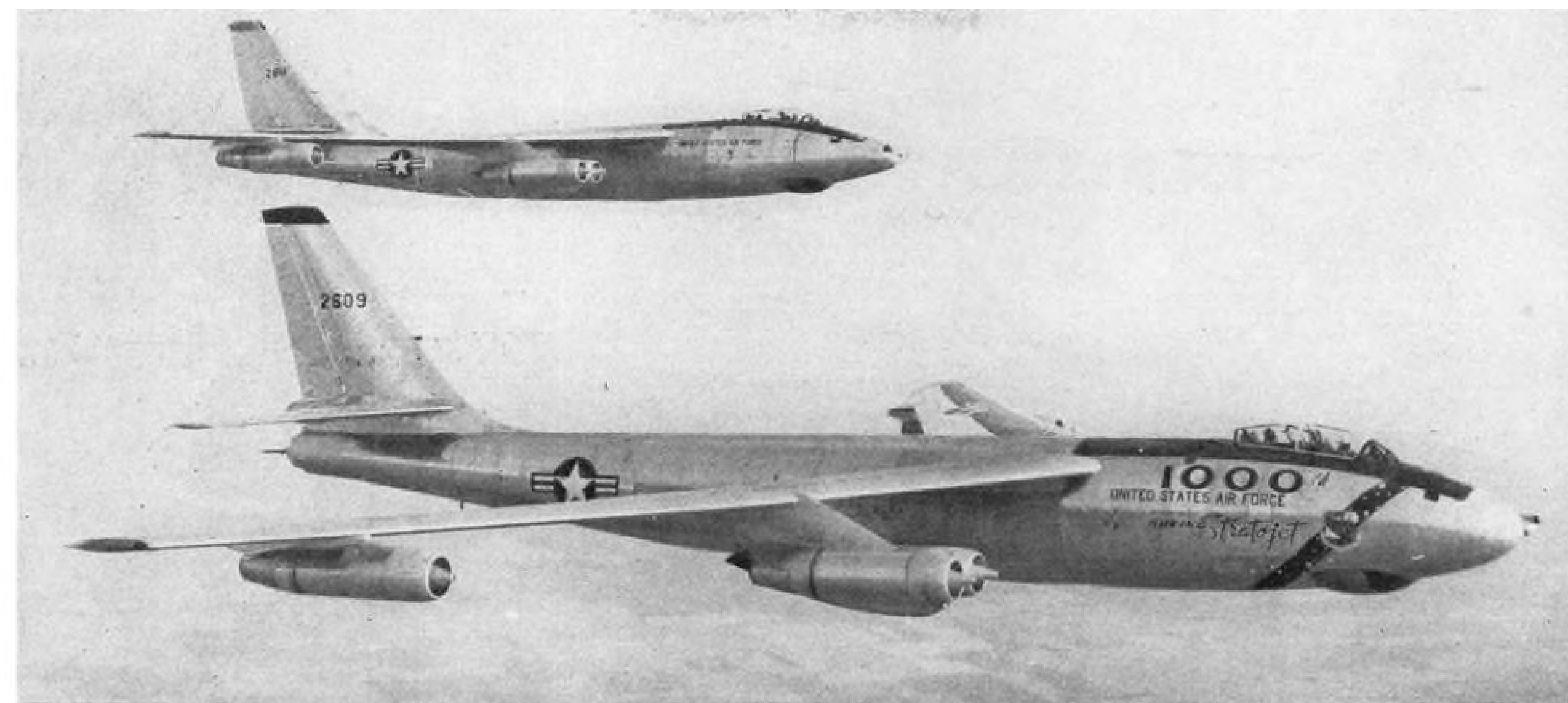
Aid for Flight Safety.....	86
John Stapp's Contribution.....	86

Departments

News Digest	7
Picture Page	9
Who's Where	11
Industry Observer	11
Washington Roundup	12
Production Briefing	47
BuAer Contracts	47
USAF Contracts	47
Off the Line.....	53
New Aviation Products.....	54
Also on the Market.....	55
Filter Center	68
CAB Orders	76
Shortlines	76
News Sidelights	84
Aviation Calendar	84

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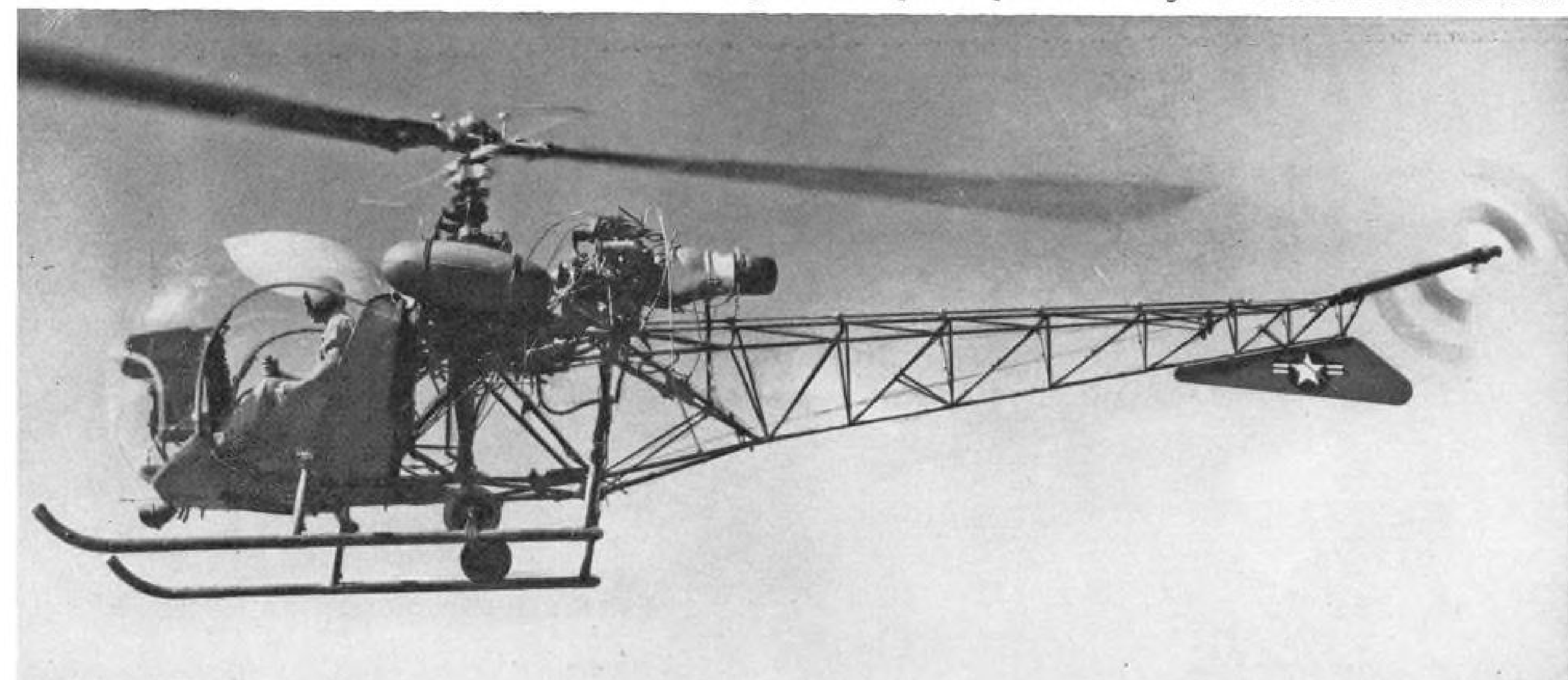
STRATOJET NO. 1,000 built by Boeing-Wichita was delivered to Strategic Air Command Dec. 17, climaxing three years of B-47 production at the Kansas facility. "One Grand" (foreground), a B-47E, is accompanied by a recon RB-47E, Wichita's 1001st Stratojet.

New Military Aircraft Join U.S. Team



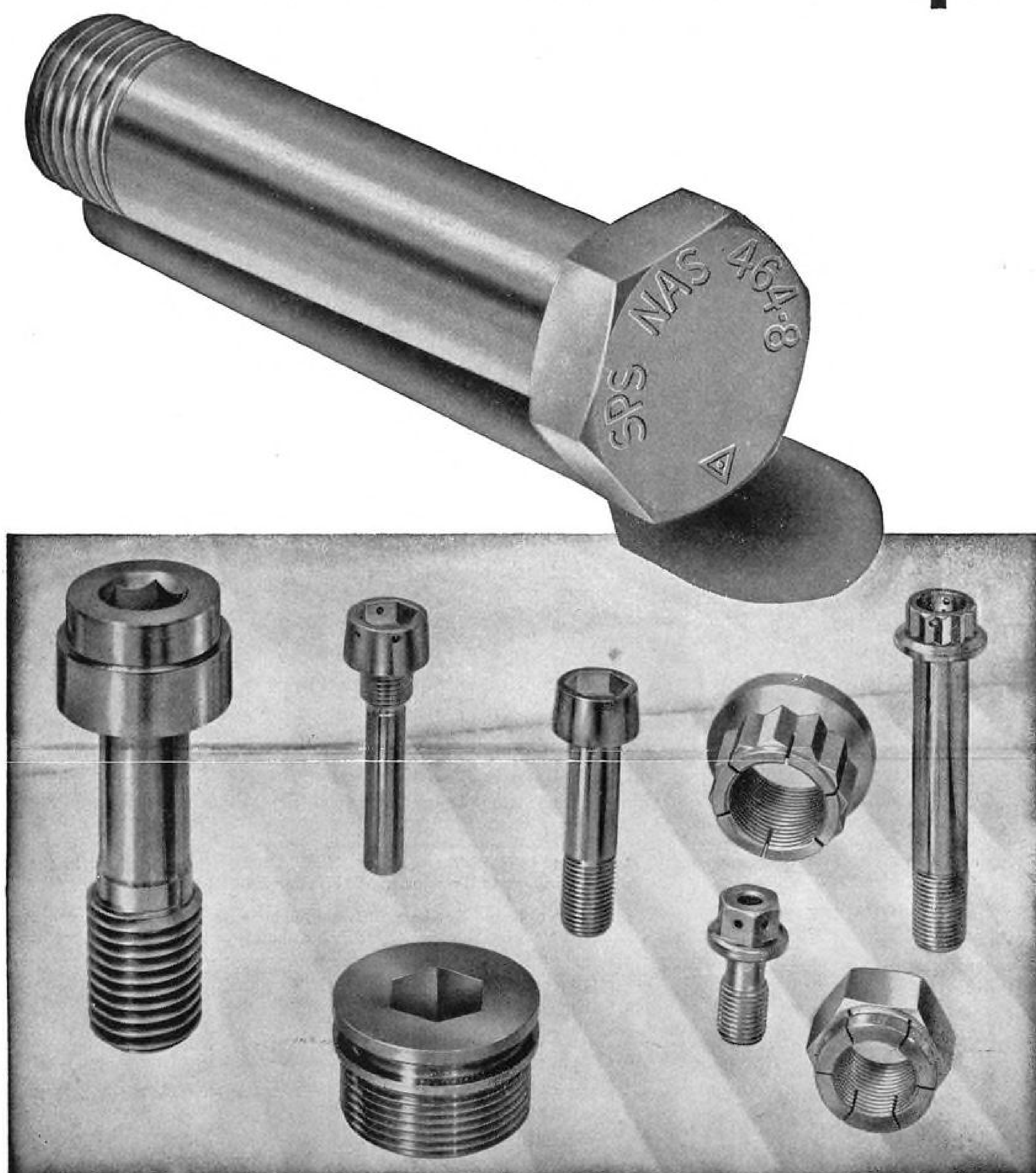
NAVY'S FIRST T-34B primary trainer was delivered by Beech Aircraft Corp., Wichita, Kan., only six months after the contract was signed. Painted bright yellow, planes will go to Pensacola NAS, Fla., for cadet indoctrination.

TURBINE-POWERED BELL XH-13F developed for Air Research and Development Command has started flight test program. Powerplant is a modified Artouste, ARDC reports. Lack of turbine engine vibration permits optimum mounting of transmission and rotor assemblies.



AVIATION WEEK, January 3, 1955

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WHO'S WHERE

In the Front Office

Lord Hives and A. G. Elliott have resigned as joint managing directors of Rolls-Royce, Ltd., will remain with the British company as executive chairman and executive vice chairman. Changes in the Aero Engine Division: J. D. Pearson, managing director; A. A. Lombard, chief engineer. New board members are as follows: A. A. Rubbra, technical director; A. F. Kelley, general manager-manufacturing, Aero Engine Division. D. R. McDonald has become secretary, succeeding G. D. L. Carnegie, who resigned.

Willis Player, public relations director of Air Transport Assn., has been elected a vice president.

Ben F. Warner is new vice president and general manager of Coast Pro-Seal Manufacturing Co., Los Angeles.

Warner Edmonds, Jr., Santa Barbara, Calif., attorney, has been elected to the board of Southwest Airways.

Omer E. Robbins, founder and retired president of Robbins Engineering Co., subsidiary of Ex-Cell-O Corp., has become a director of the Detroit parent firm.

Changes

R. E. Bishop has moved up to design director of de Havilland Aircraft Co., Hatfield, England, in a reshuffling intended to give him more time to study new aircraft in early design stages. Other changes at Hatfield: C. T. Wilkins, chief designer; J. P. Smith, deputy chief designer; A. G. Peters and E. R. Owen, assistant chief designers; at Christchurch: W. A. Tamplin, chief designer; F. Hamilton, assistant chief designer.

Herb C. Bostwick is manager of Sperry Gyroscope Co.'s new Aeronautical Equipment Division, Great Neck, N. Y.

D. N. Taylor has been appointed controller of Rheem Manufacturing Co.'s Government Products Division, Downey, Calif.

Harold Bauman has become chief engineer of Transco Products, Inc., Los Angeles.

Honors and Elections

Stanley Hiller, Jr., president of Hiller Helicopters, has been elected 1955 chairman of Aircraft Industries Assn.'s Helicopter Council.

R. C. Oertel, aviation department manager of Esso Standard Oil Co., is 1955 chairman of the Aviation Technical Service Committee of the American Petroleum Institute's Division of Marketing.

Emil M. Farris, sales executive of American Viscose Corp.'s Sylvania Division, has won Civil Aeronautics Administration's Honor Award for his "outstanding contribution to aviation."

Richard C. Palmer, assistant to the president of Fairchild Engine and Airplane Corp., Hagerstown, Md., has been appointed to a two-year term on the James Forrestal Memorial Medal Award Committee of the National Security Industrial Assn.

INDUSTRY OBSERVER

► Rolls-Royce R.B. 109 turboprop is 9 ft. in length, has a basic diameter of 32 in. The bare engine weighs 1,850 lb. and with propeller weighs 2,766 lb. It is expected to run as a complete engine on the test stand in February.

► Bristol Aeroplane's latest Olympus turbojet, the B.O.L.6 is expected to develop 15,000 lb. thrust. Earlier model now in production for the Avro Vulcan bomber develops 11,000 lb. thrust.

► Latest model of the Fletcher utility plane was flown recently by project engineer John Thorp. New model has a sliding canopy, new rudder and fin and other improvements. Seats aft of the hopper in the agricultural plane now face aft rather than toward the center, giving passenger more leg room.

► SNECMA's axial-flow Vulcain turbojet engine has reached 13,200 lb. static thrust on the test stand. The big new French gas turbine held that thrust 5 min. to qualify for the increased power rating. It originally qualified at 9,000 lb. in 1953, completed 15-hr. test run at 12,100 lb. last summer (Aviation Week July 19, p. 10). Quantity production is scheduled this year.

► Bristol Aeroplane Co.'s lightweight, medium-thrust Orpheus turbojet has started its running trials, less than a year after start of detailed design. Orpheus, specifically designed for operational light fighters and trainers, is scheduled to power the Folland Gnat. First Orpheus model will develop about 3,750 lb. thrust. Ultimate thrust for the engine powering the Gnat will be 4,800 lb.

► First Doman-Fleet Helicopters Ltd. LZ-5 is scheduled to make its initial flight early in March. The eight-place LZ-5 is Canada's first production helicopter.

► Fibrous glass reinforcement in combination with modified silicone resin is scheduled for use in new high-speed bomber radomes to withstand temperatures of about 400F induced by aerodynamic heating.

► Look for British design emphasis to shift to pod-mounted engines. Study of Boeing Airplane Co.'s reasons and methods has led British thinking to the conclusion that it is a better way after all. It is reported that the next Avro Vulcan will have podded engines.

► French S.E.210 Caravelle twin-jet transport now is undergoing pressure tests on portions of its fuselage. Cabin windows have been tested successfully at 16 times the normal cabin pressure. Window glass was then scored deeply and remained intact under pressure 10 times normal, according to official French sources. In other trials the window glass was subjected to temperatures of 68F on one side and 140F on the other side.

► New titanium alloy known as "three percent manganese complex" has been developed under USAF auspices. This alloy has an optimum strength of 200,000 lb. psi. after heat treatment.

► USAF is working on development of a completely automatic aerial refueling system for all-weather operations.

► Combat speeds of military aircraft will increase to Mach 5 and planes will operate at altitudes of 100,000 ft. during the next 10 to 20 years, according to Col. W. A. Hotman, chief of the Tactical Weapons System Division of Air Research and Development Command.

► Army is converting field artillery batteries from conventional cannon to Honest John unguided rockets built by Douglas Aircraft Co. Minimum transition troubles are expected, because of simplicity of systems. Fire control, for example, is practically the same.

► Navy is concerned over lagging production schedules at the Douglas El Segundo. F4D Skyray, for example, made its first flight in January 1951, still has not reached the fleet in operational numbers.

Willis Exit?

Charles Willis, assistant to Sherman Adams, top presidential aide, is expected to resign his post in the near future to head an electronics firm. Willis has shown a keen interest in aviation affairs during his two years in the White House assignment. He operated a non-scheduled cargo airline after World War II.

He has been involved in the Administration's patronage program which has drawn strong criticism and threats of investigation from Democratic Senators.

New CAB Standards

Civil Aeronautics Board set some important standards in deciding the trans-Atlantic final mail rate case. Policies used in fixing the rates set new precedents in some cases, clarify unclear issues in others.

The Board refused to allow strike losses to be counted as a business expense in figuring rates. "It is, we think," said the Board, "a basic tenet of fair government policy that there be no partisan intervention in a labor controversy and that, except where otherwise required by the public welfare, the resolution of differences between management and labor be left to the parties."

"Obviously, were we to insulate the carriers from the financial loss of a strike, we would deprive labor of its most significant economic weapon and weigh the scales heavily on management's side. Nor do we fear that our refusal to pay strike losses will necessarily tip the scales in labor's favor or lead to unwarranted subsidy increases."

Earnings classified as "non-divisional" and non-operating are tabbed "other revenue" and used to reduce subsidy needs. Such items as income from investments in other companies and government securities are included in this category.

The rate of return on investment for future periods will now be 9% instead of the 10% applied in the past. The Board notes that the "uncertainties and inherent risks" of international operations are considerably reduced today from what they were at the outset.

The Board established a uniform rate for Trans World Airlines and Pan American World Airways based on TWA's rate in areas where they have been underwriting PanAm's operation of the Boeing 377 after four and a half years and \$16 million of support.

Murray Successor?

Former Republican member of Civil Aeronautics Board Harold Jones, wealthy California attorney, figures as a leading prospect to become Undersecretary of Commerce for Transportation. Louis Rothschild, present Maritime Administrator, has been widely publicized as an Administration choice for the post. Robert B. Murray, Jr., present undersecretary, leaves the post Jan. 20.

The post has been controversial since it was established in 1950 to coordinate government policies toward various forms of transportation. The jurisdictional line between the undersecretary and Civil Aeronautics Board is hazy. The first appointee to the post, Delos Rentzel, averted conflict with Congress by a "hands-off policy." Undersecretary Murray, on the other hand, stirred criticism by proposing air transport policies which congressmen maintained should be decided by Civil Aeronautics Board.

Threat from India

Prospect is that Pan American Airways and Trans World Airlines will be permitted to continue their schedules into India, but under traffic limitations. India repeatedly has threatened to halt U. S. air operations in that country. The bilateral agreement under which PAA and TWA have unrestricted operating rights in India expires Jan. 14.

The Indian government has declared that it will not renew the agreement. Informed observers, however, believe that in the showdown the Indian government will go no further than to insist on traffic restrictions for PAA and TWA, aimed at constricting international air transport competition with Air India International, which now operates to London. Most other international carriers operating into India now are under such restrictions.

Flight Time Squabble

American Airlines and Air Line Pilots Assn., still embroiled in a lawsuit resulting from a recent strike, joined forces against a proposal to extend the 8-hr. domestic flight time limit to 10 hr. for irregular carriers. Extension was requested from Civil Aeronautics Board by North American Airlines so that it could operate nonstop transcontinental service with a recently acquired DC-6B (AVIATION WEEK Dec. 20, p. 79).

American told CAB it would be compounding evils to allow North American to perform a daily service which is in direct opposition to the limits of authority laid out in the exemption under which it operates. AA describes it as "... the latest step in a series of law violations committed by 'North American' in open and unmitigated defiance of the Civil Aeronautics Act and the orders and regulations of the Board."

In attacking the rule for large irregulars, ALPA takes a swipe at the whole idea of extending the 8-hr. rule. The union describes it as a chain reaction stemming from earlier extensions granted American, United, TWA.

It holds that it all started with preferential treatment accorded American, and "similarly, North American, following in American's footsteps, does not come before the Board with clean hands. It is our understanding that flights have now been scheduled for 7 hr. and 55 min., which is a completely unrealistic schedule but avoids the requirements of the flight time regulations pending the Board's action on their request for a waiver."

Wilson and the Hill

Defense Secretary Charles E. Wilson, who says he is having some unexpected problems due to the shift in control of Congress to the Democrats (AVIATION WEEK Dec. 20, p. 9), sometimes gets so busy that he neglects Capitol Hill. Senators Henry M. Jackson (Dem., Wash.), and Estes Kefauver (Dem., Tenn.) had hailed Wilson's recent directive on spreading the mobilization base as a reversal of his policy which, they charged, concentrated contracts in the plants of a few large corporations.

The Secretary denied his policy has been reversed. Queried a reporter: "Have you informed Senators Jackson and Kefauver of the change?"

"If I paid attention to everything like that," Wilson replied, "I wouldn't have any time left at all to run the business and I didn't start it and I feel no responsibility for stopping it."

—Washington staff

Second Report From Formosa:

Red Airpower Threatens Offshore Islands

- Most of Chiang holdings could fall to invaders.
- Lack of planes precludes mainland invasion plans.

By Dan Kurzman
(McGraw-Hill World News)

Taipei—Air inferiority of Nationalist China not only renders most of the offshore islands vulnerable to Communist invasion but also precludes the possibility of an attack on the mainland by Chiang Kai-shek's forces.

While the Nationalists maintain they could establish a beachhead on the mainland and hold it with little difficulty, fighter cover would be essential and the numerical superiority of the Red air force (AVIATION WEEK Dec. 13, p. 14) would have to be neutralized.

However, of greatest concern right now is the threat to Nationalist-held islands. An invading army of 40,000 to 50,000 men could take almost any of the offshore islands, including the 30 relatively large ones, if the Nationalists had to fight alone.

And, indeed, if there is disagreement within the Nationalist high command on military policy, all agree that Chiang's troops, without American air aid, could not hold out on the main islands if the Reds attacked in force.

► U. S. Aid—The Tachens are particularly vulnerable. A steady buildup of Red air strength along the Chekiang coast opposite them, in addition to artillery bombardments from nearby Communist-held islands, eventually will enable the enemy to isolate this area.

Members of the high command here suggest that planes of the U.S. 7th Fleet—with up to four carriers at a time in the region, each capable of carrying about 80 aircraft—might be used to join Nationalist planes on patrols.

Actually, American planes do patrol occasionally within 12 miles of the mainland and Red-held islands, risking encounters with Communist aircraft. They cover a much wider segment of coastline than 7th Fleet destroyers and operate much closer to Red air and naval bases in the Shanghai region.



OFFSHORE ISLANDS held by Chinese Nationalists are easy prey for Communist planes.

► "Too Few to Risk"—"The Communists are not too anxious to control the land," a high command officer says. "What they want is to bag a large number of troops. We have too few to afford the risk. We should conserve all our military strength for the one all-out invasion of the mainland. We must think in military rather than political terms, or we might lose everything."

So completely does the Red air force dominate the air that a large percentage of Nationalist planes are chased back to Formosa long before reaching their offshore island destination. To avoid radar detection, Formosan planes must fly at very low altitude as long as possible.

The Communists have so many more planes than the Nationalists that they

do not have to worry about altitude. Their MiGs fly high, their Tu-2s fly at medium altitude and their prop-driven planes at low altitudes.

Nationalist aircraft are sent on about 150 missions a week, exceeding Communist activity, but most are simply for patrol purposes. Only occasionally—and almost always at night—do these planes sneak through the Communist air defense curtain on bombing missions.

► Cross Fire—Usually, the main target of the Formosan-based aircraft are the Red-held islands north of the Tachens. Planes based on Big Quemoy, which has an excellent airfield, generally gun for Red artillery positions on neighboring Amoy to the west.

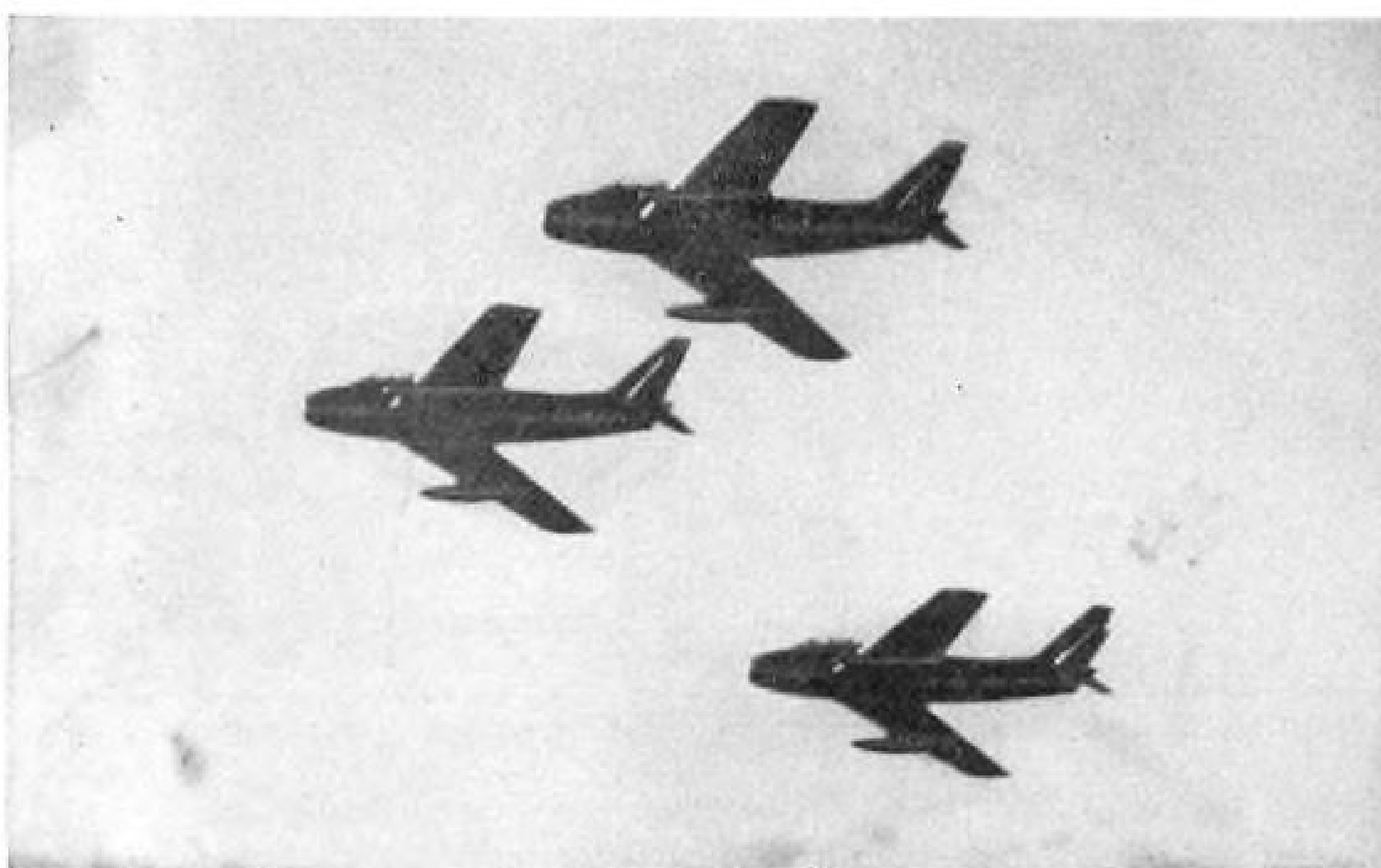
Heavy firing from Communist-held



AGAINST some 600 Chinese Communist MiG-15 jets (left), 150 II-28 jet bombers (right), and hundreds of piston-engine planes . . .



CHINESE NATIONALISTS can muster fewer than 500 fighters of all types, mostly obsolete piston F-47s (left), a few jet F-84Gs.



HANDFUL OF SABRES have arrived on Formosa, vanguard of about 75 sweptwing planes.

Amoy, combined with that from Wei-Tou to the east and Lienho to the north, can all but blanket Big and Little Quemoy, the southernmost islands.

Nationalist air attacks are made on Red bases on the mainland, but they have been the least effective of all because of their hit-and-run nature.

► **Six to One**—About six Nationalist planes have been shot down since the island war started in earnest last September. Three F-47s are believed to have been felled by anti-aircraft fire over Quemoy and three by MiG fighters in the Tachens area.

Approximately 10 aircraft, mostly F-47s and P-4Ys have suffered damage. Altogether, more than 10 crew members have been killed.

The Reds have lost only one plane—a MiG shot down by an F-47 north of the Tachens. One other MiG is reported to have been damaged.

► **Outmoded Network**—The Tachen Defense Command, which includes scores of tiny islands in addition to the Tachens proper, could probably use more anti-aircraft guns and modern radar equipment. This is particularly true of the Yushans, only 60 miles southeast

of the Red naval base at Tinghai on Chushan Island.

The Nationalists' radar network still is made up largely of outmoded World War II Japanese sets. The U.S. has promised to send about six modern sets, but only a few parts have arrived so far.

The proposed network would give Formosa about 20 minutes warning of an enemy air attack.

► **Invasion Planning**—Should the Nationalists attempt an invasion of the mainland, large numbers of bombers—particularly heavy bombers—would play a minor role, military experts here say. The Formosans would avoid strategic bombing for fear of turning the people, on whom they would have to depend for support, against them.

Although Chiang's forces would need American naval and air aid, they maintain they would not want U.S. troops. For this, they say, would give the Reds the chance to sell the idea to the Chinese people that China was being invaded by American armies.

The Nationalists argue that their relatively small forces would be sufficient to hold a beachhead for three or four months—long enough, they figure, for a large-scale defection of Red troops.

They also say the Communists would be unable to concentrate more than 800,000 to 1 million of their 3 million troops in any one area because of the long coastline they must defend.

► **Long, Slow Buildup**—Although the Nationalist air force is not prepared

now to attack the Communist mainland, it has come a long way since May 1951, when the United States started to supply Formosa with military aid under the supervision of the Military Assistance Advisory Group (MAAG).

At that time, Chiang Kai-shek's air force consisted of only about 160 combat planes. It had no jet fighters and few piston powered fighters or patrol and reconnaissance aircraft.

MAAG, whose 840 American officers and men are under the command of Gen. William C. Chase, former commander of the First Cavalry Division that was the first to enter Tokyo during the war, has done an excellent job assisting and advising the Nationalist Chinese military leaders and seeing to it that material received from the U.S. is used wisely.

► **2,000 Combat Pilots**—One of MAAG's most important functions has been to train pilots to fly the modern jet aircraft Formosa is getting. A large percentage of Nationalist China's estimated 2,000 combat pilots, who average from 80 to 100 patrol or combat missions each, have been trained under this program.

Hughes, Radioplane Grant Pay Increases

Los Angeles—Wage increases at Hughes Aircraft Co. and Radioplane Co., a subsidiary of Northrop Aircraft, Inc., were announced last week following agreement on new labor contracts at other West Coast aircraft plants (AVIATION WEEK Dec. 27, p. 14).

► **'Prevailing Rates'**—Hughes and United Aircraft Workers (AFL) jointly announced an agreement calling for a pay increase of 6 to 9 cents an hour for approximately 6,000 employees in the Culver City, Calif., and Los Angeles plants.

"The agreement was in accordance with the company's practice of meeting the prevailing aircraft industry rates in this area," said W. G. Tuttle, industrial relations director.

Whitley C. Collins, president of Northrop and Radioplane, said the agreement with R.P.A., Inc., an independent union, grants increases amounting to 6 cents an hour for 1,200 workers at the pilotless aircraft builder's Van Nuys, Calif., factory.

► **7-Cent Raise**—New labor contract at Convair, calling for wage increases averaging 7 cents an hour, was ratified by members of the International Association of Machinists (AFL). Also included is a provision for an increase in group insurance benefits.

The Convair-IAM agreement covers 15,000 hourly paid employees at the San Diego plant. Labor contracts at Ryan Aeronautical Co. and Solar Aircraft Co. in San Diego still are to be negotiated.

Stapp Plans Supersonic Sled Test

Los Angeles—Lt. Col. John P. Stapp hopes to reach a supersonic speed that would blast him with a wind of 24 psi. before he ends his aircrew bailout tests on rocket-propelled sleds.

The aero-medical research scientist, "fastest man on earth," revealed this goal after he disclosed last week that he set a record of 632 mph. last month on a sled at Holloman Air Development Center—fast enough to pass a Lockheed T-33 jet trainer flying overhead.

Stapp's latest speed run on the sled, built by Northrop Aircraft, Inc., broke his own world's land speed record by more than 200 mph. He reached 421 mph. last summer, topping the 403-mph. record for land travel set by John Cobb in a racing car in 1947.

► **1.4-Sec. Halt**—The 2,000-lb. sled, propelled by the 40,000-lb. thrust of nine rockets, reached its 632-mph. speed in five seconds after traveling 2,800 ft. After coasting for half a second, the sled was slammed to a halt in 1.4 sec. by a water brake.

Col. Stapp withstood deceleration forces of up to minus 35Gs during the run on the 3,500-ft. track. Wind pressure forces were up to more than two tons or 7.7 psi.

The tests were designed to reproduce conditions experienced by air crews in supersonic bailouts.

► **Highspeed Blast**—Windshield used on previous runs was removed from the sled for this test and Stapp wore a full enclosure helmet locked to the headrest to hold his head steady in the windblast, equivalent to that encountered by a man ejected from an aircraft flying at more than 1,000 mph. at 35,000 ft.

Col. Stapp was strapped to his seat with a special nylon web harness.

The Air Force scientist suffered two black eyes when his eyeballs pressed forward against his eyelids during the rapid deceleration. He also received small blood blisters from dust particles in the air.

► **Visual Goal**—Stapp reports that after three seconds he experienced a rapid visual—not cerebral—blackout due to the swift acceleration. This lasted for two seconds.

"There was a rapid return when decelerating," he says. "It went from black to yellow, I saw the water splash when I hit the brake, and then came the redout. After that I didn't see a cockeyed thing."

Pain in the eyes was so extreme, he reports, that for the first time he felt no other physical sensations while braking. He says the pain lasted for 8½ min. after the run.

► **Longer Tracks**—Stapp says the 632-mph. speed is the maximum that can be reached on the 3,500-ft. Holloman



COL. STAPP: "And then came the redout."

track. The latest speed run started 8 in. from the head of the track and braked to a halt only 32 ft. from the end.

"We could make it faster with a longer track," he says.

The USAF scientists probably will try for supersonic speeds on longer tracks available at Edwards Air Force Base and Inyokern Naval Air Station.

Airline Traffic, Safety Make '54 Record Year

New safety and traffic records were set by commercial airlines in 1954, Civil Aeronautics Administration reports.

By the end of the year, CAA estimates the U. S. domestic and international scheduled airline carried 34,673,000 revenue passengers, a 10% increase over 1953, and flew 20,212 million revenue passenger-miles and 262,082,000 cargo ton-miles.

► **Low Fatality Rate**—The safety record for scheduled operations marked a new low passenger fatality rate of 0.08 per 100 million passenger miles, down from 0.47 for 1953 and a considerable drop from 2.6 in 1944.

Irregular airlines operated for 15 months 22 days without a fatality. The nonscheduled safety stretch was broken Dec. 22 when a Johnson Flying Service DC-3 crashed near Pittsburgh on an Army-charter flight, killing 10 of the 23 persons aboard.

► **New Increases**—Other civil aviation activities in 1954 include:

- **Business flying** increased from 3,626,000 hr. to an estimated 3.9 million hr., 700,000 more than the revenue hours flown by all scheduled airlines.

- **CAA control tower traffic** went up by nearly a million landings, from 16,815,-

Aircraft Industry Backlog: \$14.8 Billion

Backlog of unfilled orders for complete aircraft, engines and propellers totaled \$14.8 billion at the end of this year's third quarter, the Department of Commerce reports. This was a drop of 2% from the previous quarter.

Orders for U. S. military customers represented 94% of the aircraft backlog, 97% of the engine orders and 86% of the propeller backlog.

Total net new orders during the third quarter amounted to \$1.5 billion, representing 11% of the total backlog at the end of the quarter.

	Quarter ended				
	Sept. 30, 1953	Dec. 31, 1953	Mar. 31, 1954	June 30, 1954	Sept. 30, 1954
	(in millions)				
Total	\$18,257	\$16,752	\$16,100	\$15,247	\$14,859
Complete aircraft and parts	11,944	11,610	11,383	10,679	10,487
For U. S. military customers	11,210	10,846	10,664	10,012	9,823
Other	734	764	719	667	664
Aircraft engines and parts	5,173	4,080	3,597	3,361	3,254
For U. S. military customers	5,033	3,945	3,465	3,245	3,144
Other	140	135	132	116	110
Aircraft propellers and parts	261	218	193	206	202
For U. S. military customers	234	191	169	180	174
Other	27	27	24	26	28
Other products and services	879	844	927	1,001	916

133 for 1953 to an estimated 17.8 million. En route traffic, measured by position reports, increased from 15,026,893 to about 16.8 million.

• **New navigation aids** commissioned by CAA in 1954 included 11 additional airport surveillance radars, 205 distance measuring equipments, nine instrument landing systems and 16 very-high-frequency omniranges.

NACA Forms New Flight Safety Group

National Advisory Committee for Aeronautics last week formed a Subcommittee on Flight Safety to study hazards to crew, passengers and airplanes in aircraft operations.

Recommendations by the subcommittee will be made to NACA's Committee on Operating Problems as to what investigations should be conducted or other measures taken to eliminate or reduce the hazards.

Duties on the Subcommittee on Aircraft Fire Prevention and the Panel on Aircraft Survival will be taken over by the new subcommittee.

► **Review, Recommend**—In carrying out its assignment, the subcommittee periodically will:

- Review research in progress by NACA and other agencies.
- Recommend problems that should be investigated by NACA or other agencies.
- Assist in forming and coordinating programs for research.
- Serve as a medium for interchange of information regarding investigations and developments in progress or proposed.

First organizational meeting is scheduled for February. Location of the meeting has not been decided.

► **Committee Makeup**—The subcommittee is headed by Charles Froesch, vice president-engineering of Eastern Air Lines. Boyd C. Myers, NACA, is secretary.

Other members are: Dr. Albert W. Hetherington, Jr., USAF, Research and Development Command; Lt. Col. John P. Stapp, USAF, chief, Aeromedical Field Laboratory, Holloman Air Development Center, N. M.; Capt. Ritchie H. Belser, Jr., USAF, Directorate of Flight Safety Research, Norton AFB, Calif.; Cmdr. Samuel G. Parsons, USNR, Aviation Safety Division, Office of Deputy Chief of Naval Operations (Air); W. A. Klikoff, deputy chief, Aircraft Engineering Division, Civil Aeronautics Administration; John

M. Chamberlain, director, Bureau of Safety Regulation, Civil Aeronautics Board; Melvin N. Gough, Langley (Va.) Aeronautical Laboratory; I. Irving Pinkel, Lewis Flight Propulsion Laboratory (Cleveland, Ohio); Carl M. Christenson, United Air Lines; Allen W. Dallas, director, Engineering Division, Air Transport Assn.; Dr. Paul M. Fitts, Jr., Ohio State University; Scott Flower, Pan American World Airways; A. Howard Hasbrook, associate director, Aviation Crash Injury Research, Cornell-Guggenheim Aviation Safety Center; Harold E. Hoben, preliminary design group, engineering department, Lockheed Aircraft Corp.; Otto E. Kirchner, preliminary design unit, engineering department, Boeing Airplane Co.; Jerome Lederer, managing director, Flight Safety Foundation; Dr. Ross A. McFarland, Harvard School of Public Health; William I. Steiglitz, design safety engineer, Republic Aviation Corp.

CAB member Joseph P. Adams is an ex-officio member of the NACA subcommittee.

Budget Bureau Backs ACC's Air Policy Role

Bureau of the Budget, an arm of the White House, is supporting the Air Coordinating Committee's role as the overall administration agency to make "periodic reviews of civil air policy."

The bureau views ACC as "a valuable mechanism for the coordination of aviation policies, programs, procedures and standards."

In a survey of ACC, the Budget Bureau declares it "should be retained and supported by the participating federal departments and agencies."

► **Review 'Mechanism'**—ACC's first civil aviation policy report since its creation in 1946, made last spring under the chairmanship of Commerce Undersecretary for Transportation Robert Murray, aroused controversy.

Rep. Carl Hinshaw and other congressional aviation leaders said the committee should be confined to coordinating administrative activities and should not encroach on civil aviation policy matters.

On this argument, the Budget Bureau comments: "ACC provides a mechanism for periodic reviews of civil air policy, but the findings and recommendations derived from such surveys will reflect many compromises and will tend to emphasize policies which the participating federal agencies are prepared to propose and implement."

► **Positive Role**—The Budget Bureau supports participation in ACC by Civil Aeronautics Board and other quasi-judicial regulatory agencies, observing: "Regulatory commissions represented

on the ACC . . . cannot, of course, deprive parties at interest of the right of hearing and judgment on the facts as provided by law; but such commissions can, and should, play a positive role in the committee and engage in the freest possible exchange of information with other participating agencies."

The committee's unanimity rule, frequently a stumbling bloc to reaching decisions, should be continued, the survey says.

The bureau also stipulates that ACC "cannot compel member agencies to implement its decisions." On legislation to be proposed to Congress, "ACC should not attempt final coordination of the views of the executive branch . . . nor should it seek to coordinate agency reports on (aviation) legislation before Congress."

► **ACC Makeup**—Other points the bureau made in its survey:

- Federal Communications Commission should be designated a member, and a White House assistant should participate in ACC activities on a liaison basis.

- A management and steering group, composed of alternate representatives of each of the nine agencies participating in ACC, should be formed to promote ACC's effectiveness.

- Of ACC's four major subdivisions, the bureau comments: The Economic Division "has fallen short of its potential and should be reconstituted as an Economic and Resources Division."

The Subcommittee on Facilitation of Civil Aviation "needs to be strengthened both in terms of membership and agency support if it is to advance aviation facilitation as an important element in the foreign economic program of the U. S."

The Legal Division has "performed its functions well, but a chairman should be chosen as soon as practicable."

The Technical Division has been "one of the most successful and highly regarded of the components . . . but it could serve more effectively in the future if all the members were of the standing in their agencies warranted by the major technical problems coming before the division."

Meacham Buildup

Development of Meacham Field, Key West, Fla., through the use of federal and community funds was recommended by Air Coordinating Committee's airport use panel.

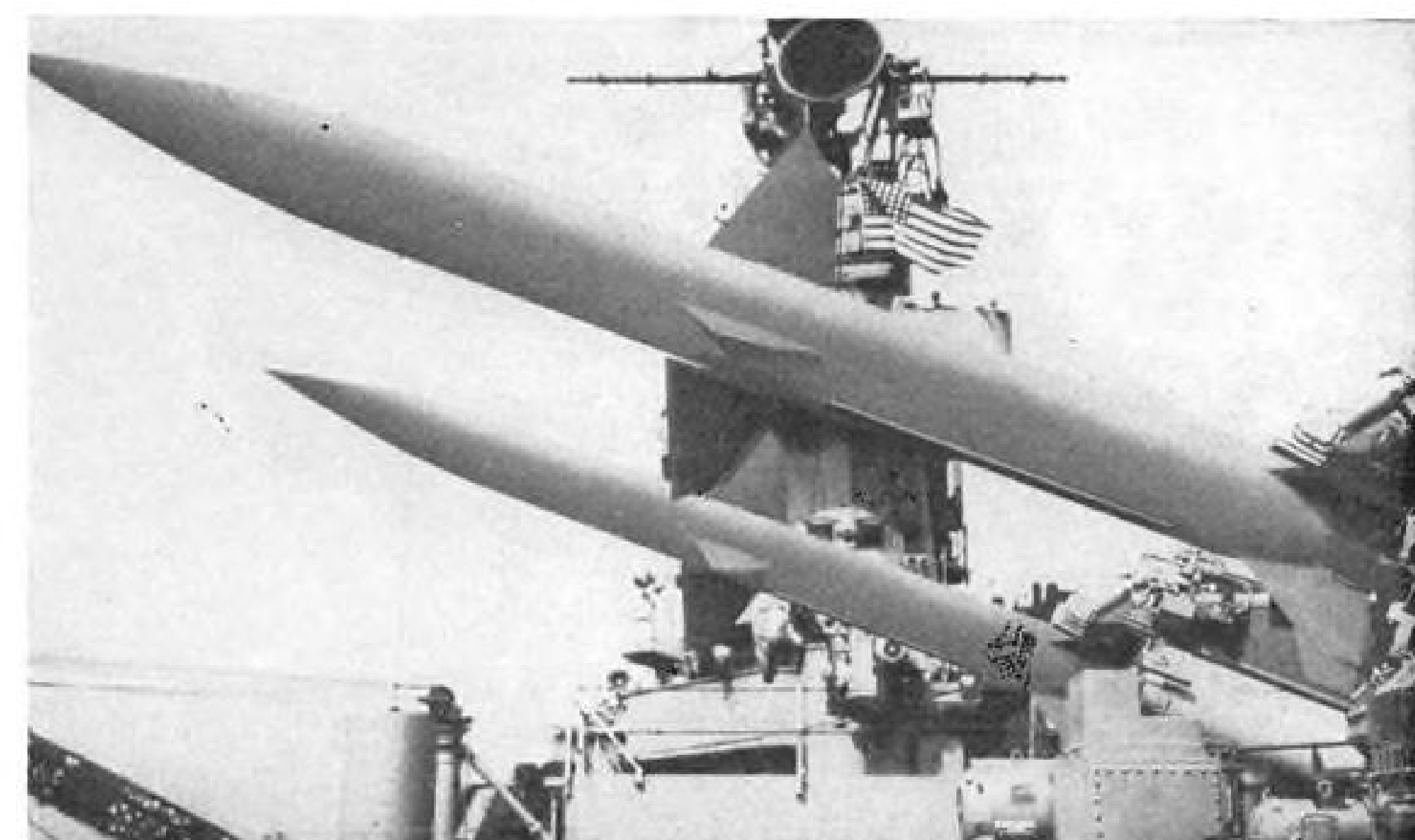
At the same time, joint civil-military use of Boca Chica, Naval Air Station at Key West, was turned down by the group.

The panel also recommended that a Meacham Field runway be realigned to reduce traffic pattern conflicts with Boca Chica.

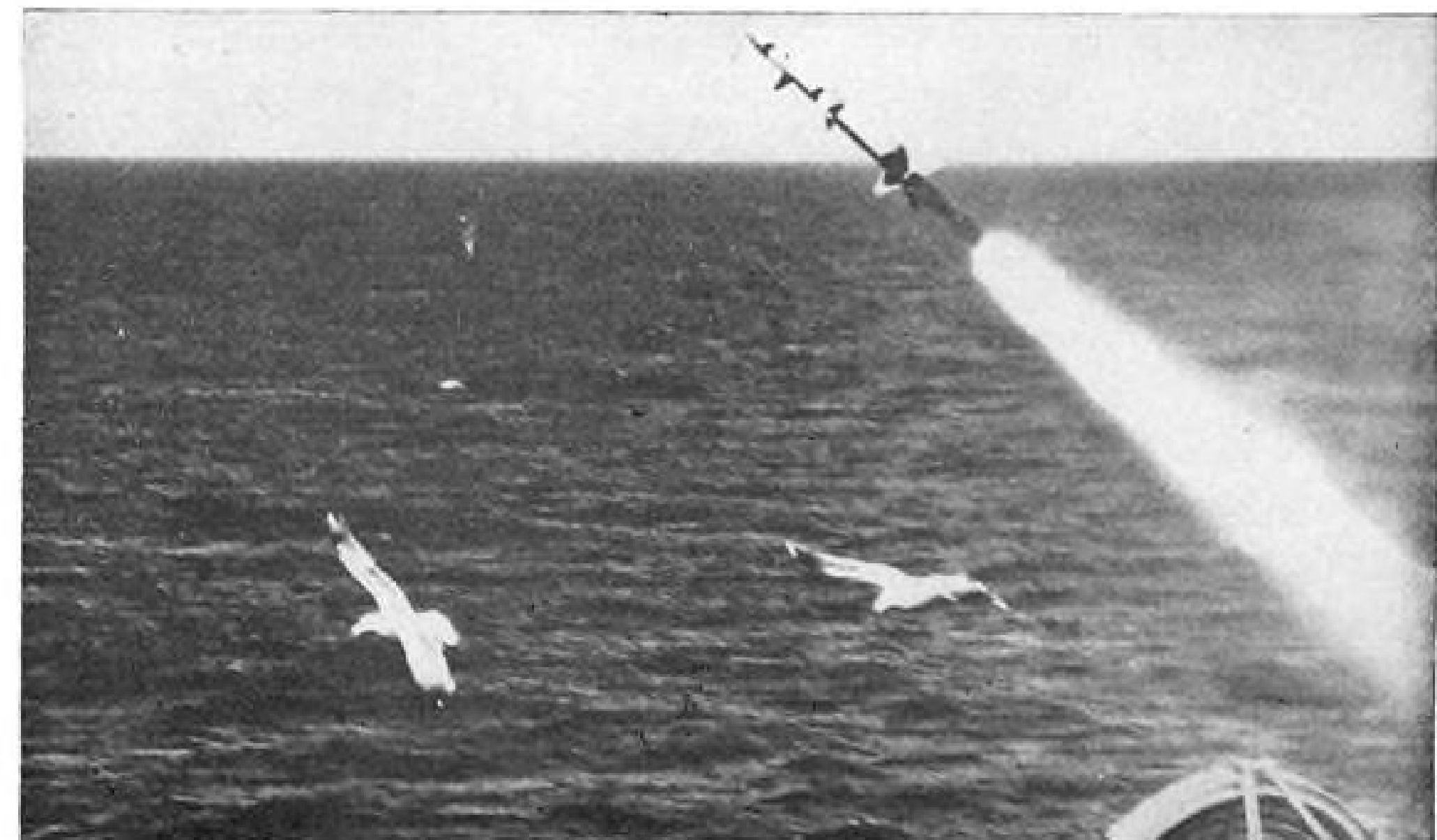


TWIN-MOUNT LAUNCHER is loaded with two Convair Terrier anti-aircraft missiles. In service, loading procedure probably would be automatic for speediest, safest handling.

First Closeups of Convair's Terrier



ABOARD USS MISSISSIPPI, missiles recently completed two years of intensive tests. Cruisers Canberra and Boston, with Terriers, will be fleet's first guided missile units.



BOOSTED SKYWARDS, Terrier heads for target. It reportedly has good reliability record and recorded high rate of kills. Aerojet sustainer rocket provides range of about 20 mi.

Air France Blames 'Politics' for Losses

(McGraw-Hill World News)

Paris—Reports here that Air France will show a \$10-million loss on its 1954 operations became so widespread at year's end that company president Max Hymans called a news conference to detail the airline's problems in an effort to combat criticism.

Hymans blames political considerations involved in operating a government-owned airline as the cause of Air France's financial and operating woes.

► **Prestige, Support**—He makes this familiar European complaint: Costly services, essentially political in nature, are demanded of the international air carrier because it is government owned; at the same time, it is treated as a private company for accounting purposes.

Chief among the political problems is unprofitable runs believed by the government to be necessary and desirable for non-commercial aims.

Hymans says government pressure to use French-built transports as a means of supporting the aircraft industry resulted in seven different types of equipment in the Air France fleet during 1954, forcing the airline's operating expenses higher than normal.

Hymans also cites these expenses:

• **Comet 1 groundings** last year resulted in loss of revenue and continuing costs. No settlement has been reached with de Havilland Aircraft Co. on possible compensation for the four jet transports owned by Air France.

• **Airport taxes** paid to the government have nearly trebled in five years.

► **Increasing Burden**—On borrowed funds, Hymans reports his airline pays an interest rate of 7%, substantially higher than is demanded of carriers in other countries. In 1955, he says, interest charges will total \$4.6 million.

He also charges that Air France is forced to depend on medium-term loans to a large extent, and amortization payments this year will run to \$10 million—nearly 10 times the amount in 1951.

► **Foreign Competition**—Hymans predicts a period of strong international competition, with the airline industry entering a period of "overcapacity" in which too many seats will be available.

He fears this will result in a return to "deluxe competition," with gifts to customers and possibly the growth of a system of rebates. The Air France chief says aircoach, one result of increasing competition, has cost his airline some of its revenues, particularly on routes within the French union.

Trans-Atlantic air traffic patterns also are shifting to the disadvantage of Air France, Hymans reports. Americans traveling to Europe in 1954 made their first stop in some other country more frequently than in France.

Finally, Hymans says postal revenues failed to increase during the past three years and predicts a decline in 1955. In his view, airmail payments are excessively low.

► **Overall Subsidy**—The airline president proposes that the French government should provide some type of overall subsidy for "prestige routes" it orders Air France to fly.

He also favors close links between Air France and the heavily subsidized Compagnie Generale Transatlantique (the French Line).

Local Service Route To Switch to Trunk

Civil Aeronautics Board has decided to change Braniff Airways' Route 106 from a local service to a trunkline run and parcel out various points to United and Ozark Air Lines.

The present route extends between the terminal points of Chicago and Sioux City, Iowa, via intermediate points of Rockford, Dubuque, Clinton, Waterloo, Mason City and Ft. Dodge. ► **New Makeup**—Here is how the route will look:

• Braniff will continue to operate Route 106, but as a trunkline route between Chicago and Sioux City via Mason City and Waterloo. The airline cannot schedule one-plane service between Chicago and Minneapolis/St. Paul via any intermediate point on Route 106. The renewal is good until Sept. 30, 1958.

• United's Route 1 is amended to include Ft. Dodge, Dubuque and Rockford as intermediate points on Segments 1, 5 and 6 until Sept. 30, 1958.

• Ozark's certificate for Route 107 is amended to add a new segment authorizing service between Davenport/Moline and Chicago via Clinton and Rockford.

► **Service, Economy**—Braniff got Route 106 when it took over Mid-Continent Airlines and its system in 1952. The route has been adjusted a number of times but has maintained its local service characteristics up to now.

CAB now believes the new systems will improve service greatly to the affected points and save the government money at the same time. Estimated breakeven need under the new setup will be \$229,166, compared with the current cost of \$395,020.

The main traffic difficulty with the route is that the flow generally is toward Chicago, with relatively little to Sioux City. High traffic density between Rockford and Chicago creates a bottleneck and contributes to low load factors on the western part of the route. The shorthaul Chicago, Rockford traffic is low-revenue and blocks much potential longhaul traffic from obtaining space.

► **Lost 'Opportunity'**—CAB member Oswald Ryan dissented from the majority decision. He favored a plan that would retain the local service characteristics of Route 106, giving the bulk of it to Ozark and parts to United and Braniff.

"The Board here has the opportunity of providing Ozark, a carrier whose prospects for future expansion are limited, with additional productive route mileage which can be of substantial assistance to the carrier in its progress toward self-sufficiency," he said. "That opportunity should not be lost. . . ."



Cessna Holds Price Line On New 180

Cessna Aircraft Co.'s 1955 version of the four-place, all-metal Model 180 business-plane continues to sell for \$12,950 f.o.b., Wichita, Kan. Improvements in engine and airframe make the new 180 quieter than previous models, Cessna reports. Its Continental O470-J is operated with one-inch manifold pressure and 100 less rpm. to provide more than 150-mph. cruise

speed. This feature, plus relocation of the cabin air intakes outside the propeller arc and a one-quarter-inch windshield, aid in keeping down interior noise levels. Tire-to-ground contact is three-inches farther forward for improved landing and taxiing characteristics. An all-metal constant-speed prop is provided at no extra cost. The 180 is approved for skis and floats.

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Engineering to the Nth power

NAVY'S XFY-1 TAKES OFF AND LANDS ON A DIME

Here's a new kind of aircraft for America's aviation arsenal...the Convair XFY-1, a vertical takeoff, delta wing Navy fighter. Powered by a turbojet engine, it is one of the world's fastest propeller driven planes.

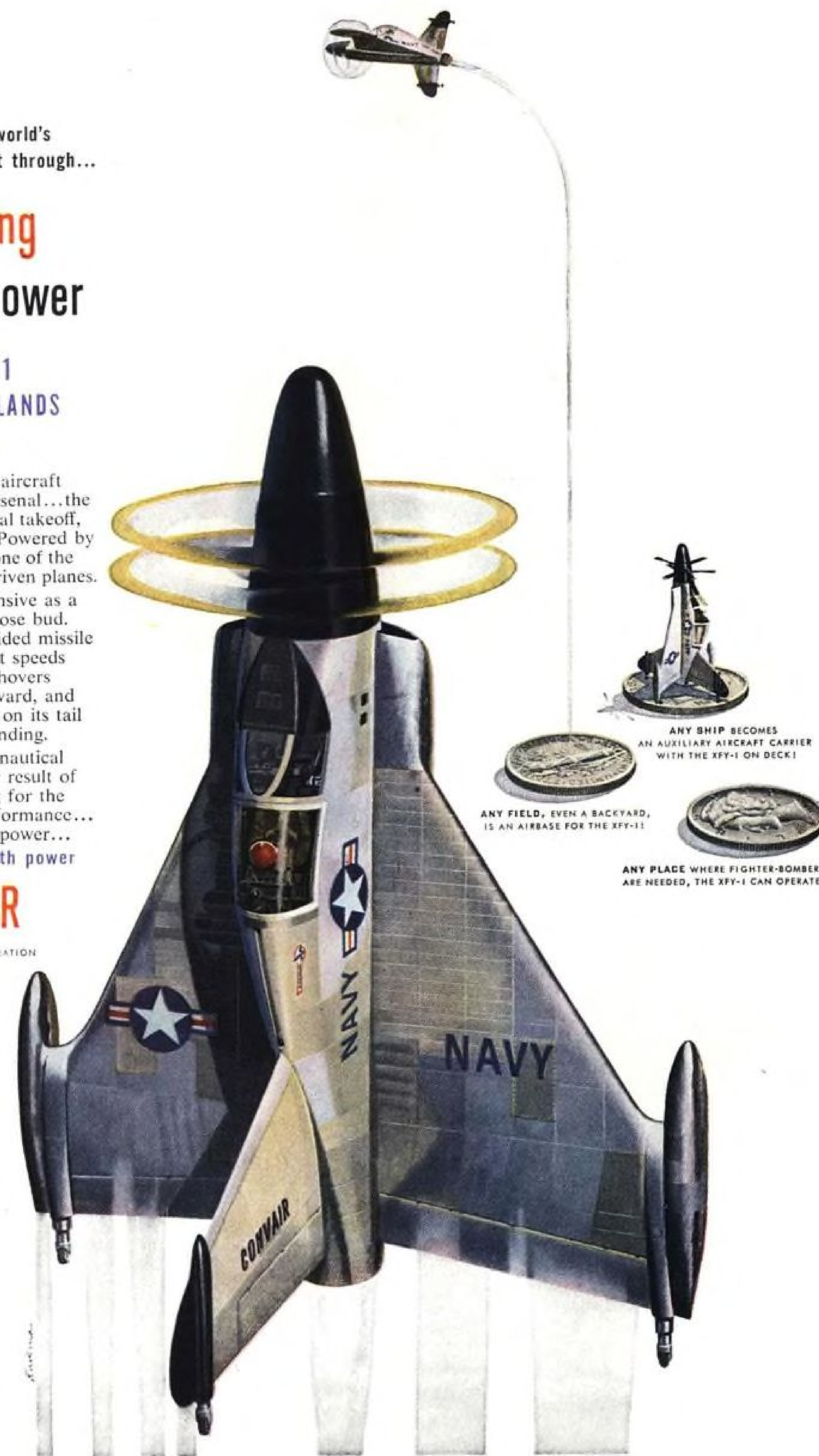
The XFY-1 is as responsive as a hummingbird over a rose bud. It rises nose-up like a guided missile...flies like a fighter at speeds beyond 500 mph...hovers motionless...darts forward, and sideways...backs down on its tail to a feather-light landing.

This remarkable aeronautical achievement is another result of Convair's engineering for the maximum degree of performance...the Nth degree of air power...

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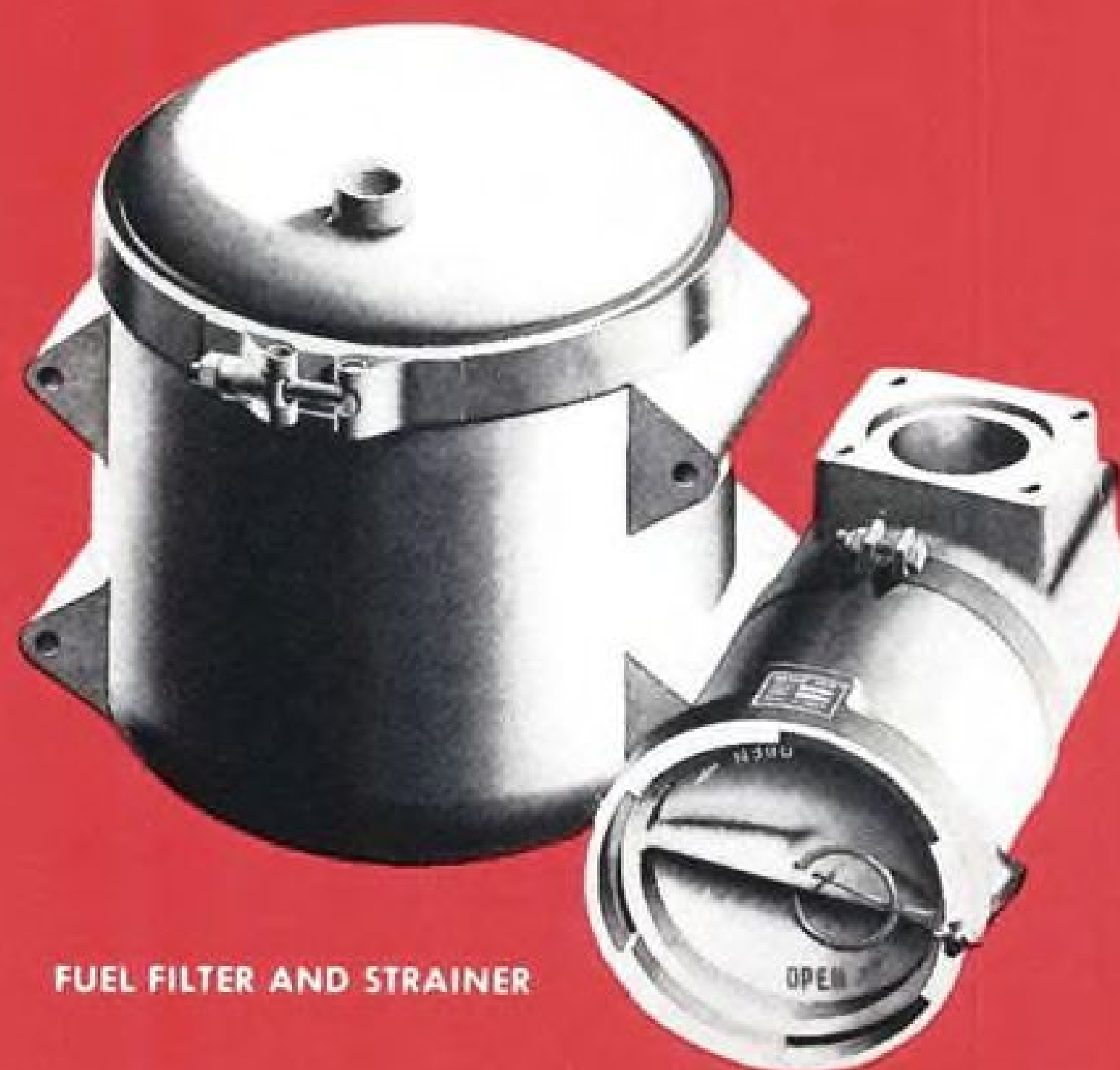


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Basic Airpower Debate Shapes Up

Navy Secretary Thomas makes it clear he will defend aircraft carriers and the role of sea power all the way.

Los Angeles—The U. S. Navy's debate with British Field Marshal Viscount Montgomery over basic airpower questions is shaping up as one of the most important since the B-36 controversy.

An angry attack by Navy Secretary Charles S. Thomas against Montgomery's demand that the United States stop building aircraft carriers makes it apparent the Navy intends to fight the British soldier's views all the way.

Thomas followed a similar rebuttal earlier this month by Assistant Navy Secretary for Air James H. Smith, Jr., who said carriers have "massive retaliatory ability" (AVIATION WEEK Dec. 13, p. 16).

► **Strategic Defense**—Thomas chose this area for a series of press conferences and speeches defending the U. S. Navy's strategic views.

It was here at the California Institute of Technology that Montgomery publicly launched the military debate by insisting land-based airpower soon will control the seas, a concept calling for bigger air forces and smaller navies with no carriers (AVIATION WEEK Dec. 6, p. 12).

Montgomery, Deputy Supreme Commander of Allied Forces in Europe, presented the same views in conferences with President Eisenhower and U. S. military planners, arguing that atomic and thermo-nuclear weapons require a complete re-evaluation of the military organization of the West in order to maintain air superiority—the key to any future war.

Montgomery presented a conviction that the Navy's future role would not require more than small ships and submarines.

► **Mobile Air Base**—Criticism of the British military figure by Thomas makes it plain that the Navy has decided to make the debate a public one rather than a battle behind the closed doors of the Pentagon.

"Field Marshal Montgomery is not always realistic," Thomas said. "The aircraft carrier is actually a mobile air base, one that can cause the potential enemy to readjust his offensive and defensive tactics."

In addition to his press conference remarks on Montgomery, Thomas attacked the Field Marshal's recommendations in a speech before the Institute of Foreign Affairs at Riverside.

"In these days of supersonic planes, nuclear weapons, and guided missiles we must still have soldiers and sailors, rifles, tanks, grenades and bayonets, antisubmarine ships and landing craft as we so

recently saw in Korea, as well as global bombers and massive retaliatory weapons," the Navy Secretary argued. "This is especially true when it is remembered that our fundamental philosophy gives to our opponent the initiative of choosing when, where and what type of war there can be."

► **Fringe War Danger**—Thomas backed up the Administration's massive retaliation concept, saying: "Quite obviously, the free world must excel any enemy's capability for massive attack with nuclear weapons. Without this, we are surely doomed."

But the Navy's civilian chief expressed the opinion that the great danger to the free world in the next decade is not hot war but continued cold war, with the danger of fringe wars "wherever and whenever we fail to maintain a posture of strength and a program for resistance."

"I do not subscribe to the theory that a little war must inevitably grow until it becomes a big one," he said in answer to Montgomery's contention that, if war comes, atomic and thermo-nuclear weapons will be used.

► **'Indispensable' Seapower**—Referring to what he termed the "indispensable element" of seapower, the Navy Secre-

Seaplane Bomber?

There is no reason why the Navy should not build seaplane jet bombers "as large as we care to build them," Navy Secretary Charles S. Thomas told a Los Angeles press conference.

"As large as the Air Force B-52 intercontinental bombers?" asked a newsmen.

"I don't see why not—with the oceans as landing fields," Thomas replied.

He then was asked whether this would create conflict with the Air Force. "No," the Navy Secretary said. "There is no friction today among the services. Air Force Secretary Talbott and I are good friends."

tary said: "Militarily, seapower is still indispensable to survival and success, whether in global war, atomic or traditional, fringe wars or cold war. By itself, seapower cannot achieve a military victory; but it is still valid to say that no type or size of war can be won without seapower."

Thomas made it apparent that one reply to Montgomery's recommendations will be the argument that the Field Marshal is overlooking the importance of the Navy and its air arm in the cold war and in any fringe wars that might break out. The kind of Navy Montgomery describes would be inef-



Eisenhower Awards Collier Trophies

President Eisenhower congratulates E. H. Heinemann, chief engineer of Douglas-El Segundo, awarded Collier Trophy for work on supersonic F4D Skyray. J. H. Kindel-

berger, North American Aviation board chairman, holding model of Super Sabre, was given Collier Trophy for development of the F-100 (Aviation Week Dec. 27, p. 18).

talk about Vibration!



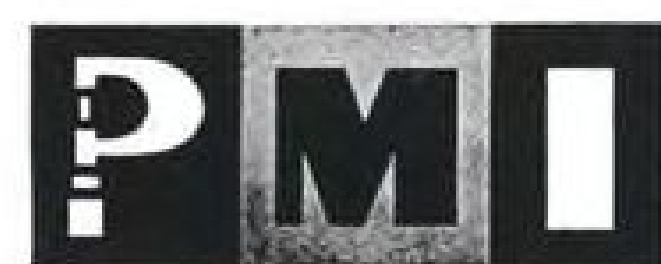
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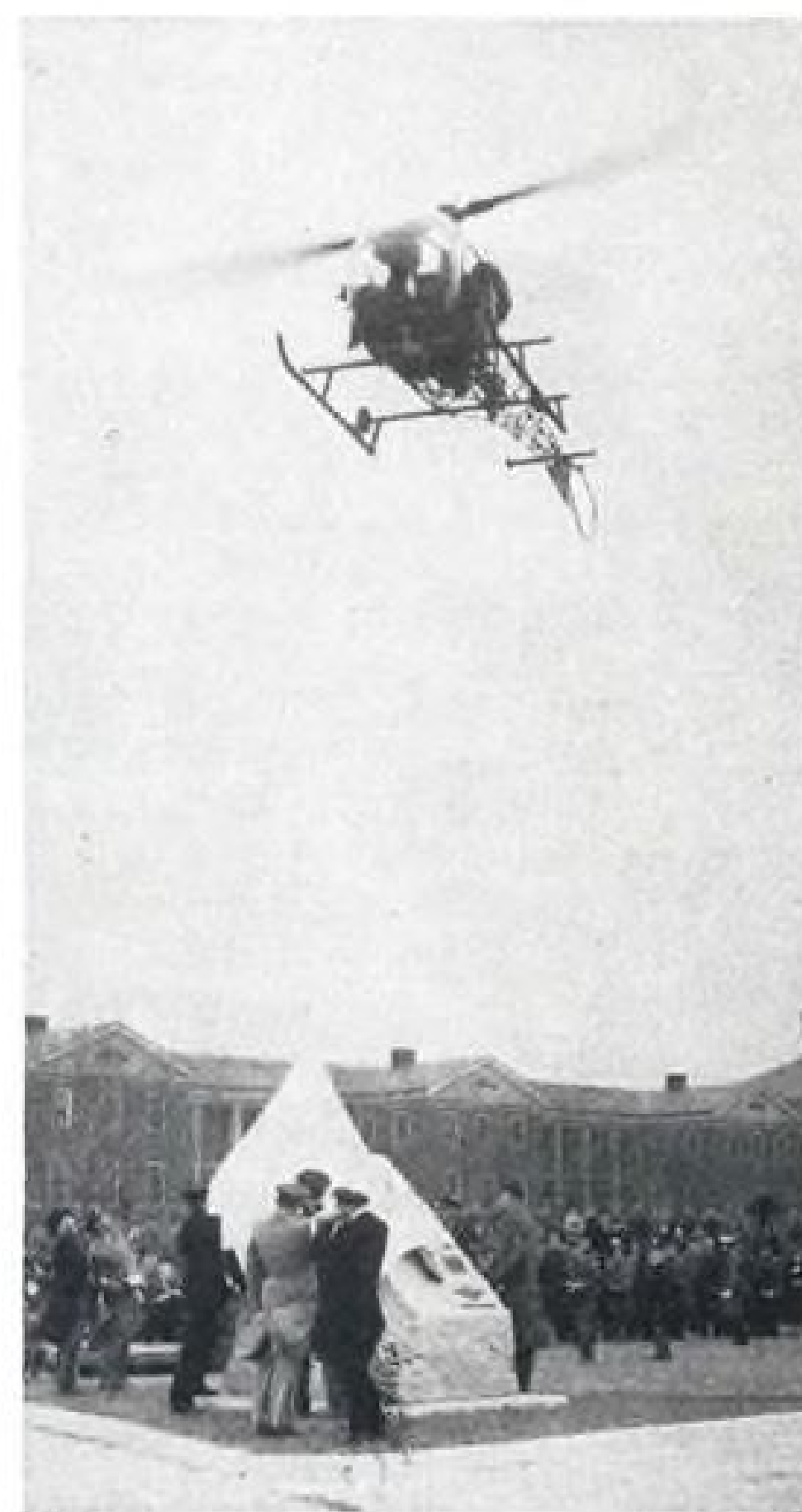
fective in that type of warfare, Thomas implied.

Thomas outlined this role for the Navy:

"If war should be thrust upon us, seapower gives us the ability of projecting our strength overseas. Otherwise, our Army becomes either a local defense force or a band of refugees. A modern fleet has the ability to move quickly to any threatened areas of the world, and on arrival, to serve a variety of ends. It can support troops already ashore; it can assist the landing of additional troops. It can strike the enemy's airfields and supply bases; and if needed, it has the ability of making massive attacks deep into the heart of any continent.

"Seapower also insures that the worldwide airbases which we have built around the free world are maintained, fueled, fed and supplied."

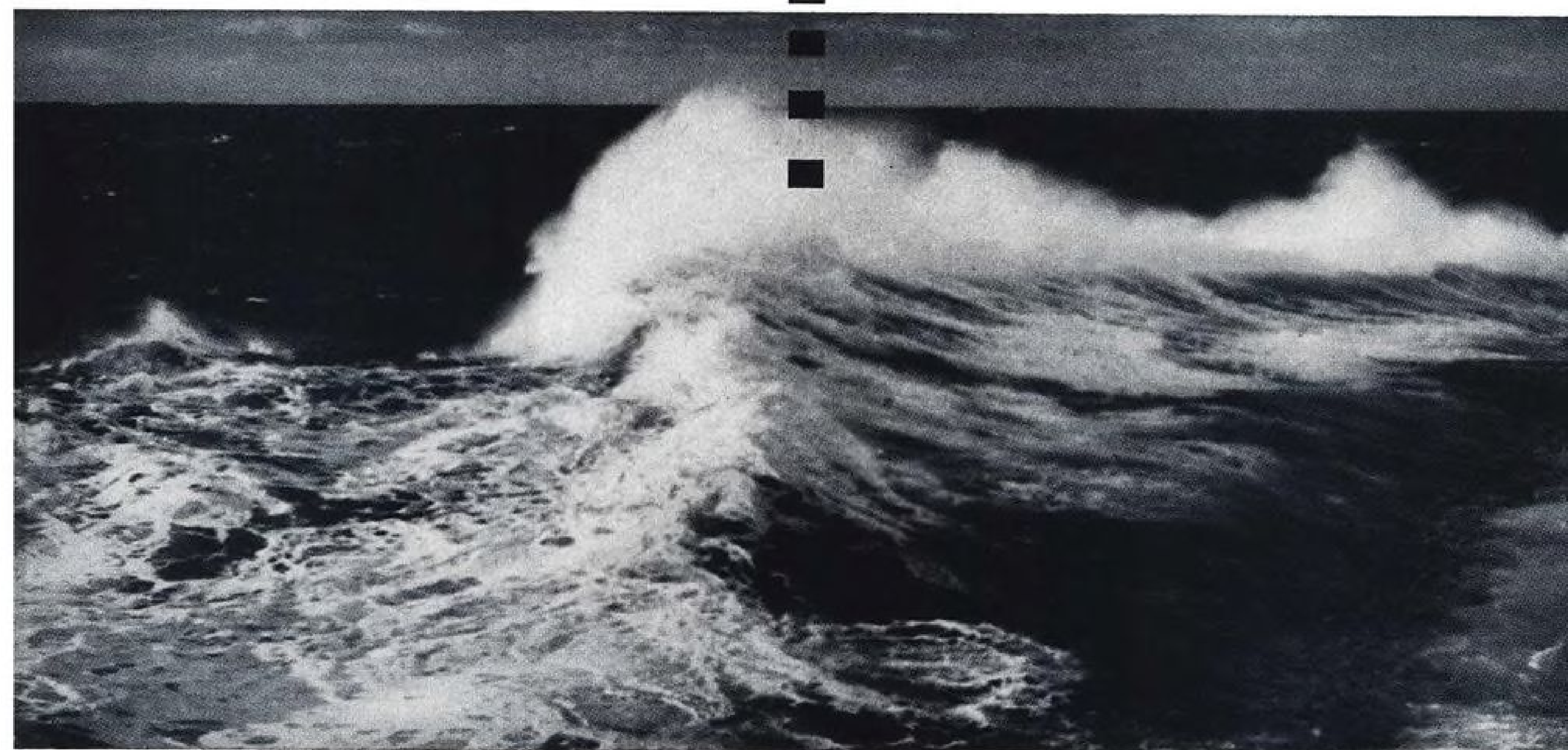
Secretary Thomas left no doubt in Los Angeles that the U. S. Navy is prepared to prove that Defense Secretary Charles E. Wilson was right when he said Field Marshal Montgomery was a "very brave man" to come to this country and suggest that the Navy prepare to abandon its air arm.



Air Pioneers

Army Bell copter pulls a parachute from monument on Governors Island, N. Y., in an unusual unveiling ceremony Dec. 17 honoring pioneer pilots who flew from the island in aviation's early days. The memorial includes a replica of a propeller from a Wright brothers plane.

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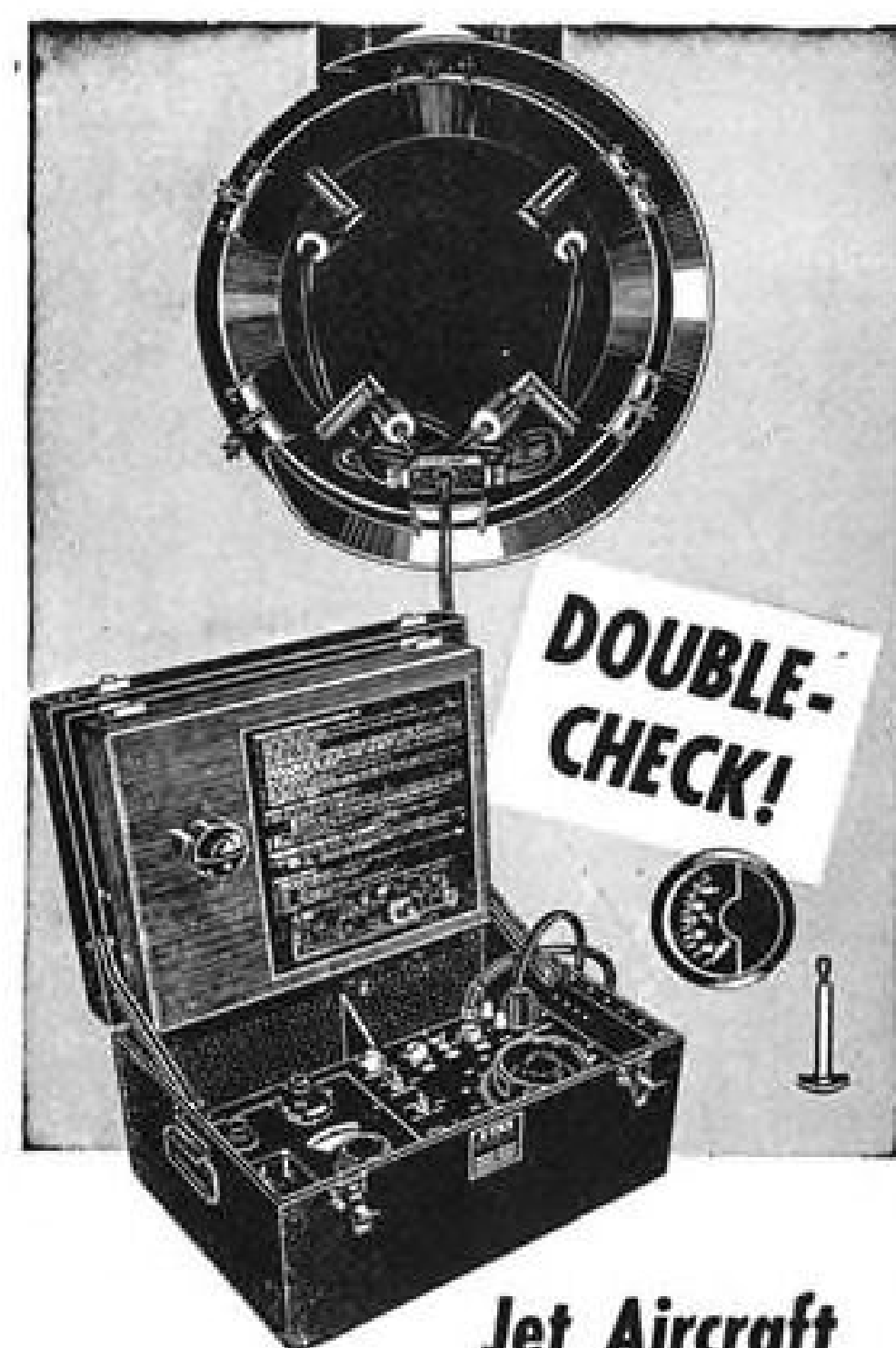
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Swiss Design Short-Field Fighter

New aircraft is built for close-support operation, will replace DH Venoms and Vampires used by air force.

Zurich—A new Swiss fighter, designed for operation from small military airfields situated high in the rugged mountains of Switzerland, now is under construction and probably will make its first flight early next year.

The new fighter is designed as a replacement for obsolete British-designed Venom and Vampire aircraft now flown by the Swiss Air Force. Although Swiss sources are reluctant to discuss the new aircraft before the prototype makes its first flight, it was learned that designers concentrated on high lift to overcome the limitations of short field operation at high altitude.

The new aircraft is a single-engine, sweptwing fighter designed for close support operation. It is not built for high-altitude performance against bombers or other fighters. The Swiss are banking for high-altitude protection upon a new Oerlikon ground-to-air anti-aircraft missile now under development (AVIATION WEEK Dec. 20, p. 21).

► **High-Lift Devices**—The new Swiss aircraft will be small. One limitation on its size resulted from the small Swiss military hangars, often built into a mountainside. Wing is designed with moderate sweep for high lift. Short-field requirement also means a low landing speed.

"This forces us to use ... almost all the high-lift devices available," says a Swiss source. Since extensive boundary layer control experiments have been carried on at the Swiss Federal Institute of Technology at Zurich, this presumably could mean boundary layer control on the new fighter.

By the same reasoning, the aircraft also may have a new reverse thrust device developed at the school's Institute of Aerodynamics under Dr. Jacob Ackeret.

The new aircraft will be produced by Flug & Fahrzeugwerke A.G. (FFA), the former Swiss branch of the German Dornier company. This now is a Swiss company and the largest private aircraft plant in Switzerland. At present, FFA is turning out de Havilland Venoms and Vampires for the Swiss government.

The new fighter may be the P.16 known to be under development at this plant.

► **Powerplant Question**—Although construction of the prototype is well along, a reliable source reports the final decision on whether to purchase the fighter's engine direct from a British manufacturer or to tool up for production in Switzerland has not been made.

The Swiss say they could tool up and produce about 500 engines at a cost only 20% greater than that of the British manufacturer who turns them out by the thousands.

Manufacturer of the engine was not revealed, although it may be de Havilland Aircraft Co. since the FFA plant is closely associated with that British firm due to its production of Venoms and Vampires under license. The DH Ghost centrifugal-flow turbojet already is under license for manufacture in Switzerland. This is rated in the neighborhood of 5,000-lb. thrust, enough to provide high performance for the small fighter.

► **Conventional Design**—The new fighter is not radical in design.

"We cannot afford to be radical within our limited budget," says a Swiss. "You will be disappointed when you see this aircraft because it is so conventional. You may even wonder why we are so brazen as to want to build our own aircraft at all."

But to anyone who has seen the small Swiss military airfields tucked into high valleys surrounded by mountains—such as the one at Ambri, just south of the Gotthard tunnel—there is little question as to the need of a special fighter.

No North American F-86 Sabre or first-line British aircraft could operate from these strips, sometimes not more than 3,000 ft. in length with an Alp close to each end of the runway.

► **Special Problem**—The Swiss are interested in rotary-wing aircraft, as well as recent vertical takeoff flights in England and the U.S., as answers to their special problem.

Another development not being overlooked is Convair's water-based F2Y. Switzerland's many lakes would make ideal landing areas for a fighter like the Sea Dart.

But for the present, the Swiss hope the new fighter may be an answer to airstrips which are short, obstructed and located at high altitude. Designed to the Swiss requirement for a close support fighter, the aircraft may mount new Oerlikon quick-firing 30-mm. cannon. Provisions also will be made for external stores.

► **Fighter Experience**—FFA has a background in fighter aircraft dating back to 1938 when the Dornier 3801 was built by the German plant under license for the Swiss. The Germans also may have more than a passing interest in the new Swiss fighter.

The Dornier 3802 fighter powered by a 1,250-hp. Saurer YS 2 engine was de-

NEW FJ-4 FURY FEATURES

"pump that couldn't be built"



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

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

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

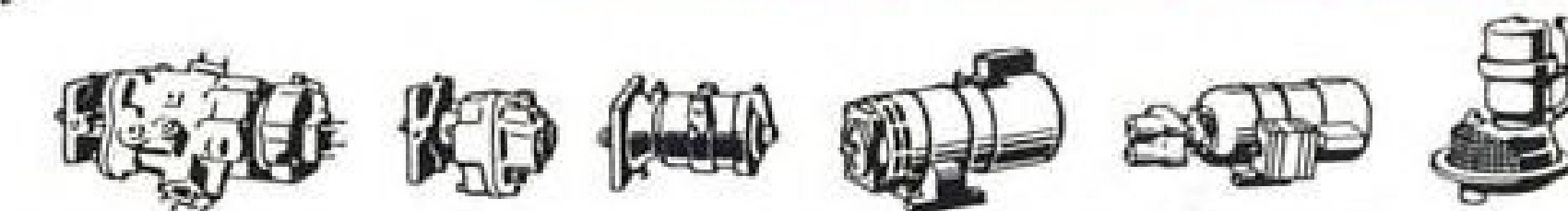
Designed for a 1200 hour overhaul cycle, this motor-driven pump is powered by a Pesco-built DC Electric Motor. Precise and powerful, it weighs only 7.4 pounds and its 11" x 5" x 5" envelope fits into a close-tolerance fuselage location.

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

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



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



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veloped at the plant in 1943, and from this was developed the D.3803. A few of these were built for the Swiss, but production was halted after the decision in 1946 that made the de Havilland Vampire the standard Swiss fighter.

A later attempt at a water-based fighter would not be too surprising since the Dornier plant also has a flying boat background.

—WJC

Airport Council Wants CAA to Lower Costs

The Airport Operators Council has asked Civil Aeronautics Administration to modify its airport standards, recommending changes aimed principally at lowering costs.

The suggested code revisions were adopted by the AOC at a recent meeting and submitted to CAA Administrator Fred B. Lee.

► **Runway Requirements**—A large block of the recommendations deal with runway and taxiway design.

The council wants CAA to study runway width to see whether the present 200-ft. width required of large airports could be reduced, perhaps to 150 ft.

AOC asks no changes in runway length requirements but suggests that manufacturers be required to design aircraft to meet present limitations.

AOC would have CAA establish definite standards for separation of parallel runways to permit landings on one runway and simultaneous takeoffs on another under IFR conditions.

► **Taxiway Review**—A CAA study of taxiways is recommended to determine whether the 100-ft. width standard can be reduced. Such width reductions would produce savings both in capital outlay and operating cost, according to AOC.

Taxiway design for highspeed turn-offs should be reviewed, says the council, and recommended design data on various layouts published. CAA development of standard layouts for taxiway warmup and by-pass areas also is recommended.

► **Budget Program**—The airport operators also ask CAA to:

- Review the need for surface detection radar at major airports and establish a budget program for needed installations.
- Set up off-the-airport visual aids to guide pilots in and out of congested areas.
- Consider new taxi lights now being developed.
- Revise regulations to provide that fire and rescue equipment used in airports be painted chrome yellow instead of red because of greater visibility of yellow in darkness and bad weather.
- Establish standards for marking unserviceable paved areas.

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pinpoints defects that can be quickly attended to upon landing.

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Stits Tests Folding-Wing Lightplane

A new lightweight business plane with folding wings—designed to be towed from an airport and stored in the owner's garage—is being flight tested by Stits Aircraft at its Riverside, Calif., plant.

The three-place Stits-Besler Executive was designed and built for William Besler of Besler Corp., Oakland, Calif., to test the market potential for a folding-wing aircraft.

► **Heavy Plane Feel**—"I have 2 hr. and 15 min. flying time in on it now and its response is good," says designer-builder Ray Stits. "It has the feel of a heavy plane—like the executive wants. And it tows well. It has been towed at a speed up to 50 mph."

The wings are easily folded, he adds. "By simply releasing a pin and exerting about 2 lb. of pressure, they fold back and are hooked to the fuselage."

Stits says the prototype will be used

at a later date as a test bed for new aircraft engines.

This plane is a completely new design, the builder reveals. "We couldn't adapt any of our standard models to accommodate the folding wing."

► **165-mph. Craft**—The company reports the new plane, powered by a 150-hp. Lycoming, has a top speed of 165 mph, and cruises at 150 mph. Range is estimated at 400 mi., with a 50-mi. gas reserve.

Other specifications of the Stits-Besler Executive:

Wing span, 25' 6"; maximum height (wings folded), 6' 11"; maximum length (wings folded), 18' 6"; maximum width (wings folded), 7' 5"; wing area, 120 sq. ft.; gross weight with pilot and two passengers, 1,450 lb.; net weight, 800 lb.; time required to fold the wings, 30 sec.

Sale price: about \$5,000.

Wilson Revises Small-Firm Policy

Faced with loud complaints from small business and the prospect of criticism from the new Congress, Defense Department has revised its small business policy directive, pledging "an equitable opportunity to compete" for both advertised and negotiated military procurements.

► **'Comprehensive, Effective'**—Announced purpose of the new directive, issued by Defense Secretary Charles E. Wilson, "is to establish a more comprehensive and more effective Department of Defense small business program."

To achieve this, the directive says, the Army, Navy and Air Force will revise their regulations within 30 days to make sure these procurement conditions are met:

- The bidders' mailing list must include all eligible small business firms.

- Invitations to bid must be sent to all firms on the list; if they are not, a pro rata percentage of small business firms

must be included by the services.

- Small business requirements must be considered in planning quantities, delivery schedules, time for preparation of bids and drafting of USAF, Navy and Army specifications.

- Proposed procurements must be publicized.

- The opportunity must be extended to bid for quantities less than the total procurement.

- The search for potential small business suppliers must continue.

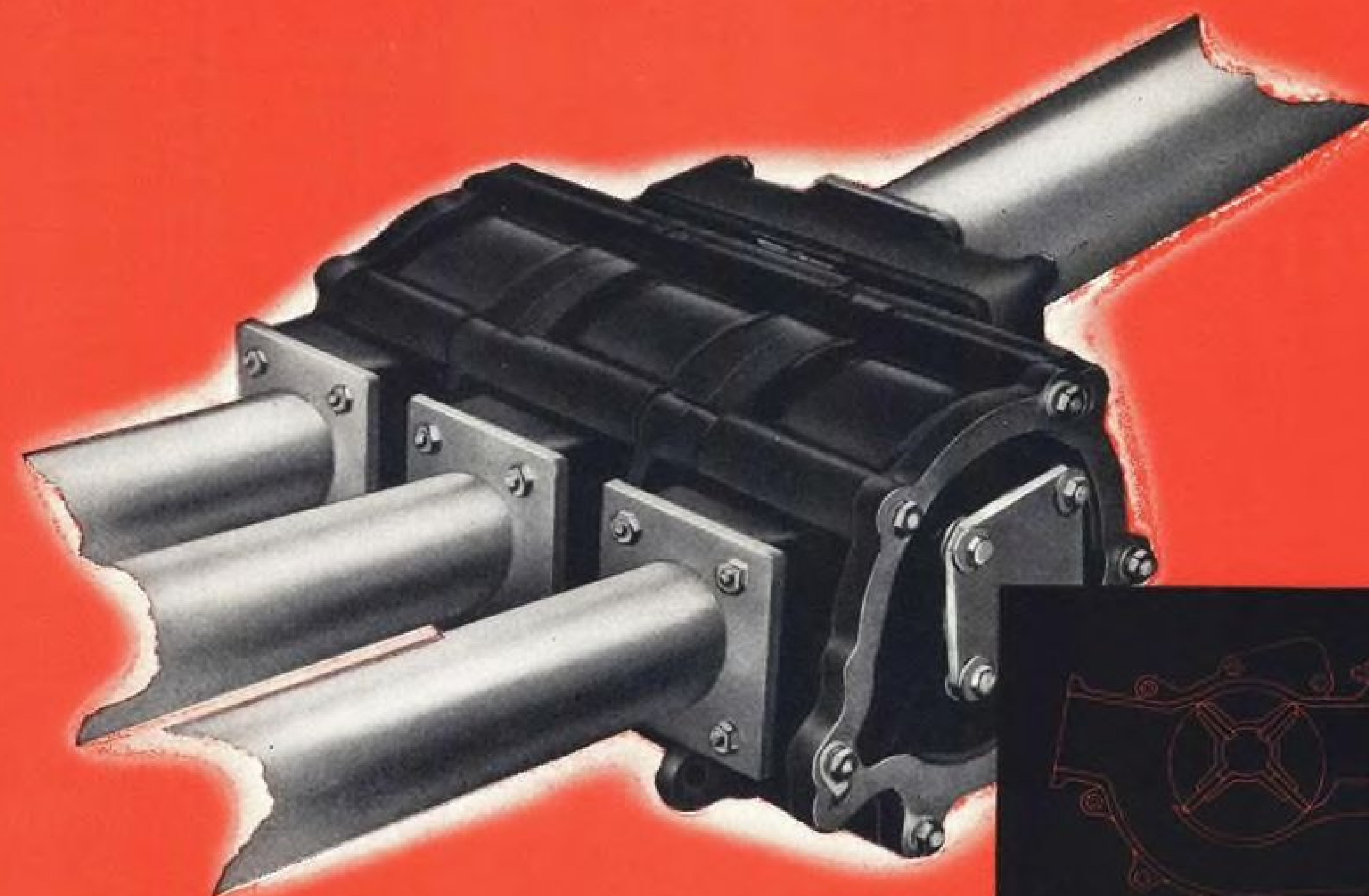
The directive says the Defense Department will issue an additional instruction on how the revised policy will be carried out in respect to future subcontractors.

► **Congressional Pressure**—The new directive probably can be traced back to hearings held last spring by the Senate Small Business Committee. At that time Defense Department was urged by the committee to draft a comprehensive

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statement of its small business policy, drawing together the loose ends that were scattered through a long series of instructions, policies, procedures and directives.

One feature of the new directive is that it sets down for the first time definition of the small business specialist and tells what he is to do.

These appointments now definitely are ordered by Secretary of Defense Wilson:

- Small business advisor to Assistant Secretary of Defense for Supply and Logistics Thomas P. Pike. In addition to counseling the assistant secretary, the advisor will represent him in Defense

Department contacts with the Small Business Administration.

- Office of Small Business for the Army, Navy and Air Force. The chief will be responsible for carrying out the Defense Department's small business policies.

- Small business specialists for each principal procurement office. These men are to "maintain the necessary independence of thought and action in the performance of their functions." They must be men of high calibre, preferably civilians, with small business experience.

The tendency of military procurement offices to evade and resent contacts by representatives of the Small

Better Break

Small business firms, those employing fewer than 500 persons, are assured of a better opportunity to win defense contracts by a new ruling from Defense Secretary Wilson that will break up large orders for certain military items.

In his new directive, the Secretary orders the armed forces to include in their regulations the following conditions:

"The procurement is divided into, or bids or quotations may be submitted on, such reasonably small economically sound production lots as will enable and encourage small business concerns to make bids or quotations on such procurement or portions thereof—unless such division is clearly to the disadvantage of the department."

Business Administration comes in for important consideration in the new directive.

The armed forces are ordered to let SBA representatives inspect their procurement records and give all requested information. When the SBA is not satisfied that small business has been properly represented, the military are ordered to cooperate in correcting the situation.

In addition, monthly meetings must be held with SBA officials to evaluate reports on the effectiveness of the program.

ODM Grants Writeoffs For Research Facilities

General Electric Co. has been granted a \$6,823,000 certificate of necessity by Office of Defense Mobilization for a research and development laboratory, with 50% allowed for rapid tax amortization.

Other certificates granted by ODM are as follows:

Kollsman Instrument Corp., Elmhurst, N. Y., aircraft instruments, \$2,107,027 certified, with 55% allowed.

General Electric Co., Schenectady, N. Y., aircraft parts, \$1,476,850 certified, with 60% allowed.

Downing Crystal Co., Westminster, Md., quartz crystal for military electronics, \$65,000 certified, with 45% allowed.

Lockheed Aircraft Corp., Missile Systems Division, Van Nuys, Calif., research and development facilities, \$106,638 certified, with 65% allowed; research and development facilities, \$180,351 certified, with 60% allowed; research and development facilities, \$243,147 certified, with 60% allowed; Lockheed's, Burbank, Calif., plant, military aircraft, \$63,364 certified, with 65% allowed.

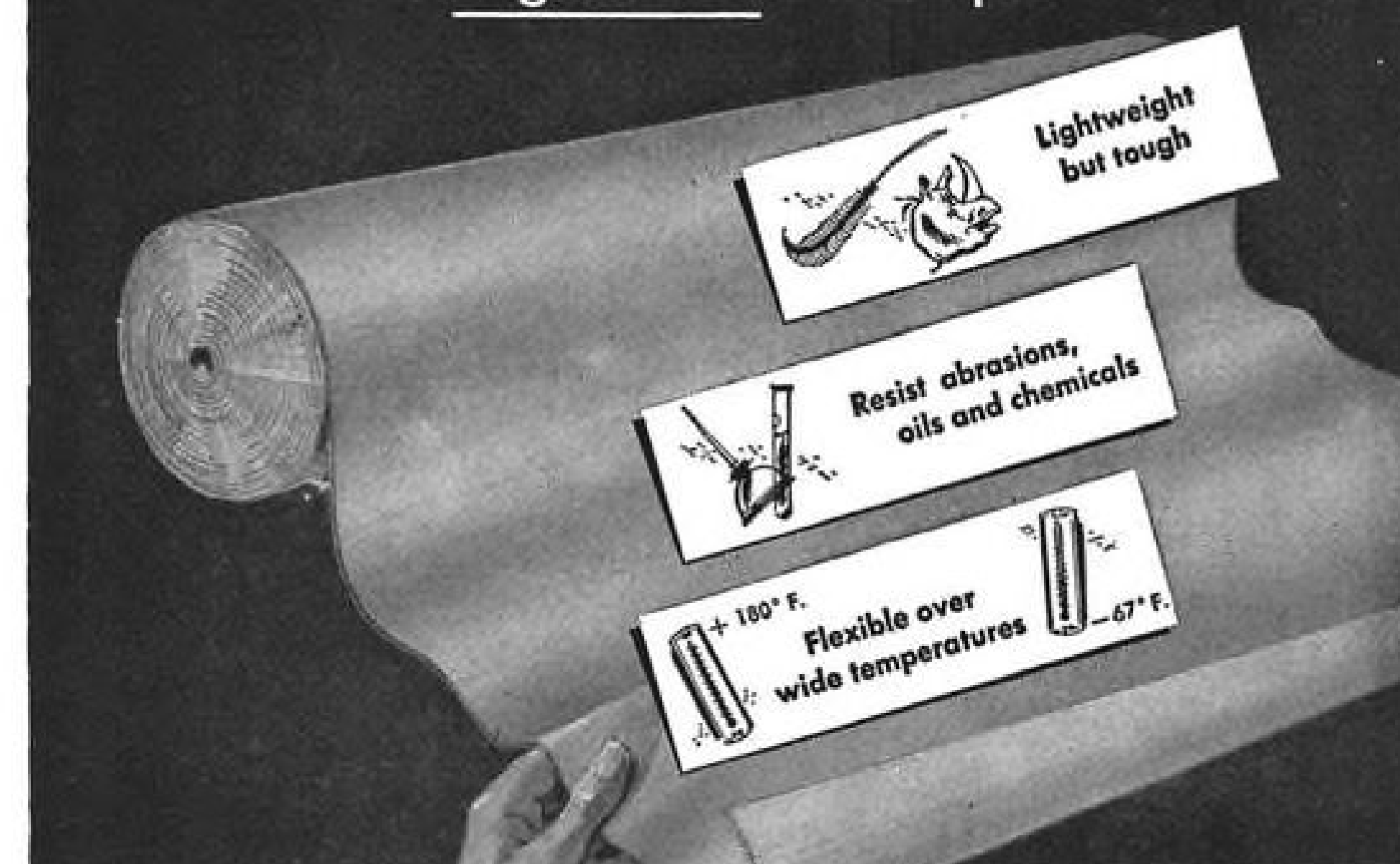
Convair Division of General Dynamics Corp., San Diego, research and development, \$90,000 certified, with 60% allowed.

General Precision Laboratory, Inc., Pleasantville, N. Y., electronics research laboratory, \$18,226 certified, with 70% allowed.

Glenn L. Martin Co., Baltimore, Md., military aircraft, \$69,464 certified, with 65% allowed.

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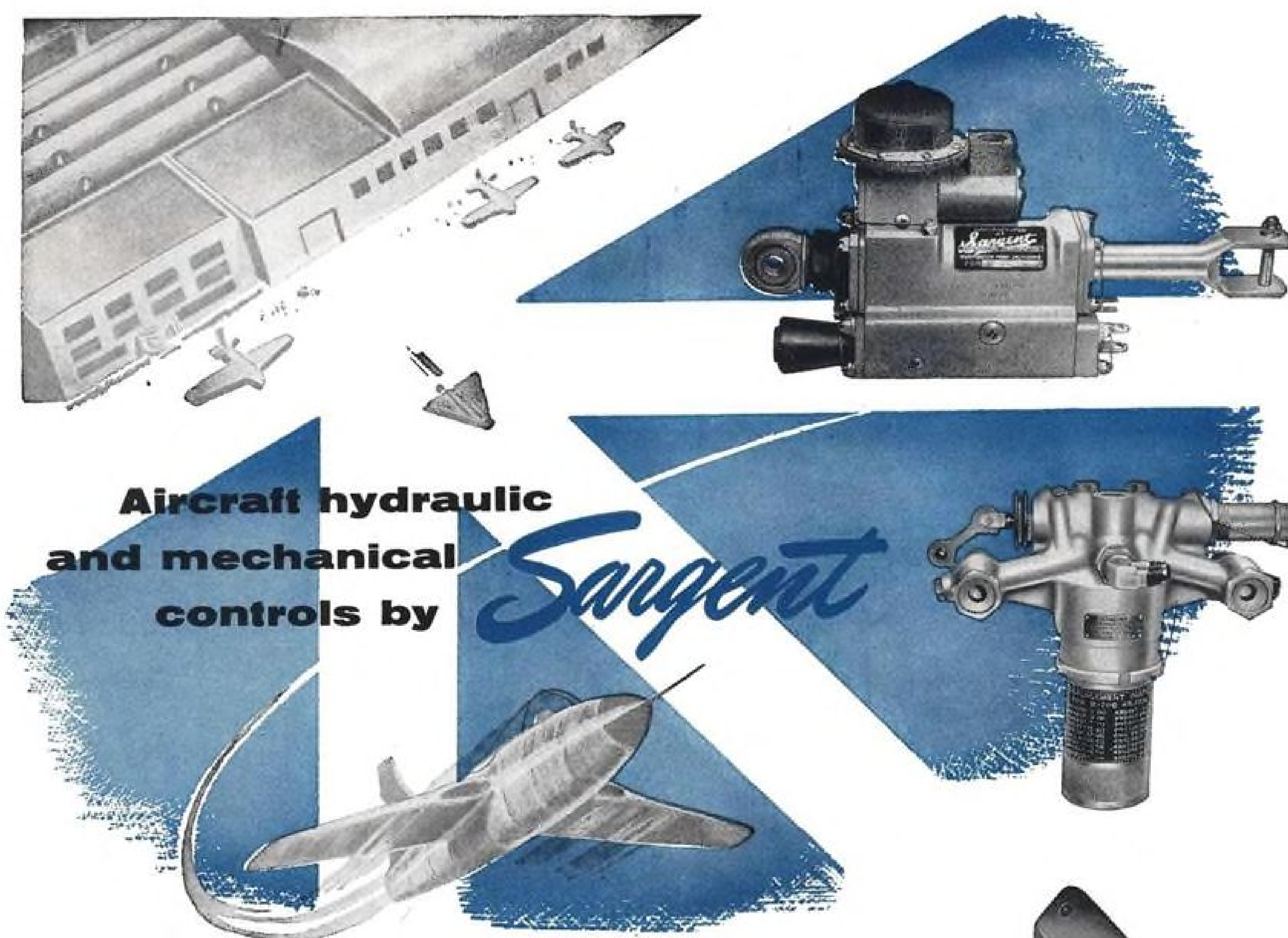
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As these carefree passengers rely on Eastern's reputation for fast, reliable transportation to Florida, so does Eastern rely on Sinclair Aircraft Oils exclusively for dependable aircraft engine lubrication. Today, 45% of the oil used by major scheduled airlines in the U. S. is supplied by Sinclair. Why not place your confidence in Sinclair Aircraft Oil?

...**SINCLAIR AIRCRAFT OILS**

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



FUEL TANKS IN THE RAW. Fibrous-glass preforms for 450-gal. tanks are prepared at Zenith Plastics. Closed ends on cylindrical portions (right) are later cut out; these portions become center sections of completed tanks. Finished units require no painting or treatment.

Tiptanks Could Be Scrap Gift to Enemy

In Korea alone, we threw away 50 million lb. of metal in expendable tanks; that's one reason planners are testing reinforced plastic.

By Irving Stone

Almost 50 million pounds of aluminum alloy were tossed away as expendable fuel tanks during the Korean conflict, according to industry sources.

The Korean war was a "limited" war. Now think of this loss in terms of a near-global conflict:

- How many hundreds of millions of pounds would be "scrapped" in combat?
- How much of the metal would fall into enemy territory as scrap recoverable by him?
- How much might the metal requirements for these expendable tanks strain an already-tight material supply in time of national emergency?

► **No Production Yet**—It would be hard to pinpoint some near-accurate figures for these conditions, but whatever the answers may be they constitute the main arguments advanced by proponents of reinforced-plastic makeup for expendable tip and underwing fuel tanks to be toted by our aircraft.

In addition to the point that the reinforced-plastic material is non-critical, the arguments are that the plastic tank is lighter, cheaper, isn't affected by corrosion, with component parts of some types nesting for easy shipment for field assembly.

But, although it has been reported that somewhere about \$50 million has been allocated for production of jettisonable fuel tanks during fiscal 1955 by the Air Force, no reinforced-plastic tanks have yet been approved for full production.

Some units, however, have passed qualification tests, with flight tests still to come.

► **British Change Likely**—British military planners, it is reported, are acutely conscious of metals conservation and the scrap value, to the enemy, of jettisoned metal fuel tanks.

It is likely that, within the very near future, a complete switch from metal to reinforced-plastic jettisonable tanks may be mandatory for the Royal Air Force,

AVIATION WEEK has learned.

► **Big Production Abroad**—It is reported that Britain already is in large-scale production of reinforced-plastic jettisonable tanks.

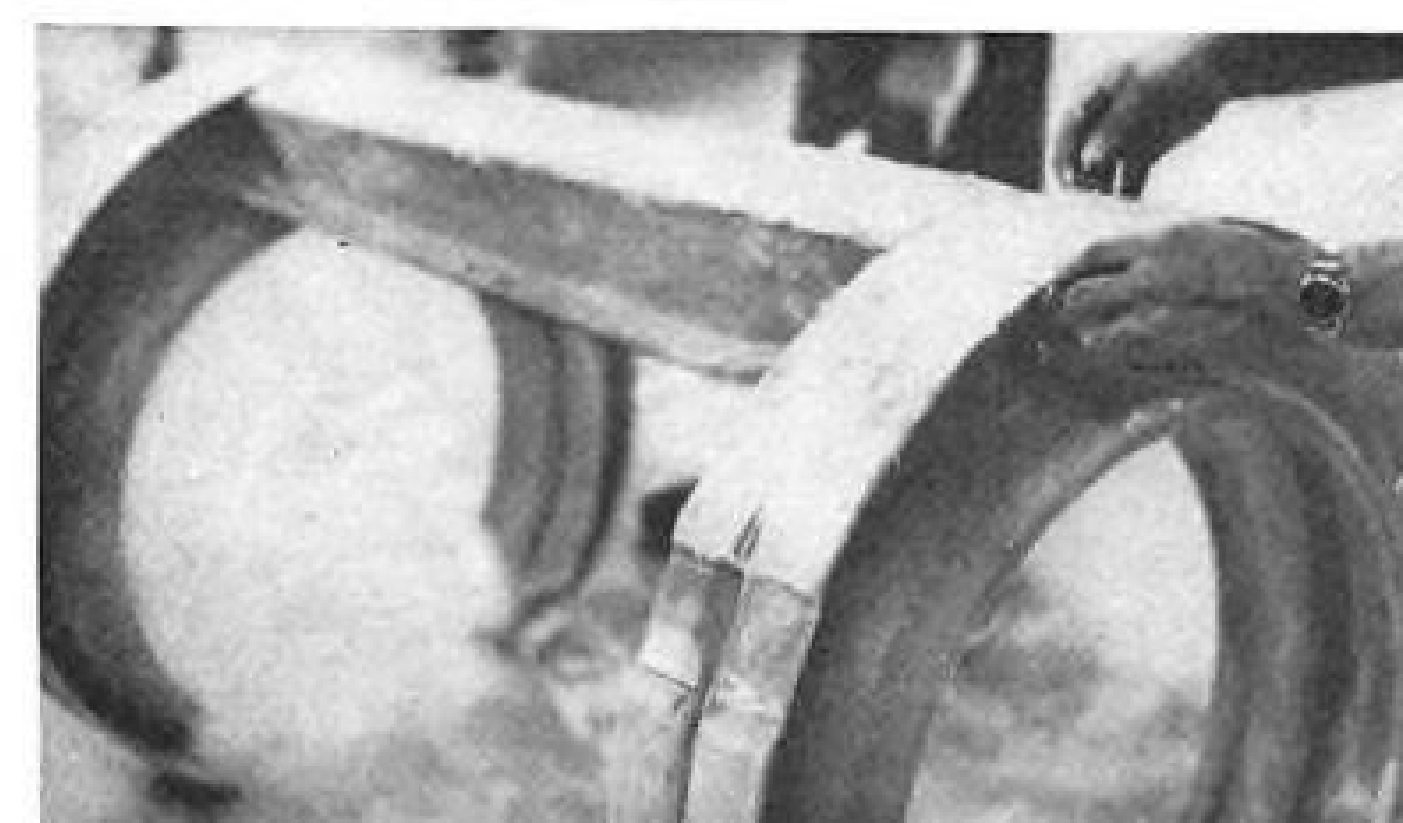
Bristol Aeroplane Co., Ltd., is turning out large quantities of external underwing and tiptanks constructed of Durestos-reinforced plastic. Durestos is a trade name for an asbestos-type of reinforcement. Bristol is reported to possess a top amount of know-how with this material.

► **Highspeed Shapes**—The Hawker Hunter, very-highspeed interceptor, is reported to have been flown with reinforced-plastic underwing fuel tanks at the top speed of the plane, indicating that the configuration could be carried into combat, if necessary.

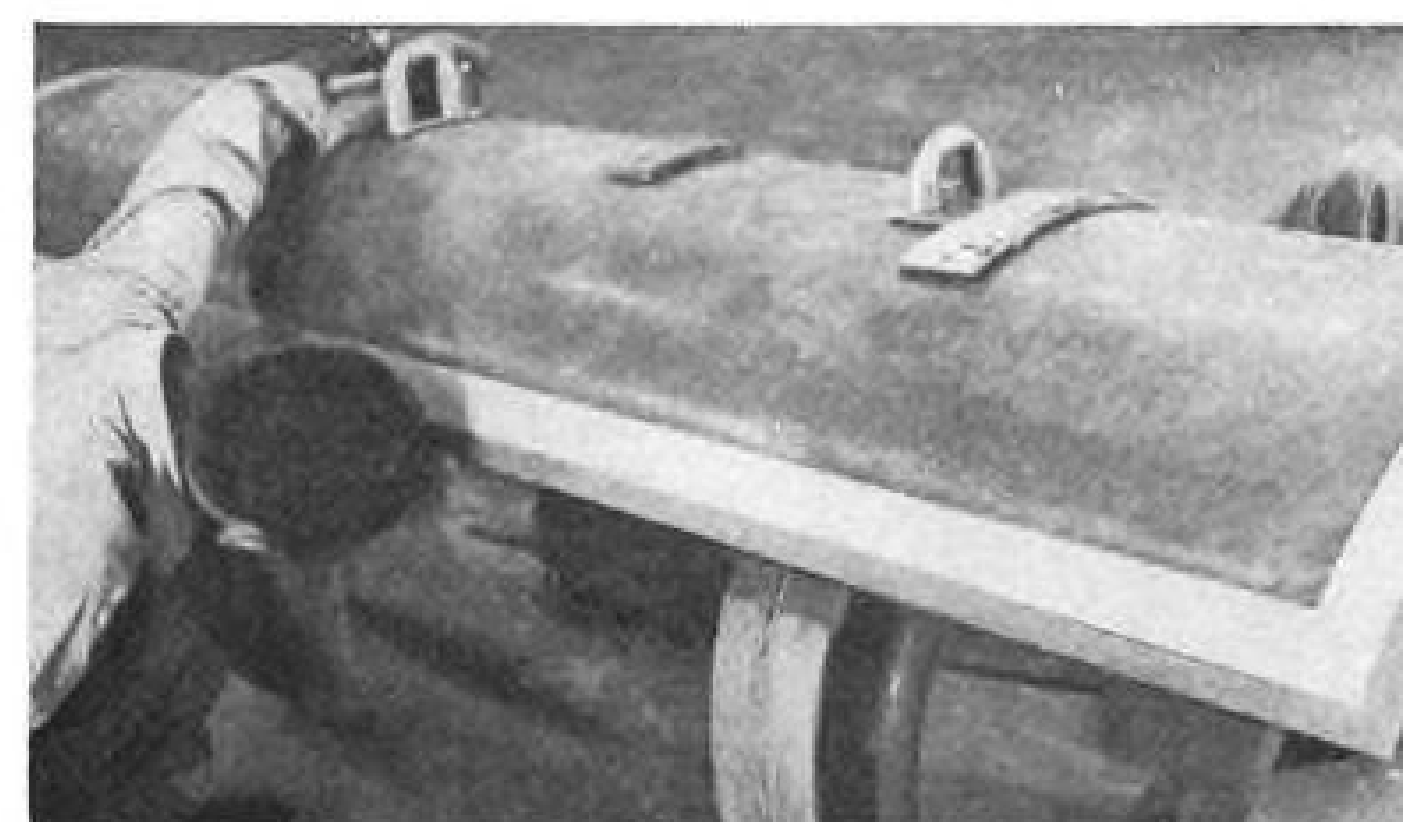
Other developments in British reinforced-plastic jettisonable tanks are said to include units of such size and capacity as to dwarf anything here.

The British tanks, to a much greater extent than their U.S. counterparts, are

Zenith demonstrates field assembly:



1. **ADHESIVE** for center-section-skin bond goes on frame, beam.



2. **HANGER BRACKETS** are installed on top-center skin.



3. **SKIN EDGE** is coated with adhesive for mating section.

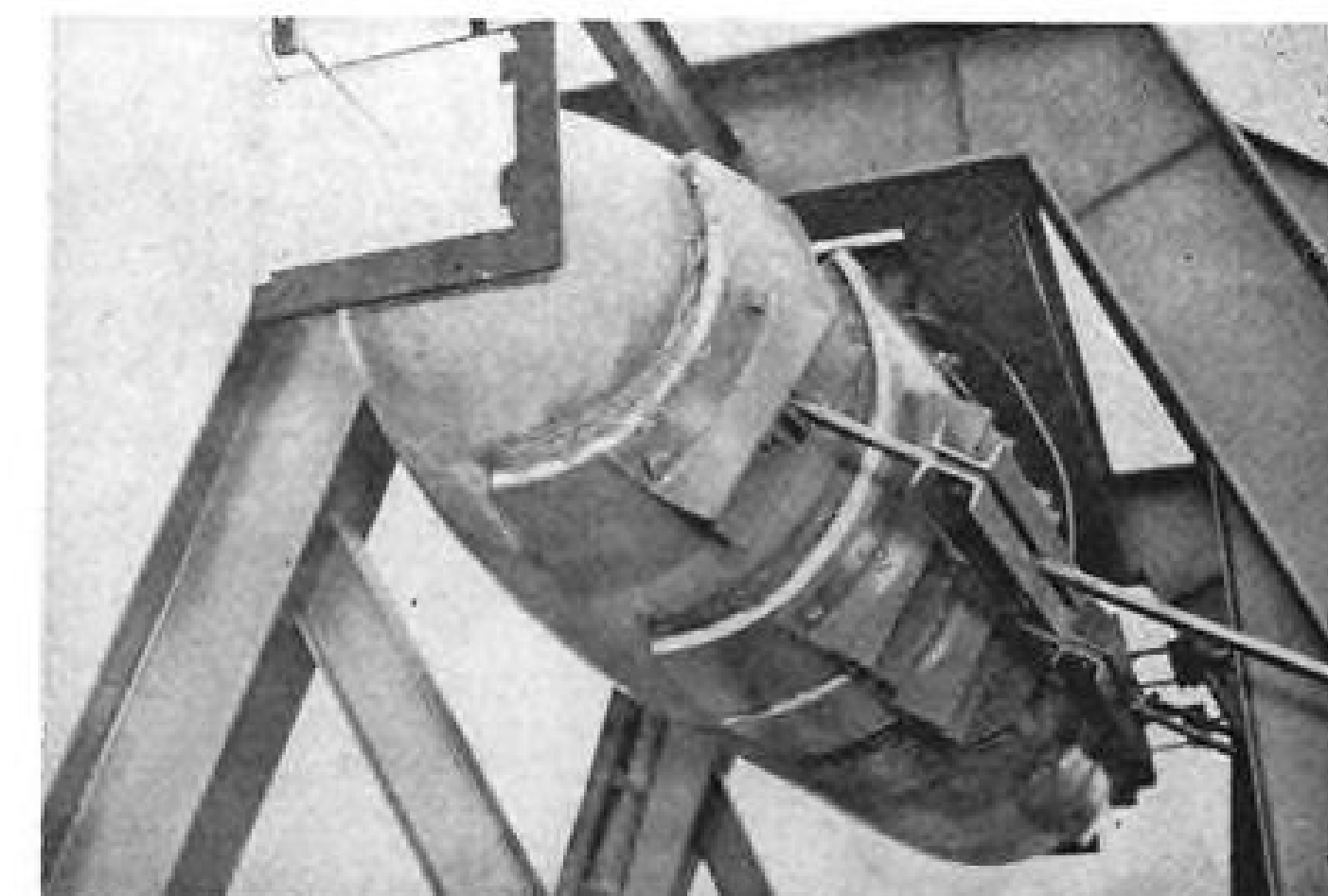
tailored to highspeed flight conditions—nose portions are sharper, tail sections have longer tapers.

► **Various Participants Here**—Companies engaged in development of reinforced-plastic fuel tanks in this country include Zenith Aircraft division of Zenith Plastics Co.; Pastushin Aviation Corp.; Molded Products Corp., division of Admiral Distributors, Inc. and possibly others.

One of Zenith's developments is a 450-gal. fibrous glass-reinforced fuel tank, now awaiting flight tests at Wright Air Development Center. This is a Type II unit—a limited service (expendable) tank having a nesting ratio of about 10 to 1. The tank is designed for assembly and bonding in the field. Maximum tank diameter is 29 in.

Pastushin's tank is a 200-gal. glass-

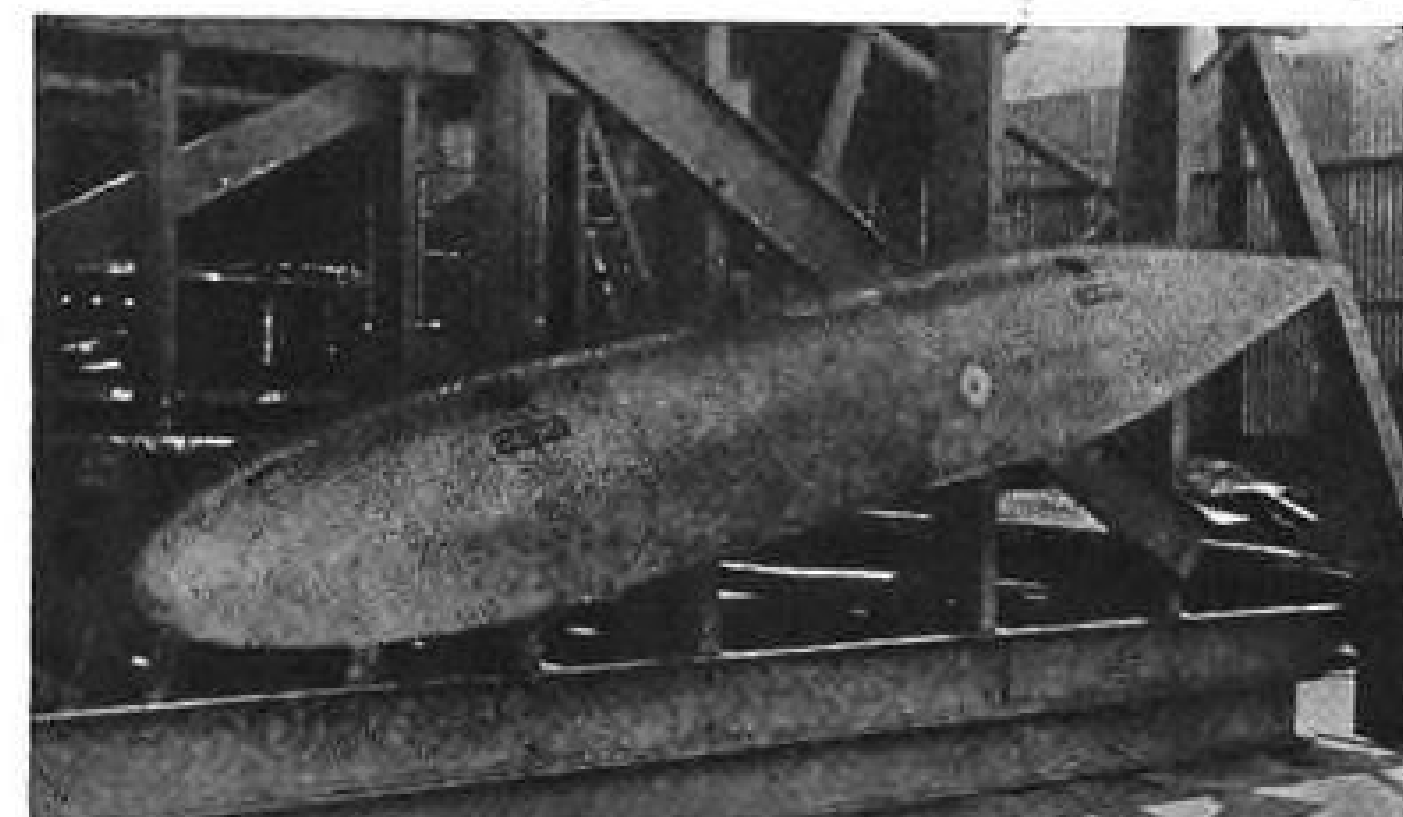
Typical tests for expendable tanks:



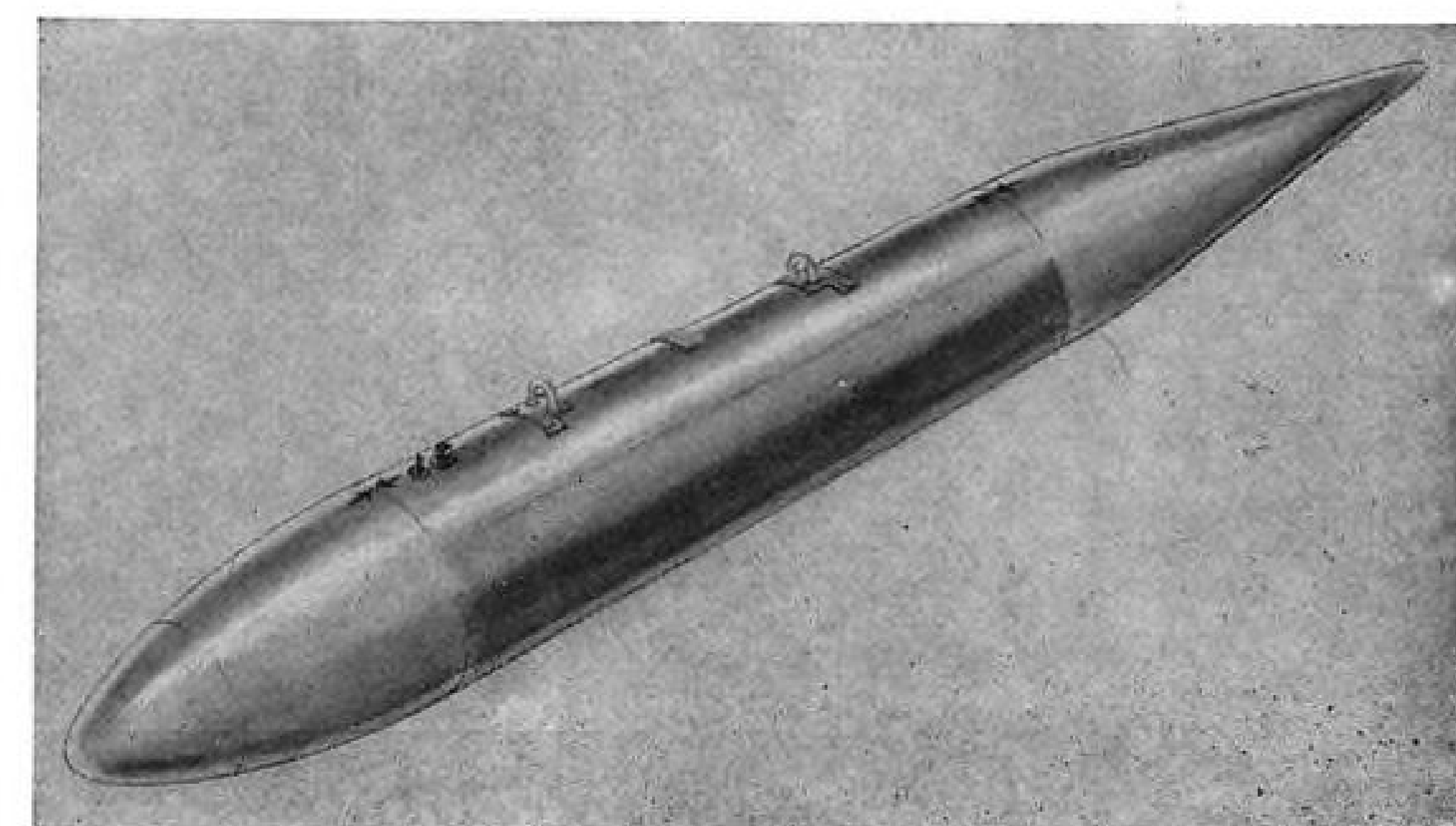
ZENITH tests 450-gal. tank in simulated flight condition.



450-GAL. Zenith tank gets slosh-vibration test at Century.

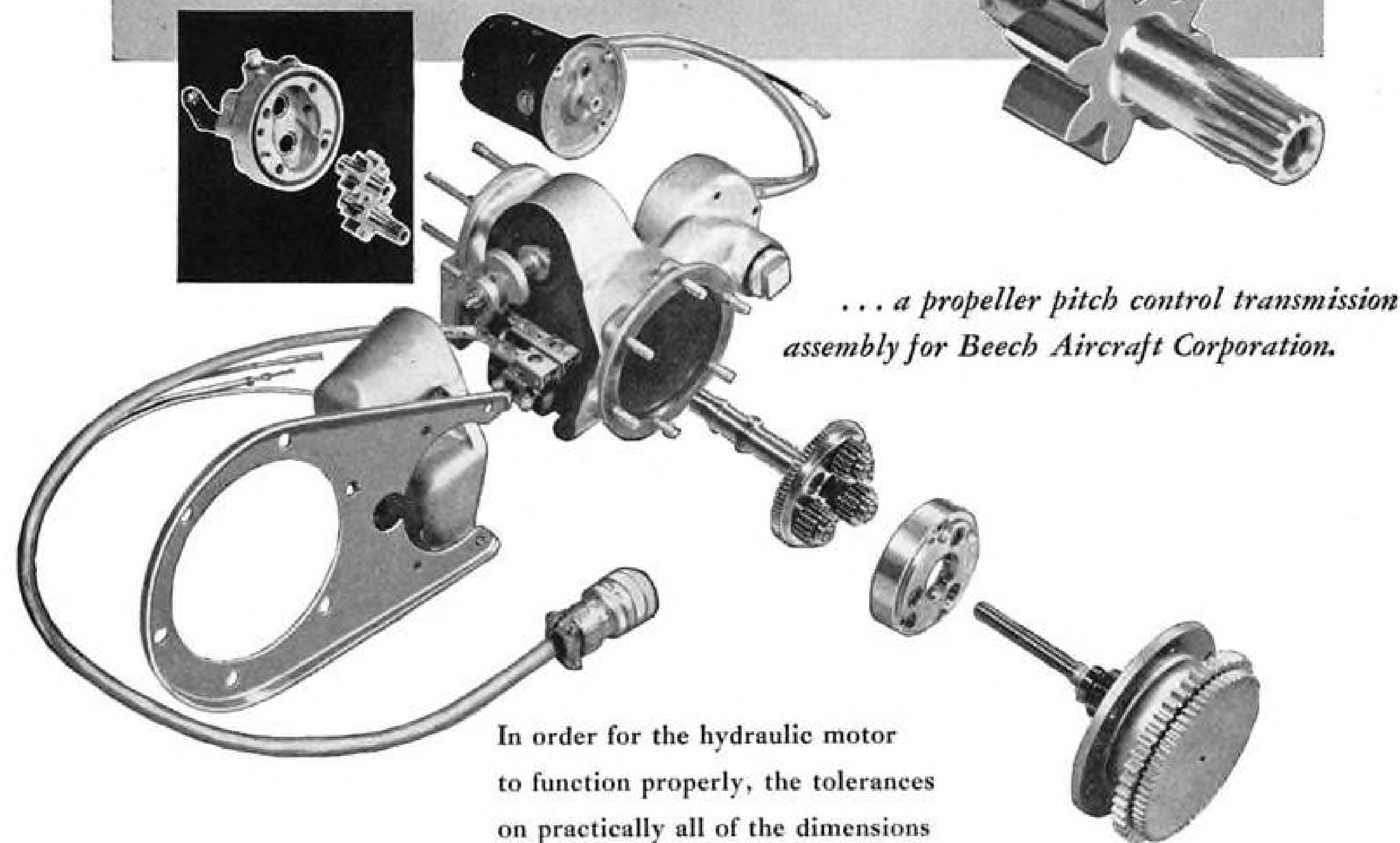
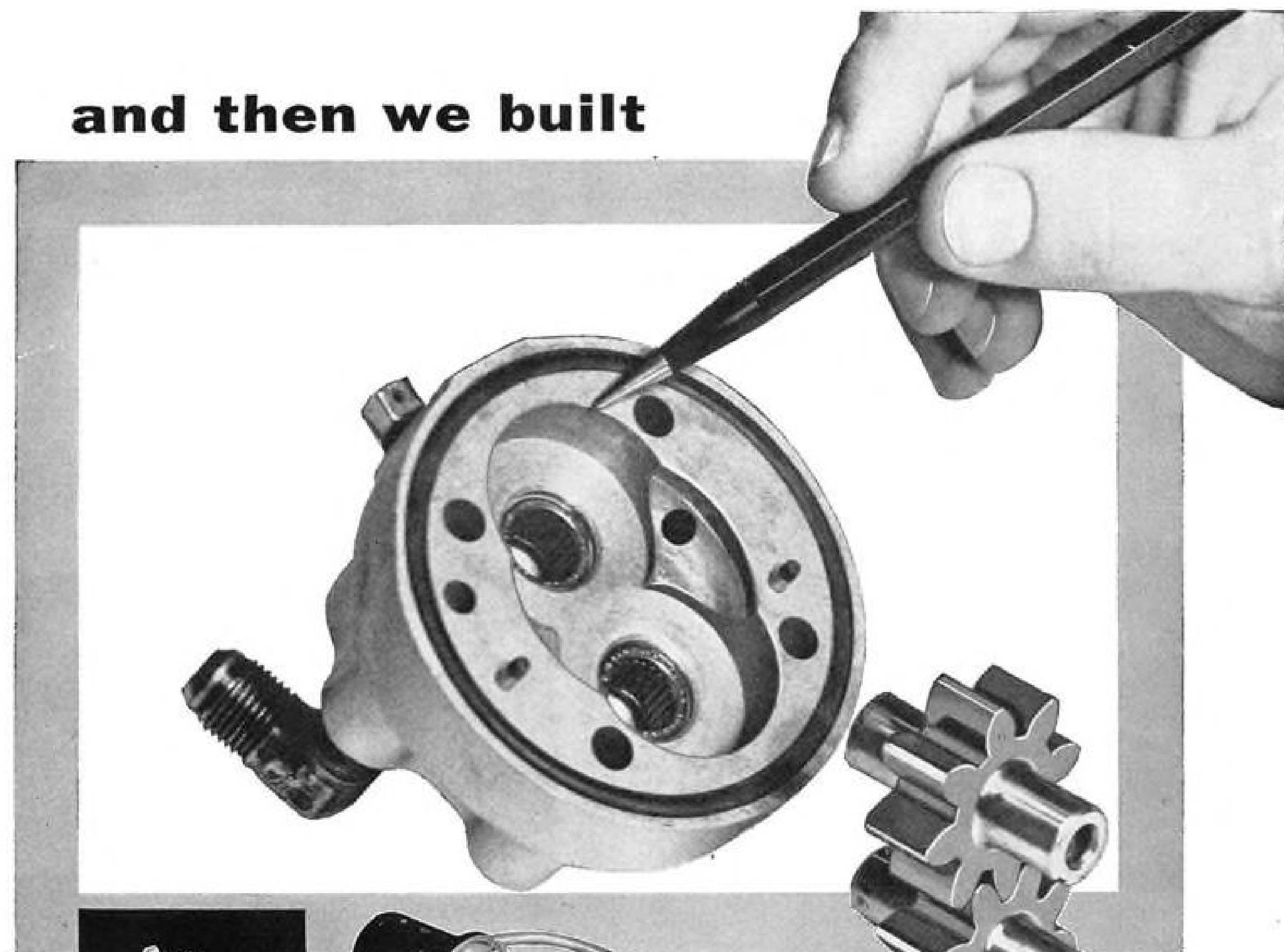


PASTUSHIN 200-gal. tank undergoes 15-ft. drop test.



ARTIST'S VERSION of Zenith 450-gal. reinforced-plastic, expendable fuel tank.

and then we built



... a propeller pitch control transmission assembly for Beech Aircraft Corporation.

In order for the hydraulic motor to function properly, the tolerances on practically all of the dimensions had to be held to within .0001" or .0002" for squareness, parallelism and concentricity.

INDIANA GEAR

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Nesting 10 Tanks

1. Nest 10 tail sections.
2. Nest 10 nose sections into the nested tail sections.
3. Stack 16 of the 20 frames in groups of two in bottom of crate.
4. Stack one of remaining four frames on top of the first group of two at one end of the crate.
5. Place nested nose and tail sections over the frames on proper supports.
6. Stack remaining three frames above end of tail sections.
7. Stack the 30 center-section skins in groups of 15 each above the nested nose and tail sections.
8. Nest eight of the 10 beams into the open end of the nose sections.
9. Place remaining two beams vertically, one on each side of the tail cones.

fiber-reinforced Type III unit, an extended-service tank (not expendable, but jettisonable in emergency), which is completely assembled for installation on the aircraft, and incorporating inspection and repair provisions. Inside diameter of the tank is 23 in. It too is awaiting flight evaluation tests at Wright-Patterson AFB.

Molded Products' tank is a 225-gal. unit. Reports are that this tank originally was designed as a Type II unit and was changed later to a Type IV tank, a limited-service type completely assembled at the factory. This unit also is reported to be in its final testing stages at Wright-Patterson AFB.

► **Advantages Seen**—Numerous reasons are advanced for the use of reinforced-plastic jettisonable fuel tanks:

- **Weight is saved.** Ready for use, a 450-gal. reinforced-plastic jettisonable fuel tank weighs 175.5 lb. or 0.39 lb./gal. of usable tank capacity, according to Zenith. The figure for the lightest 450-gal. unit in metal, Zenith says, is about 195-200 lb.
- **No salvage value accrues to the enemy** when plastic tanks are jettisoned over its territory.
- **Competitive costs.** Estimate for the 450-gal. tank in reinforced plastic, including all plumbing, might run about \$250 for production quantities of 5,000-10,000, according to Zenith. A 450-gal. metal unit, it is said, may run anywhere between \$325 to \$800.
- **Material is inert.** The plastic makeup is resistant to corrosion, salt water, fungi, aromatic and non-aromatic fuels. Zenith reports that its tank withstands high humidity and temperatures ranging from -65F to 165F.
- **Minimum leakage.** Joints are sealed with a flexible bonding material which penetrates cracks and fissures for leak resistance, also providing the strong

DME NEWS FROM narco

NARCO DME PRODUCTION INCREASED

Many Aircraft Now Equipped With Distance Measuring Equipment as CAA Completes DME System

With DME fully operative at 246 VOR and ILS sites along all the major airways of the U. S., pilots of hundreds of DME-equipped aircraft are already enjoying the benefits and advantages of simpler, safer, more economical IFR and VFR operations.

Expedites Approach Procedures

DME is giving these pilots positive continuous position indication enroute, lets them hit ETA's precisely with minimum calculating. New, approved DME let-down procedures are cutting many minutes off approach time normally required.

Pilots can verify or locate most favorable winds aloft by checking ground speed accurately with their DME. They are saving money, getting there quicker and operating with far less strain now that they have DME on board.

Demand Increases for Narco DME

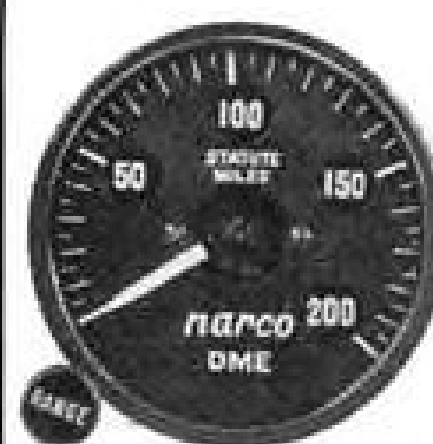
As one pilot tells another, the demand for DME as an essential piece of equipment for safer IFR operations has resulted in stepped-up production of the Narco DME, the only DME on the market with an unrestricted CAA Type Certificate for airline use.

The Narco DME is proving superior in every important aspect for reliability, accuracy and service ease.

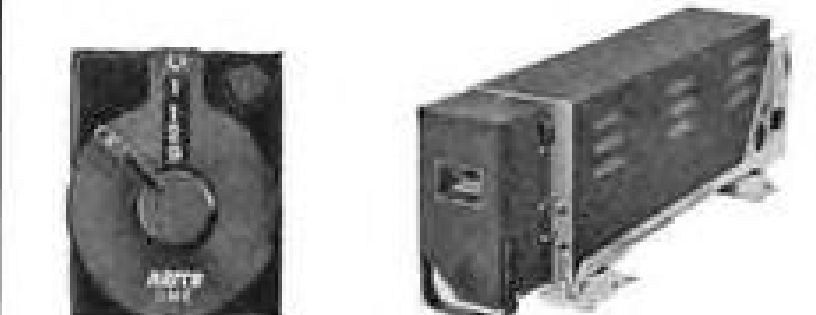
Crystal Controlled

Narco DME is the only one which is tuned by positive crystal control. It is lightest in weight and requires less power. It uses the most advanced circuitry and printed wiring to save space and weight. Tubes are ARINC ruggedized design for long life. Its unitized construction permits quick disassembly. The Narco DME is the first of the new Narco Sapphire line of air transport type equipment of finest possible quality.

TWO-SCALE INDICATION



Narco DME tells the pilot his slant distance from any VOR or ILS station equipped with DME (the majority are now so equipped) on standardized panel instrument. Pilot can select 0-200 or 0-20 mile scale by turning range knob. (Nautical mile scale also available.) Narco interrogator unit, which fits standard 1/2 ATR rack, is tuned to station by automatic crystal control with standard frequency selector switch. Total weight is 32 pounds.



Nation-wide Narco DME Service

To assure users of perfect operation of their DME, Narco has established a complete nation-wide service network. The radio service companies listed below are staffed with Narco factory-trained personnel and have complete DME test and service equipment:

Aerotran Radio Co., Tulsa, Okla.
Airborne Communications, Inc., Cincinnati, Ohio
Aircraft Electronics Co., Atlanta, Ga.
Anderson Aircraft Radio, Detroit, Mich.
Associated Radio Co., Dallas, Texas
Atlantic Aviation Corp., Teterboro, N. J.
Aviation Radio Sales & Service, Milwaukee, Wisc.
Bayaire Avionics Inc., Oakland, Calif.
Bohling Aircraft Corp., Chicago, Ill.
Matthews Electronics, San Antonio, Texas
Minnesota Airmotive, Minneapolis, Minn.
Piedmont Aviation Inc., Winston-Salem, N. C.
Reading Aviation Service, Reading, Pa.
J. D. Reed Company, Houston, Texas
Remmert-Werner Inc., St. Louis, Mo.
Roscoe Turner Aeronautical Corp., Indianapolis, Ind.
Santa Monica Aviation, Santa Monica, Calif.

Write for brochure on Narco Model UDI-1

FIRST OF THE
narco Sapphire LINE
NONE BETTER

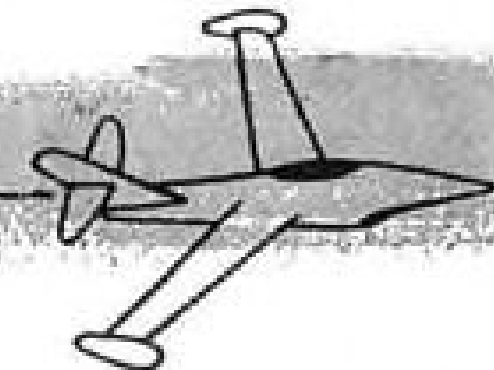
narco
NATIONAL AERONAUTICAL CORPORATION
Ambler • Pennsylvania

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,

Senior Member, Aviation Writers Assn.



If you talk with Whittaker field engineers, you'll find yourself hustling through a variety of subjects in short order, from football to females, but always the conversation comes back to the job... the problems, the successes and the people in the many places who are so helpful to the Field Engineers.

The names, themselves, mean little to me, for I have had little opportunity to meet the men with whom the Field Engineers do business. But the fact that Whittaker representatives speak most highly of them is sufficient accolade.

Unfortunately they can't all be listed. There are far too many. And, besides, I haven't been able to jot them all down as they have popped up in coffee conversations.

So, with your indulgence, I'll put them down name by name as I find them in my notebook — and apologize in advance to those I am sure to miss.

Congratulations, then, to Neil Dopheide, North American, Downey, "a great guy"; to Cliff Starr of Douglas, Long Beach, for his work on plug-in fuel control equipment; to Stu Brandt, Convair, San Diego, for fuel proportioning units, and Norm Howells for a facile purchasing job. To Bill Gurney for gas turbine developments at Solar Aircraft. To Ryan Aeronautical for the excellent Firebee drone; to Rohr Aircraft for superior power packages; and to Norm Knox of Convair, Pomona, for acknowledged expertise in gyros.

To Bill Slook and J. H. Walker of Fairchild Aircraft at Hagerstown... Slook for a smooth job as equipment engineer and for his elevation to assistant purchasing agent; Walker for promotion to equipment engineer. To Dick Muma for his able heading of Beech Aircraft's Long Tom project. To a whole group at Boeing, Wichita—Verne Hudson, aircraft project engineer; Joe Hickey and Tony Chipas, power plant experts; Johnny O'Neill and Ralph Wertz, B-47 hydraulic system aces; Clem Vail and Marion McClung, materiel director and assistant materiel director, respectively; Wally French in B-52 power plants, and Joe McCoy, Stratofort hydraulics.

To Hank Waring, T-37 project engineer for Cessna Aircraft, and Ralph Harmon, head of Cessna's new four-engine commercial project. To Chance Vought's hydraulic group leaders, Joe Ballentoni, Mort Bland and Bill Lehman. To CV's Norm Ross, Ken McRee and Dale Eagan, power plant group leaders; Andy Patton in the purchasing department, and Joe Bruno, the conscientious.

To Bud Moerschel, Jack Hicks and Jack Ray in the power plant department at Convair, Ft. Worth; to Wendell

Eldred, Pete Klevin and Harlan Dowell, Convair B-58 hydraulics; Slater O'Hare, D. A. Lilliwite and Ray Moldt, Douglas group leaders on the RB-66; Bill Furguson, Jack Butefish and Bob Austin in Douglas purchasing. To Sil Madison in hydraulics at Temco. To Al Lange in Allison production, Charlie McDowall, Allison chief controls designer. To Bill Rieke of Lockheed and Bob Mulligan, North American, Columbus.

To Bob Myers and Bob Rust of Northrop purchasing, and Chal Strayer and Jim Cassel of Northrop engineering. To the Lockheed gang—Jud Moelling and Joe Faulstich in purchasing; Dick DeGrey, T2V-1 engineering; Doyle Garrett, F-104A engineering, and Vern Bremberg, P2V-7 engineering. To Herb Hoffman, Ernie Pettit and John Bloom of Douglas El Segundo's hydraulic section, and Tom Abraham of the plant's engineering power plant section.

To Howard Stuverude, Boeing, Seattle, expert on the B-52 fuel system; to others at Boeing's Western plant—Ed Pfafman, assistant project engineer on the KC-135 jet trainer; John Fitzpatrick, heading the test group in the power plant staff unit; to Bob Burdick and Collins Clegg, buyers; to Stu Hudson.

To Ed Campbell, Dave Yonis and Mike Mifsud of Republic purchasing; to Irv Endig and Walt Doran, Republic F-105 hydraulic group and power plant group, respectively. To Gordon Leone, Pratt & Whitney purchasing; and Frank McIntosh, Canadair purchasing. To Bob Stapells, Canadair engineer for his outstanding role with the first joint meeting of IAS with the Canadian Aeronautical Institute. To Grumman's Al Weisskopf, F9F-9 hydraulics; and Norm Egloff and Ed Hald in Grumman purchasing. To Dave Harrison of A. V. Roe engineering and Eric Peters of the Navy's BuAer power plant branch...

To you all—and those I have inadvertently missed—congratulations on a year's job well done.

Thanks for your helpfulness to Whittaker's field men.
And the very best in 1955.

Advertisement

medium necessary to bond the structural components together. Experience has proved, Zenith says, that proper control of production processes will produce a tank which will not leak with aromatic or non-aromatic fuels.

• **High production.** Tank design and the materials used will permit high production rates with a minimum of labor, space and readily available standard machinery, the company reports.

• **Maintainability.** The tank is bonded with a material requiring no heat or pressure. Similarly, holes or cracks in the tank shell can be repaired quickly with patches, which can be applied without heat or pressure.

► **All-Plastic Except Hardware**—A description of Zenith's tank illustrates the design and makeup features of a reinforced-plastic expendable fuel hauler.

The tank is constructed entirely of fibrous glass-reinforced plastic materials with the exception of hanger brackets, fuel and air lines, filler cap and attachment nut and bolts.

The configuration conforms to the standard fuel tank design as specified by WADC and is intended for the 30-in.-span S-2 pylon shackle. It is interchangeable for right and left wings with no modification or disassembly.

► **Shipped Knocked-Down**—The unit is designed for a minimum nesting ratio of about 10:1. The tank can be removed from the crate, ready for field assembly in less than a half man-hour, according to Zenith. The tank also can be used as an assembly jig. The ability to package 10 fuel tanks in the space normally required for one tank should ease the problem of cargo space in haulage and storage space at bases.

The tank is shipped in five major sections—nose, tail and three 120-deg.-arc sections (skins), tongued-and-grooved to form the center cylindrical portion. In addition, there are two circular frames distributing the loads from the hanger brackets to the skins. A reinforced-plastic beam located between the forward and the aft frames resists the couple created by the combined loadings of the hanger brackets and sway braces. This beam is designed to withstand forcible ejection loads.

► **Bonding Mixture Goes Along**—Along with the knocked-down and nested components for 10 tanks, the crate also contains all the fittings, an assembly tension rod, and hermetically sealed cans of bonding compound and catalyst.

A mixture of the contents of one can of compound with that of a can of catalyst will set up and cure without heat or pressure to within 90% of its final bond strength within 40 min. from the time the mixture is applied to the mating surfaces, Zenith says.

► **Put-Together**—Tanks can be assembled, ready for attachment to aircraft in 1½ man-hours, the company



A. M. (Tex) Johnston (right), Chief of Flight Test, and R. L. Loesch, Senior Test Pilot, check the "707" before a test flight.

Boeing's jet transport is off to a good start

Day by day a big jet airplane is writing history in the sky over Seattle. The Boeing Stratotanker-Stratoliner has exceeded practically every expectation of its designers.

In the week following its first take-off, the 707 flew on six of seven consecutive days. By early October it had completed the entire first phase of flight tests, and today is far ahead of schedule. It handles well in the air, and fuel consumption has proved surprisingly low. Impressed by its performance, the Air Force has ordered a tanker version of the prototype airplane into production.

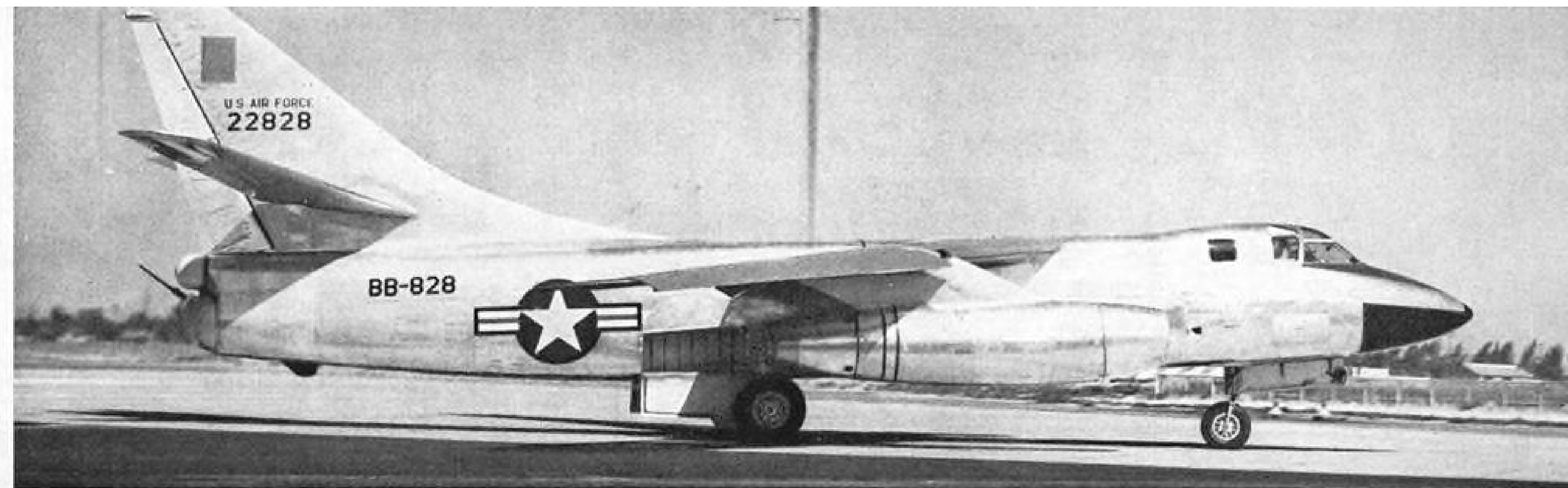
What lies behind the early success of this revolutionary transport? One factor is Boeing's unparalleled experience in designing and building multi-jet aircraft. Another is exhaustive research in the company's own trans-sonic wind tunnel, to achieve efficient airfoil and wing characteristics. And a third is sound production skill. The 707 incorporates many thoroughly tested features from other Boeing jet aircraft. For example, pod suspension of engines increases both safety and ease of maintenance.

The Stratotanker-Stratoliner inherits aerodynamic principles proved in more

than a thousand Boeing six-jet B-47 bombers and in the eight-jet B-52 which now is in quantity production to become America's front-line heavy-bombardment weapon.

In addition, in the period since World War II, Boeing has produced more than 600 military C-97s and 56 commercial Stratocruisers. The C-97s perform almost all the aerial refueling operations of the U. S. Air Force. They also serve as high-priority personnel and cargo transports. The Stratocruisers are the acknowledged queens of transocean passenger service.

BOEING



Side view of bomber shows sleek lines. It is first production aircraft to have an elevated ambient temperature a-c electric system.

Latest Air Force bomber has new G-E engineered power-generating electric system

NEW GENERAL ELECTRIC ENGINEERED SYSTEM MEETS DOUGLAS B-66 OPERATIONAL DEMANDS FOR HIGHER AMBIENT TEMPERATURES

A new a-c electric power-generating system has been developed by General Electric, and is now operating on the Air Force's newest light bomber, the Douglas B-66. The system consists of three major components: high-efficiency alternators, static voltage regulators, and generator control and protective panels.

DESIGNED FOR HIGH PERFORMANCE AIRCRAFT

With a generator that can operate at high ram-air temperatures of high speed flight, the new G-E system is designed for long life and reduced maintenance time. Its static voltage regulator has no moving components to wear out, and under laboratory testing it has withstood 5000 hours of operation without maintenance.

Regulation is preset, and requires no pilot adjustment of voltage or load division. The control panel supplies the automatic control of start-up, shut down, and maximum

protection against ground fault, over and under excitation, and open phase.

SPEEDS TAKE-OFF, SPARES PILOT

The new equipment begins operating as soon as the pilot starts the engine. The system contains only two toggle switches, which may remain "on" at all times, even when a fault develops. This eliminates a series of pilot functions and sharply reduces the time required to become airborne. Under normal conditions, fault clearing and resetting are fully automatic.

SINGLE SOURCE FOR COMPLETE SYSTEMS

General Electric offers a single source for complete a-c or d-c power generating systems and constant speed drives for most aircraft. For more information, contact your nearest G-E aviation specialist, or write Section 210-92, General Electric Company, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL  ELECTRIC

Static regulator (left) maintains constant alternator output voltage. Control and protective panel (right) helps locate and isolate faulty generation.

New G-E high-efficiency a-c generator has no harmonic over 1%; produces full rating when exposed to high temperatures in high speed aircraft.

Tests of system showed better protection against over voltage, over and under excitation, ground fault, anti-cycling, difference current, and open phase.

Douglas B-66 takes off at Long Beach, California, for its test run. Its electrical system was designed by G-E application engineers to deliver rated load with 80° C cooling air.

GENERAL  ELECTRIC



AERO COMMANDER CHOOSSES OKLAHOMA



R. T. Amis, Jr.
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We chose Oklahoma because of a combination of factors: necessary physical facilities, a ready and interested labor supply, a stimulating economic attitude, and a climate favorable to production. All this, plus a CENTRAL GEOGRAPHIC LOCATION makes us LIKE Oklahoma.

*AERO
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FOR FURTHER DETAILS...

These same favorable factors will assist you in having a more profitable operation in Oklahoma. Write to the Oklahoma Planning and Resources Board for complete information relating to the aircraft industry in Oklahoma.

**Famous Aero Commander
Twin Engine Airplane...
Made in Oklahoma
Used All Over the World!**

Aero Design and Engineering Company, makers of the world-renowned Aero Commander, selected a choice plant site in the heart of the nation when they moved to Oklahoma. Their prime requisites included a central location to eliminate long hauls on supply and delivery, a receptive community, a large, willing labor pool with a good mental attitude toward production, and a climate suitable for the aircraft industry. The Tulakes Airport area, near Oklahoma City, filled all requirements and is now their permanent production site.



says. Here are the simple, general steps in the assembly of the 450-gal. plastic tank in the field:

- Forward and aft frames are bolted to the longitudinal beam.
- Hanger brackets, assembled with studs, are inserted through bracket pads, gaskets and top center-section skin.
- Beam and frames are bonded and bolted to inside of center-section skin, and ejection pad is installed.
- Lower center-section skins (two) are bonded to each other and to upper center skin section and to the frames. Straps secure the bonded joints.
- Plumbing is installed in the center section. This piping includes the fuel outlet and the pressure vent assemblies.
- End sections (nose and tail) are assembled to the center section in the fixture. The tension rod is inserted through the complete assembly from nose to tail. Nose and tail cone are bonded to the center section and held in place by nuts on the tension rod.
- After bond has cured, tension rod is removed. Plugs are inserted in the rod holes and bonded in place.

► **Air-Blown Preforms**—Zenith's tank is designed to use the air-blown preform process. Here's how it's made:

- In the preform operation, strands of glass fibers are fed into an automatic chopper for cutting to short lengths. The chopped strands are blown into a preform chamber where, by partial vacuum, they are collected on a metal screen having the shape and size of the part to be molded. At the same time, a quick-drying binder is sprayed on so that the material will hold its shape.

- After desired thickness and density of fibers is obtained on the preform, the screen with preform on it is placed in an oven. Heat quickly cures the binder, cementing the fibers so that the preform may be taken off the screen and handled without losing its shape.

- Preform is placed in die on press. Liquid polyester resin is poured into the preform, and male part of the die is brought down for molding. Steam heat and pressure causes the resin to flow through the Fiberglas strands, molding and curing the preform into a strong, lightweight shell. After about three minutes of heat and pressure, the dies are opened and the molded part removed.

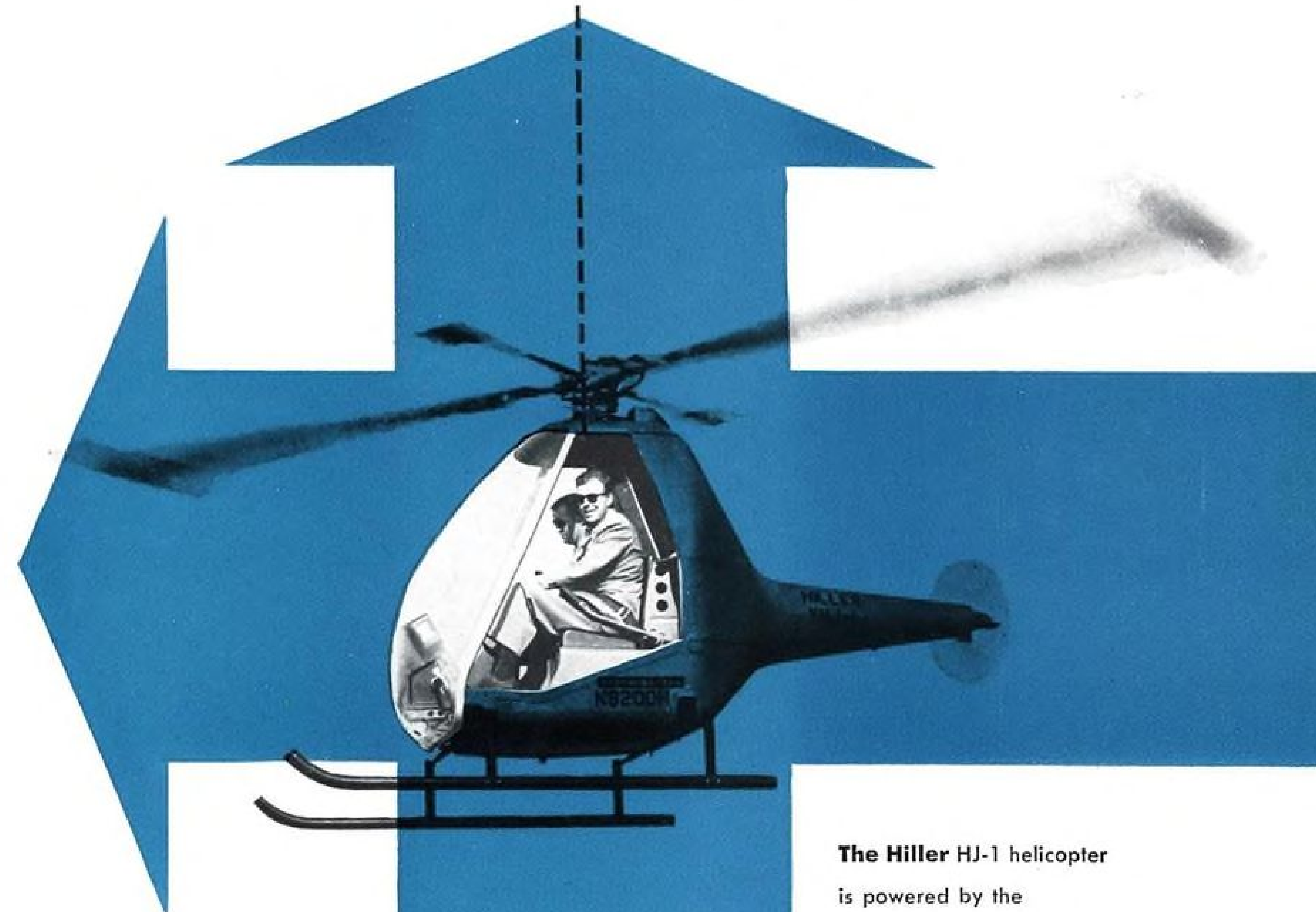
- Placed in a shrink fixture, the molded part cools to precise shape and dimension.

- A trimming fixture is used to remove flash and excess material.

- No painting or treatment of the tank is necessary unless it is desired to make the nose portion resistant to rain erosion by coating it with material which has successfully been used on radomes. Installation of metal fittings and attachment parts complete the components of the tank.

VISIBILITY by Swedlow

IN THE HJ-1 HILLER | RAM JET HELICOPTER



The Hiller HJ-1 helicopter

is powered by the first ram jet engine in the U. S. to receive C. A. A. certification. It is notable for its large transparent canopy, with the unusual visibility required for its large variety of missions, including training, liaison, reconnaissance, aerial photography and command. The HJ-1 canopy is an outstanding example of the optical perfection of Swedlow-produced components in transparent glazing materials. For specific applications, contact the Swedlow plant nearest you.

**Swedlow
PLASTICS CO.**

LOS ANGELES, CALIFORNIA • YOUNGSTOWN, OHIO

Leadership demands constant achievement



Map shows major routes of these 18 Super Constellation airlines:

(Figures represent total unduplicated route miles for each airline.)

-  Air France 162,000
-  Air-India International 16,100
-  AVIANCA (Colombia) 28,500
-  Cubana (Cuba) 8,600
-  Deutsche Lufthansa (Germany) 11,200
-  Eastern Air Lines 12,700
-  Iberia (Spain) 41,000
-  K.L.M. (Holland) 144,000
-  LAV (Venezuela) 16,700
-  Northwest Orient Airlines 17,300
-  Pakistan International 5,200
-  QANTAS Empire Airways 68,800
-  Seaboard & Western (All-cargo routes applied for)
-  TAP (Portugal) 11,300
-  Thai Airways (Thailand) 19,700 (proposed)
-  Trans-Canada Air Lines 19,000
-  TWA-Trans World Airlines 33,000
-  VARIG (Brazil) 19,000

Insignia on map show airline headquarters.

Every month another airline starts Super Constellation Service

To you this means that soon you can fly more places faster, in greater comfort than ever before . . . on big, fast, luxurious transports that are world-renowned for dependability—Lockheed Super Constellations . . . now with turbo-compound power.

Already more new Super Constellations are being built to airline order than any other comparable air transport . . . ordered by more than twice as many leading world airlines. So many, in fact, that every month during 1954 a different airline started Super Constellation service. This record is continuing in 1955.

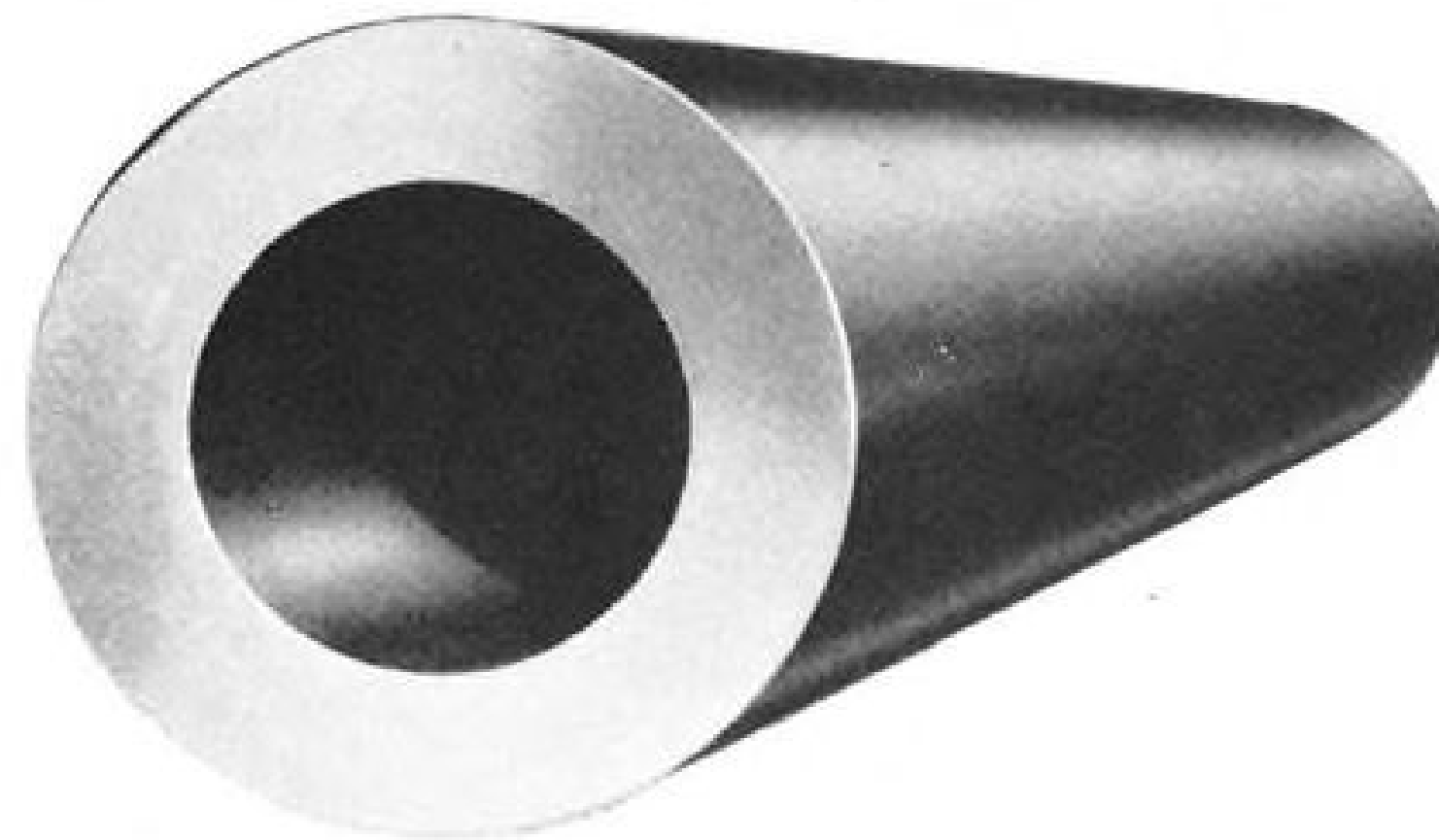
More world airlines (18) have ordered the Super Constellation than any comparable transport—worth remembering next time you fly.

Lockheed

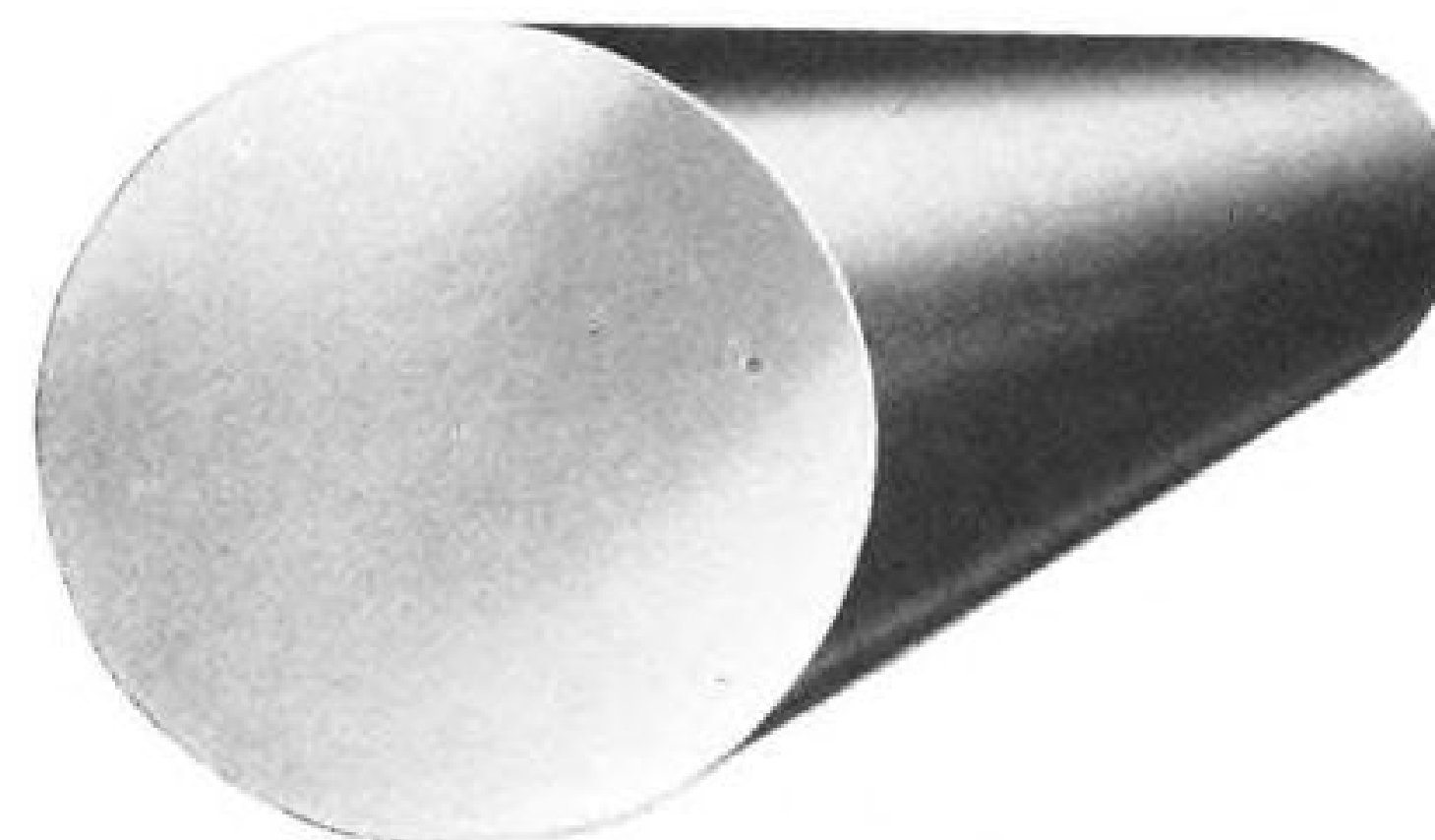
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BURBANK, CALIFORNIA, AND MARIETTA, GEORGIA
Look to Lockheed for Leadership

When you make hollow parts...

**Start with
seamless tubing**



**instead
of bar stock**



Save steel, machining time!

WHEN you make hollow parts from bar stock, you waste time boring the center hole—you waste steel because you have to throw away the chips you bore out. Why not do it the easy, economical way? Start with Timken® seamless tubing. The hole's already there! Finish boring is often the first production step. You cut machining time—get more parts per ton of steel.

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will study your problem and recommend the most economical tube size for your hollow parts job, guaranteed to clean up to finish dimensions.

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YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

PRODUCTION BRIEFING

► Forward fuselage sections for the Douglas A3D Skywarrior twin-jet Navy bomber will be built by Western Sky Industries, Hayward, Calif.

► Accessory Products Corp., maker of pressure regulators, valves, filters and allied products, has opened a \$65,000 addition to its Whittier, Calif., enlarging present facilities by about 9,000 sq. ft.

► New record for suggestions and ideas adopted is expected to be set by employees of Boeing Airplane Co., Seattle, for 1954. Up to November, management had adopted 1,888 suggestions, more than 200 above 1953, while awards totaled nearly \$110,000, approximately \$5,000 higher than 1953.

► Kaman Aircraft Corp. has opened a new 28,000-sq.-ft. flight test hangar at Bloomfield, Conn., which includes research labs, experimental shops and test and development engineering facilities.

► Columbia Machine Products, Inc., Brooklyn, N. Y., airframe and engine components maker, has completed a \$750,000 facility expansion program and realigned sales offices as follows: New York-New Jersey, 1025 W. 8th St., Plainfield, N. J.; Atlantic South-eastern-New England district, 5641 Diamond St., Philadelphia; Midwestern district sales office at Cincinnati, is continued.

► USAF has switched helmet styles for jet crew members from cotton-duck type to fibrous-glass plastic version and given an initial order for 2,200 of the new helmets to Selby Shoe Co., Portsmouth, Ohio, at a price of \$20.46 each.

► F-100 wing spars will be built at Servel, Inc.'s Evansville, Ind., plant. Company has been a subcontractor on Boeing B-52 and Republic F-84F and F-84G.

► Doelcam Corp., Boston, maker of precision instrument and control equipment, has been purchased by Minneapolis-Honeywell which will operate it as a new division.

► Robertshaw-Fulton Controls Co., Greensburg, Pa., has renamed its Anaheim Division the Aeronautical Division. This California division produces more than 70 different devices for civil and military planes and guided missiles.

► AiResearch, Los Angeles, has licensed Normalair, Ltd., England, to manufacture overseas the U.S. firm's turbines and pneumatic controls. Agreement has

been approved by State Dept., which has also approved another licensing arrangement between AiResearch and Rotol, Ltd., England, permitting latter firm to make AiResearch air turbine motors and ram air turbines.

► Kaiser Metal Products, Inc., Bristol, Pa., has been awarded a contract by an unnamed engine firm for fabrication and assembly of a number of intricate stainless steel sheet metal jet engine components. It is not a production job, but a potential for quantity orders exists, a Kaiser official notes.

BuAer Contracts

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

TEST INSTITUTE CORP., Cleveland 9, design data of hydraulic system components, tests, \$91,980.
HAMILTON STANDARD DIV., United Aircraft Corp., Windsor Locks, Conn., air turbine starters, 537 ea., \$1,060,300.
ATLAS FILM CORP., Oak Park, Ill., training films, 3 ea., \$41,216.
EMERSON ELECTRIC MANUFACTURING CO., St. Louis, design, study of soft spring recoil adapters, prototypes, reports, 6 ea., \$69,767.
RADIOPLANE CO., Van Nuys, Calif., modification of target drones, 20 ea., \$172,578.
RUFF, INC., Miami, Fla., modification of bomb rack and rocket launchers, 2,206 ea., \$68,800.

USAF Contracts

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

Aeroflex Labs., Inc., Long Island City, N. Y., torquer mounts and data, 5 ea., vertical mounts, 10 ea., vertical computing system, 10 ea., \$684,575.
Allison Div., General Motors Corp., Indianapolis 6, modify and convert J33-A-33/A engines to J33-A-41 engines, 31, \$248,000.
Espey Mfg. Co., New York 21, converter amplifier, spare parts and handbooks, 75 ea., \$89,846.
Delco Prod. Div., General Motors Corp., Dayton, starter generators, 649 ea., \$259,600.
Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., indicators, type ME-2, 257 ea., \$92,512.
Eddystone Div., Baldwin-Lima-Hamilton Corp., Philadelphia, power units, 3 ea., \$753,400.
National Supply Co., Engine Div., Springfield, Ohio, power unit, 1 ea., \$147,296.
Kollsman Instrument Corp., Elmhurst, N. Y., speed indicators, type ME-2, 257 ea., \$93,088.
Pacific Optical Corp., Los Angeles, lens assys., 674 ea., \$39,092.
Pastushin Aviation Corp., Los Angeles 45, kit, install. of external store pylon, F-86F, 1,495 kts., \$2,989,582.
Sperry Gyroscope Co. Div., Sperry Corp., Great Neck, L. I., N. Y., synchronizing generators, 604 ea., \$92,980.
Western Electric Co., New York, overhaul, repair and mod. of radar set, \$3,000,000.
Air Prod., Inc., Allentown, Pa., conversion and overhaul of nitrogen generators to oxygen generators, 5 ea., \$60,000.
Aircraft Gas Turbine Div., General Electric Co., Cincinnati 15, spec. tools and equip., \$110,000.

WE'RE LOOKING FOR ENGINEERS WITH ABILITY

Stratos—now developing new air-conditioning systems, air-turbine drives, controls and other pneumatic accessories for aircraft and industry—is interviewing well-qualified men as

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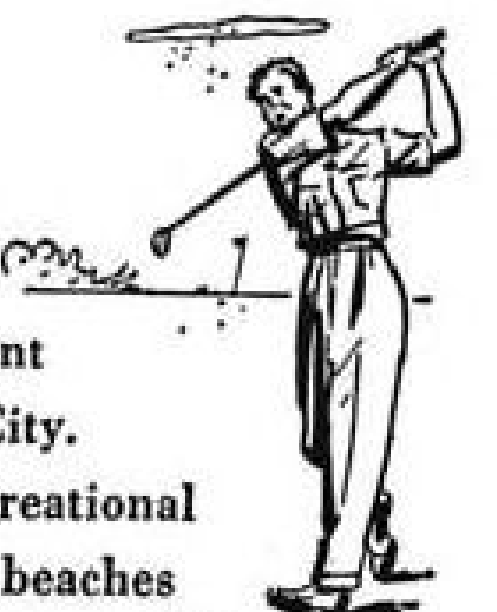
Several—Intermediate and Junior.

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Seniors and Juniors.

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Excellent housing available in area. Convenient to New York City. Wonderful recreational facilities. Fine beaches—Fishing, Boating, Golfing.



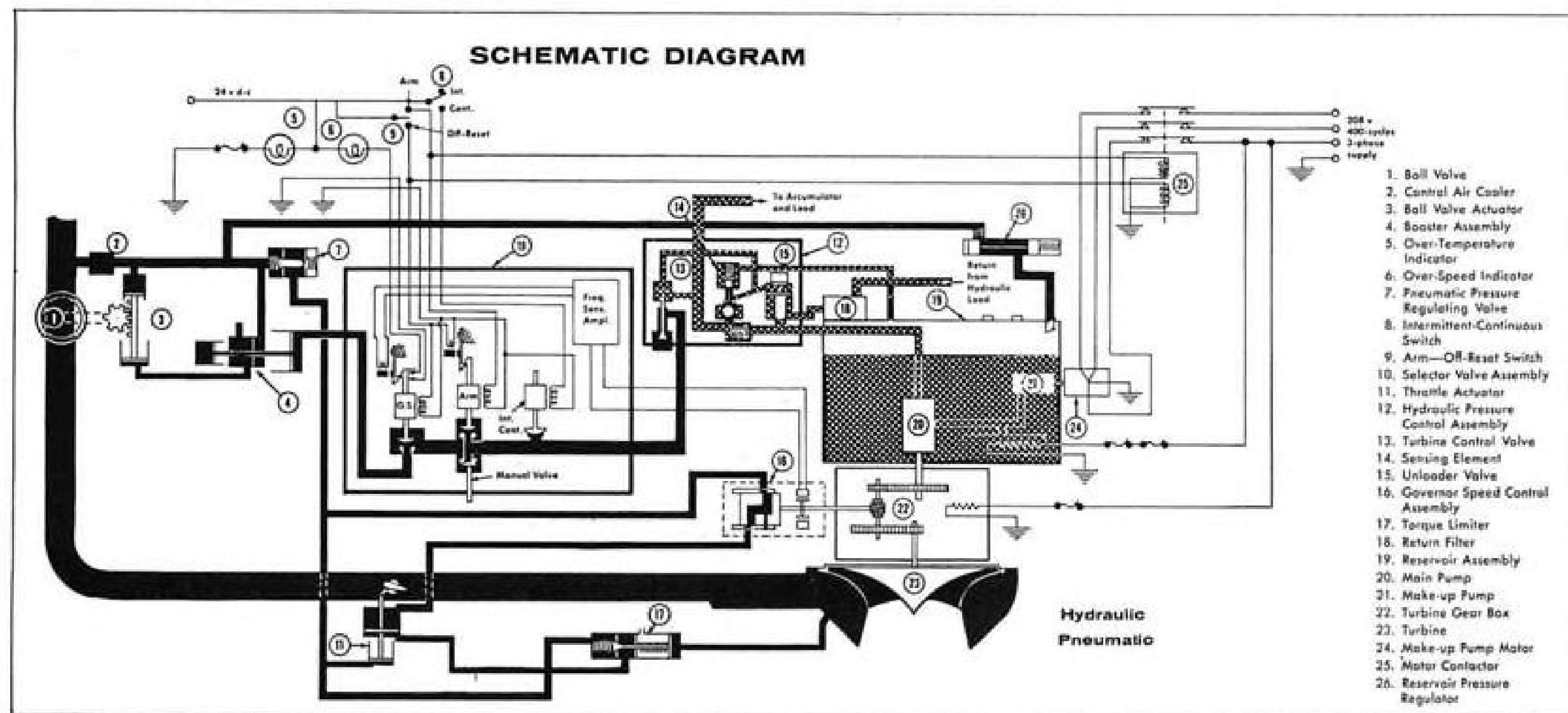
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A Division of Fairchild Engine & Airplane Corporation

BAY SHORE, L. I., N. Y.

Manufacturers of air-conditioning equipment and pneumatic accessories for high speed aircraft.

EQUIPMENT



TH1 TURBO HYDRAULIC POWER PACK uses energy of air, piped from distant jet engine compressor, to produce hydraulic power.

Remote Packs Provide Hydraulic Power

A new approach to furnishing power for aircraft hydraulic systems is being evolved by Jack & Heintz. Materializing as the TH1 Turbo Hydraulic Power Pack, the concept results from a development contract given by Boeing for design of a pneumatic-driven hydraulic power source for a plane such as the eight-jet B-52 bomber. In the B-52, ten of the packs would be required.

Three of the units have been built and are under test.

J&H's approach is to locate the power packs remotely from the power-plants (four each in fuselage and wing, two in the tail) and to make each unit completely self-sufficient.

► **Pneumatic to Hydraulic**—The packs' job is to convert pneumatic energy into hydraulic energy. This is done by piping compressed air from the plane's J57 turbojet compressor sections to the TH1's pneumatic side where an air turbine drives a pump to supply power to the aircraft's hydraulic systems. Pneumatic side of the power pack was developed and is being supplied by Stratos Division of Fairchild Engine & Airplane Corp.

The TH1 is capable of on-off operation and it wraps all of its components up in one, compact package.

The on-off feature provides air economy. Air to drive the units is bled from the engine only during the comparatively infrequent periods when hydraulic power is required aboard the plane. So, the engines are sapped of power for only a fraction of the flight's

duration. This in turn is translated into more economical fuel consumption, which means greater range or increased payload. In addition, these periods of idleness reduce wear on the packs. However, the packs can be operated continuously, if desired.

Wrapping up all hydraulic and pneumatic components into one package

means shorter lines, both hydraulic and pneumatic, between individual units, resulting in weight saving. And having everything together saves space.

Another feature, important from a logistics and maintenance standpoint, is that each of the 10 power packs is designed so it would fit into any of the 10 locations aboard the B-52, for instance, without modification.

► **TH1 Characteristics**—Jack & Heintz engineers outline these characteristics for the power pack:

- TH1 has operated successfully with inlet air at 151 psia. and 746F, conditions presented by the J57.

- Makeup pump and motor are built integrally into the pack, saving weight through the elimination of hydraulic lines between pump and pack and shortening power lines.

- Main hydraulic pump of two different manufacturers may be used with the pack because design makes provisions for such a contingency.

- Internal components of the reservoir, including the makeup pump, are all accessible by removing the cover.

- Turbine gearbox is self-cooled. Bottom is finned and a heat shield is placed between the turbine and gearbox. Also a small "fan" is mounted on the turbine drive shaft to help in cooling. This eliminates any requirement for supplemental blowers to supply cooling.

- Turbine gearbox is lubricated with MIL-L-7808 oil. Since this is the same oil used in the J57, logistics and serv-

Power Pack Data

Model—TH1

• Rating

Output—8.4 gpm. at 2,700 psi.
Altitude—60,000 ft.
Ambient temperature—-65 to 160F.
Reservoir hydraulic fluid capacity—400-1,000 Cu. In.
Hydraulic fluid—MIL-O-5606
Weight (dry)—109.6 lb.
Dimensions—27 x 18½ x 13 in.

• Main System

Cut-in pressure—2,800 psi.
Cut-out pressure—3,050 psi.
Pump output—7.9 gpm. at 2,700 psi.
Turbine input at 45,000 ft.—14.5 lb./min. at 8.5 psig., 750F.
Operation—Intermittent or continuous.

• Make-Up System

Cut-in pressure—2,900 psi.
Cut-out pressure—3,050 psi.
Pump output—0.5 gpm. at 3,000 psi.
Motor input—5.5 amp. at 208 v., 400 cps. 3 phase.
Operation—Continuous.

Aircraft Engineers



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says R. W. Middlewood, Chief Engineer

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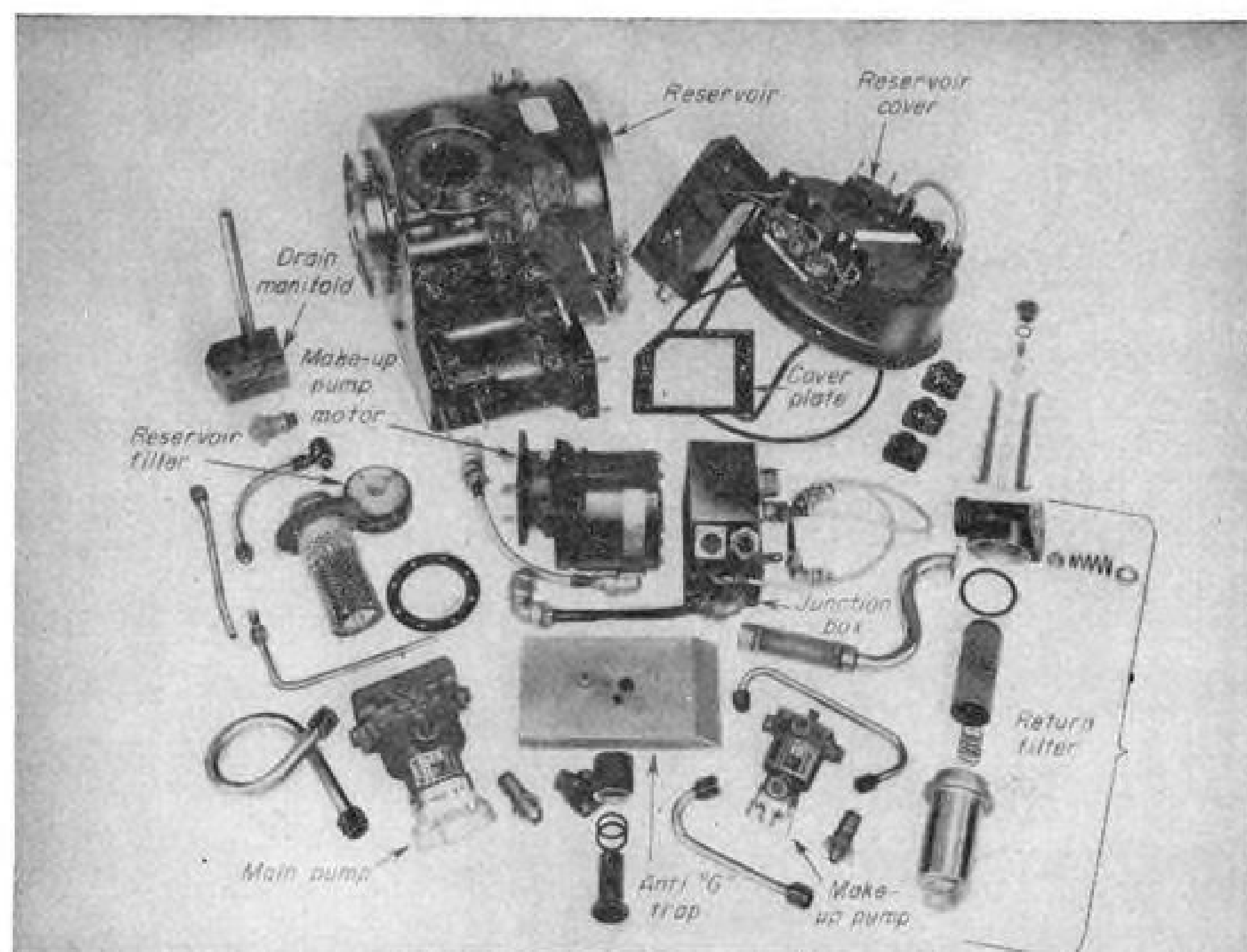
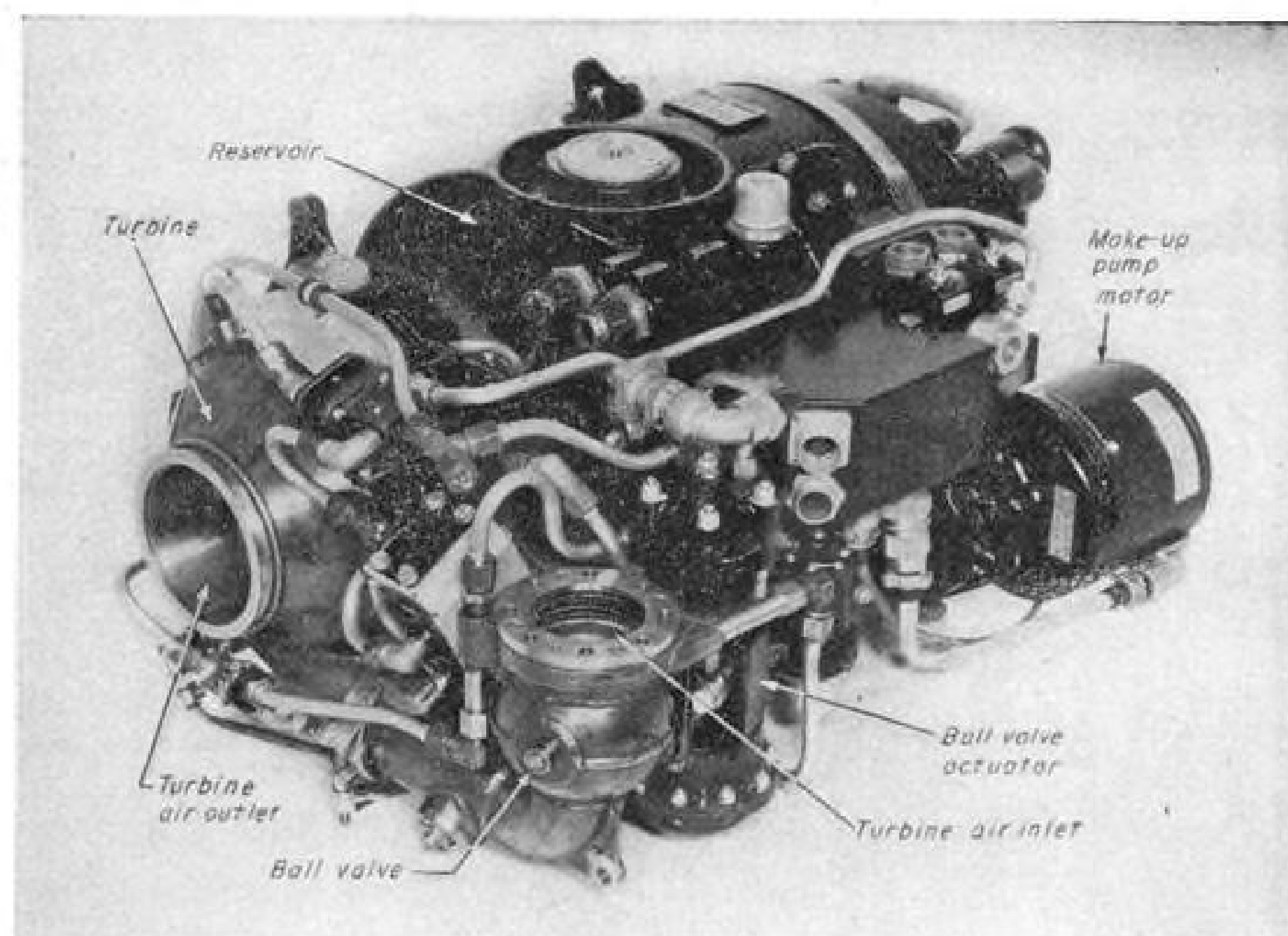
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STRUCTURES • SERVICE MANUALS
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LOCKHEED
AIRCRAFT CORPORATION

Marietta, Georgia



NEW JACK & HEINTZ POWER PACK, shown assembled at top and exploded, below.

ice problems are simplified.

- **Overspeed protection** is self-contained and is independent of any power on the airplane—*a.c.*, *d.c.*, pneumatic or hydraulic.

- **Speed transients** are limited to 10% of rated values. Controls return to normal (within 5%) in 0.6 sec.

- **Single overboard drain** serves the entire pack. It drains the main and makeup pump shaft seal chambers, reservoir and turbine gearbox scuppers, and reservoir pressure relief valve.

- **Pack uses no critical materials.**

- **How They Are Used**—Here is how the TH1 packs would be used and located in the B-52:

- **Utility pack** (four per airplane): Used to retract and extend main landing

gear; actuate main wheel brakes; actuate main landing gear steering and open and close bomb bay doors.

- **Wing pack** (four per airplane): Used to extend and retract wing spoilers; extend and retract outrigger landing gear; actuate flapperons (only on prototype aircraft).

- **Empennage pack** (two per airplane): Used to adjust stabilizer angle of attack.

This would be a typical use of the packs from beginning to end of a combat flight: packs are turned on during engine start, and are tested by checking braking and steering. After takeoff, packs are shut down by a limit switch as soon as the main landing gear retracts. Before the bombing run, packs

are turned on in the "continuous" condition so they will be operating constantly whether there is demand for hydraulic pressure or not. After bay door operation, packs are turned to the "off" position.

During let-down, units are energized in the automatic "on-off" position to supply hydraulic power to extend the landing gear and for braking and steering on the ground.

► **Three-Way Operation**—The TH1 pack can be operated in three different ways:

- **Normal.** This is the on-off condition with the pack automatically cutting in when the hydraulic system demands power and cutting out when the system power requirements have been satisfied.

- **Continuous.** Turbine and pump operate continuously. Hydraulic pressure is supplied to the plane's system as required. If not, fluid is returned to the reservoir through an unloading valve.

- **Manual.** In case of 24-v. *d.c.* failure, a valve in the packs may be operated manually to make the units run intermittently.

► **How It Works**—The following description of the TH1's operation is keyed to the drawing on p. 48.

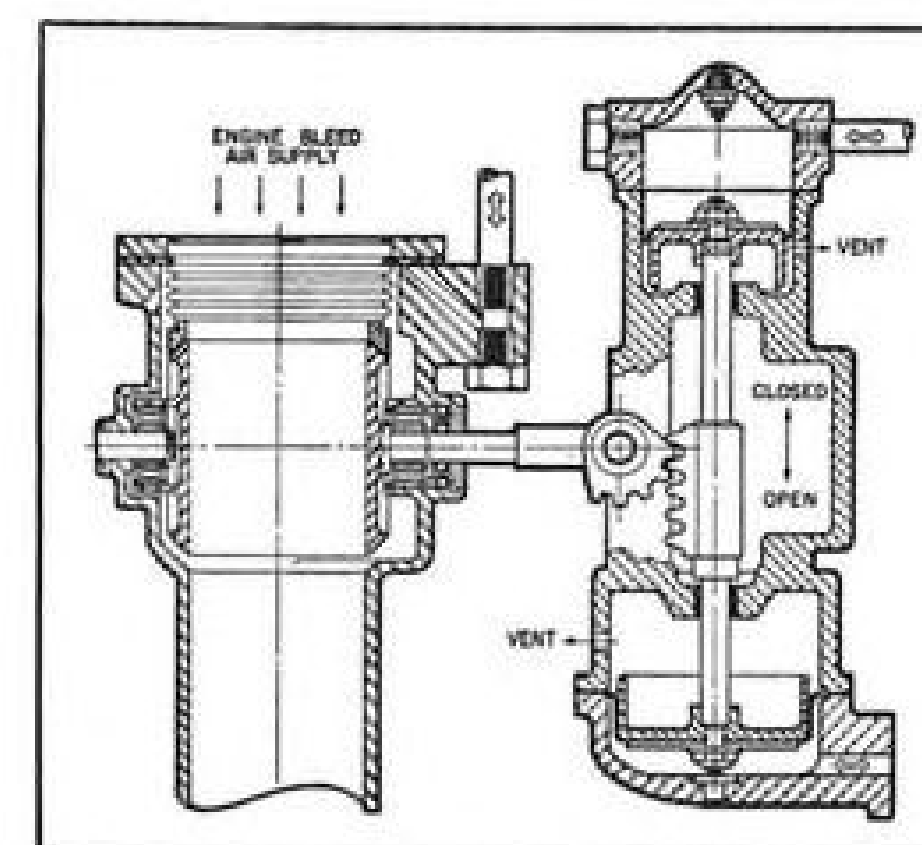
Assuming that the packs have been set at the automatic, on-off position, if pressure in the main hydraulic line from pump to plane's system drops below a prescribed figure, the turbine control valve (13) opens. This allows control air to be bled from the air inlet through the booster assembly (4), through the overspeed valve (O.S.), through the arm valve, past the intermittent-continuous valve to the turbine control valve.

Positioning of the booster assembly causes the ball valve actuator (3) to open the ball valve (1), allowing turbo-jet compressor air to flow to the pack's turbine (23) which drives the main hydraulic pump (20) through the turbine gearbox (22).

The makeup pump (21) operates continuously as long as the pack is turned on, being driven by an *a.c.* makeup pump motor.

When demands on the hydraulic system have been satisfied, unloading valve (15) switches hydraulic pump output from the plane's system to the pack's reservoir. An adjacent check valve keeps system pressure from backing into reservoir. The turbine control valve closes, shutting off flow of control air through the booster assembly which shifts position, causing the ball valve actuator to close the ball valve which shuts off the turbine's air supply. The only unit left operating is the makeup pump. The pack is ready for instant operation as soon as the hydraulic system requires it.

► **Continuous and Manual**—To make



LOW LEAKAGE, low pressure drop are features of Stratos-developed ball valve, left. Valve actuator is at right.

the pack operate continuously, pilot electrically opens the intermittent-continuous valve. This allows control air to flow through the booster assembly independent of the position of the turbine control valve's position. Then the same sequence of operations takes place as when the latter valve is actuated.

If *d.c.* power fails, pilot opens the "manual" valve remotely which allows the pack to operate intermittently.

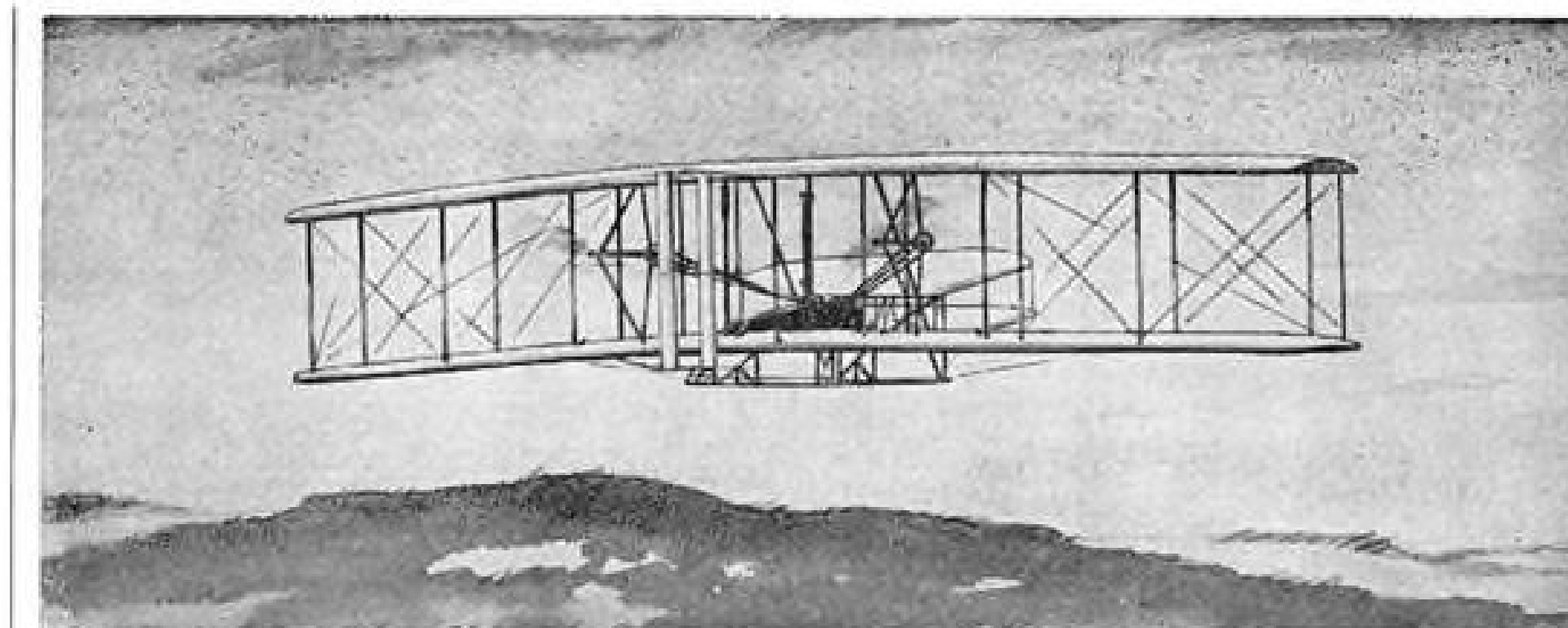
► **Pack Parts**—Other components of the pack are a throttle actuator (11) which governs the speed of the turbine by controlling a throttle valve in the main air line to the turbine. The throttle actuator is controlled by a governor speed control assembly (16) which is driven from the turbine gear box. A torque limiter (17) momentarily controls the throttle actuator to prevent any overspeed conditions which might result from high-pressure air impinging on the turbine wheel when the throttle valve is wide open. By closing the latter, the torque limiter keeps turbine acceleration and speed within acceptable limits.

The makeup pump, rated at 0.5 gal./min., makes up pressure drops caused by system leakage.

Two other components in the control air circuit are an air cooler and a pneumatic pressure regulating valve. Also in the pneumatic side of the pack is a reservoir pressure regulator.

► **Major Components**—These are the major components of the TH1 power pack:

- **Reservoir assembly.** In addition to serving as an oil storage unit, the reservoir mounts several of the pack's hydraulic items, including main and makeup pumps, a common inlet manifold for the two pumps, an anti-G trap, and the electrical junction box to which all electrical connections to the airplane are made. (An electrical circuit diagram is mounted inside the cover to help maintenance personnel). The air pressure regulator is secured to the reservoir while the pressure re-



$$F = C \frac{\rho}{2} S V^2$$

IN 1903, when the Wright Brothers were constructing the first successful powered airplane, there was data available on the forces on flat plates held at various angles in the wind. The problem of maintaining equilibrium presented the greatest difficulty of solution. The Wright Brothers had to depend on ingenuity, perseverance, courage and a home-made wind tunnel for solutions to their problems.

TODAY, IN 1954, aircraft development and production depend on the scientific skill of highly trained Engineers. During the past 50 years these Engineers have evolved countless formulae, such as the *Force-In-Pounds* equation above, to help provide simple solutions to aeronautical problems which once seemed insurmountable.

IN THE YEARS AHEAD, sub-sonic, trans-sonic and super-sonic problems will give way to hyper-sonic inquiries as new and greater opportunities challenge Aeronautical Engineers. If progress is to be made, new ideas are needed. New formulae must conquer problems of stress, space, loads and high speeds.

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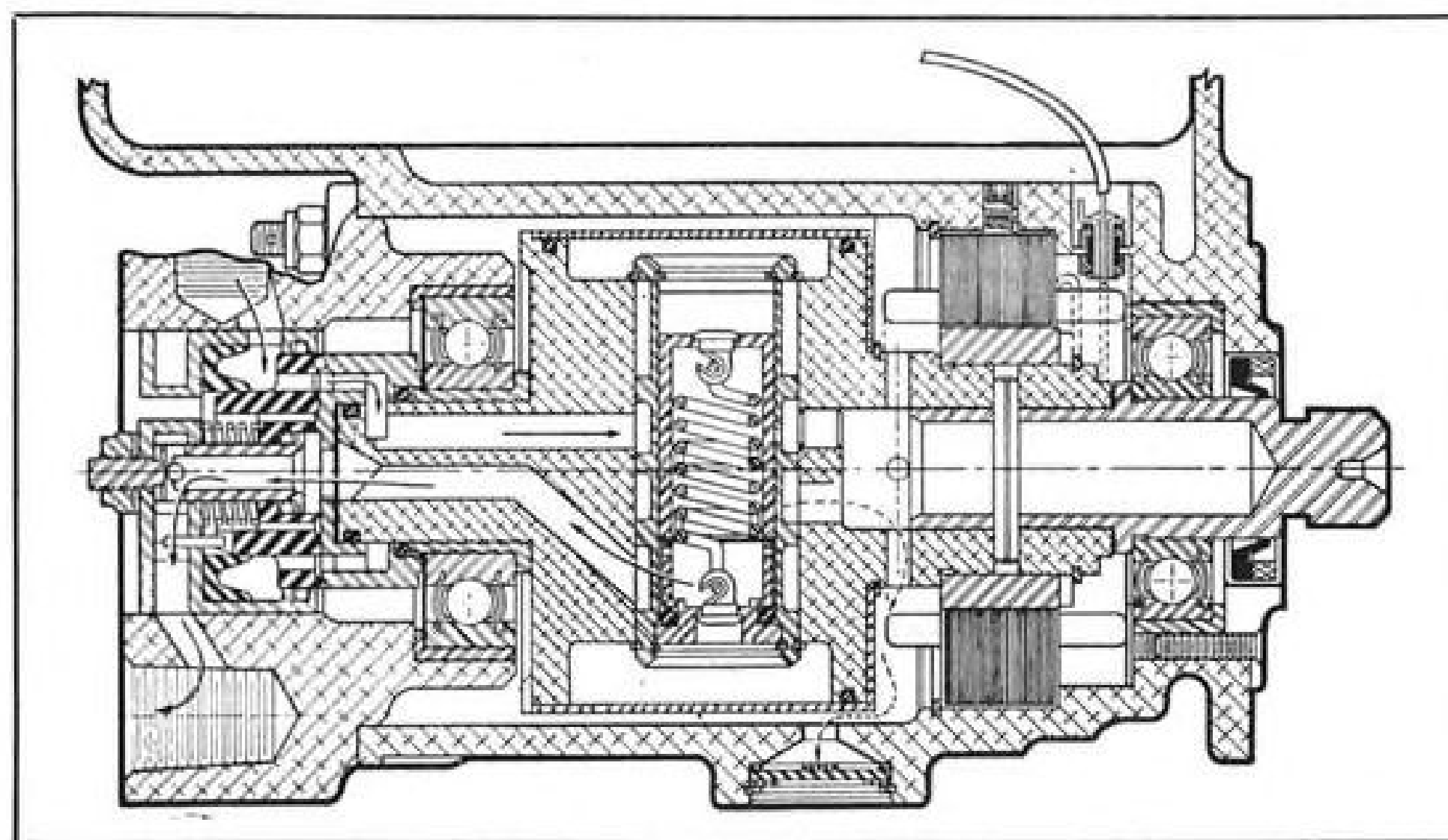
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North American facilities include supersonic wind tunnels. Construction will soon begin on a new 7 x 7 foot tri-sonic wind tunnel. Company engineers also conduct research and development at government testing facilities throughout the country.

For additional information, please forward resume to:

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WHEN TURBINE reaches 98% rated speed, governor speed control (center) and overspeed generator (right) take over. Operation is described in more detail below.

lie, thermal cutoff and vacuum relief valves are integral with the reservoir.

The reservoir cover assembly contains, among other things, the reservoir heater and two thermal switches. Switches are set at -20F and zero, respectively, to provide normal and over-heat protection.

• **Ball valve.** J&H says that Stratos engineers developed "a highly satisfactory ball valve which presents negligible resistance to air flow in the open position through a 2.25-in. bore and possesses extremely good sealing characteristics when in the closed position. Leakage rates are far below specification requirements (leakage has been measured at .07 lb. air/min. at maximum engine bleed conditions) reducing engine bleed air leakage losses to a minimum."

A carbon seal having a polished, conical seat makes line contact with the ball, while a stainless steel bellows

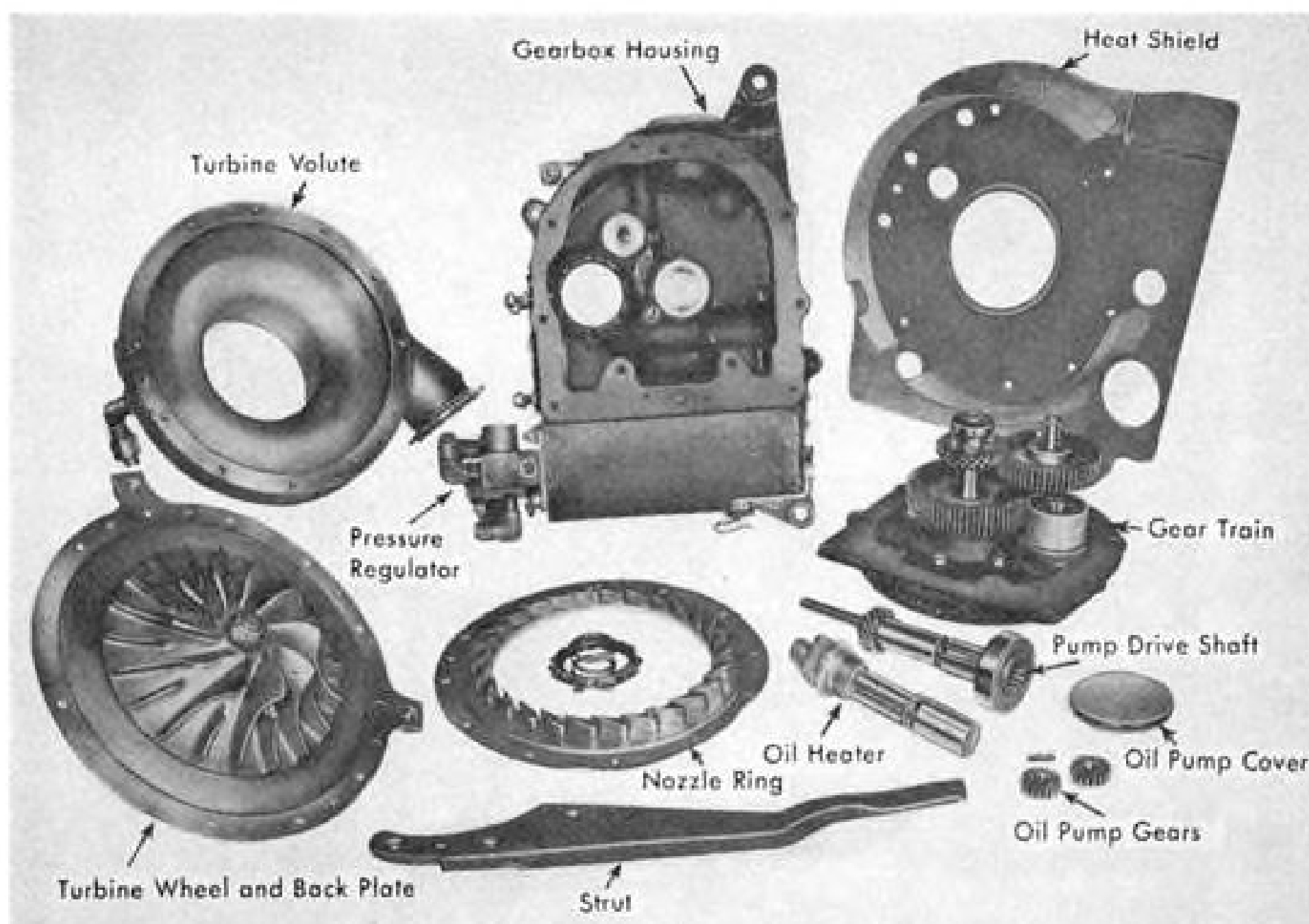
provides circumferential sealing. The ball valve is positioned by the ball valve actuator through a rack and pinion.

• **Governor speed control assembly.** This unit, also developed by Stratos, is made up of two basic parts: a metering air valve and a permanent magnet overspeed generator.

The metering valve controls speed of the turbine by positioning the throttle. Action of a rotating piston against a spring in the center of the unit performs this function by metering air to the throttle actuator. Unit begins to function when the turbine has reached about 98% of rated speed.

On a common shaft, the overspeed generator "provides a signal to the frequency-sensitive amplifier which causes the overspeed system to function."

• **Makeup pump motor.** This a.c. induction motor is open-ventilated, self-



EXPLODED VIEW shows turbine and gearbox components of TH1 hydraulic power pack.

cooled and operates on 208-v. 3-phase, 400-cycle current. Unit develops 1.2 hp. at full load speed of 2,680 rpm. at 55,000 ft. altitude. The motor has relatively flat speed-torque characteristics which allows pump loads to vary without appreciable effect on operating speed.

Motor starts easily under load and reaches rated speed quickly because starting torque and maximum torque are of about equal magnitude. Motor drives pump through a 4.83:1 spur gear train.

• **Turbine and gearbox.** The steel turbine wheel is a full-bladed, radial, in-flow wheel mounting 10 main blades and 10 short blades alternately. The nozzle is made of heat-treated, chromium-surfaced steel to resist erosion and is assembled as an integral part of the stainless steel volute. Nozzle has 27 spiral entry passages giving a total area of 1.518 sq. in.

The gearbox is made up of double-reduction gears. First pair has a ratio of 53.17, the second 20.65, giving a total reduction of 10.13:1. Thus a turbine speed of 38,000 rpm. gives a pump speed of 3,750 rpm. A gear-type oil pump lubricates the unit.

J&H says that it intends to relocate the overspeed generator so that it actually senses turbine shaft speed instead of rpm. of a shaft in the turbine gear system.

OFF THE LINE

Dallas Airmotive, Inc., has been awarded an unlimited Class I powerplant rating to overhaul airplane engines by the Civil Aeronautics Administration, the company announces. Dallas Airmotive already has a Class II overhaul certificate which covers engines from 450 hp. up. The Class I license is for engines with horsepower up to 450. The overhaul firm is currently turning out some 300 engines a month for USAF, CAA, executive aircraft owners, and several airlines. Company also overhauls copter engines. Address: 6114 Forest Park Road, Dallas.

Silicone rubber gasketing, developed by General Electric, is being used as door seals on USAF H-21 Piasecki helicopters because of its ability to withstand wide temperature extremes, according to GE. The product, called SE-550, can take temperatures ranging from -120 to 500 F. GE says E-550 also has resistance to ozone and corona encountered at high altitudes; will not cause doors to stick under arctic temperatures; withstands abrasion and aging. The material is being extruded into P-strip door seals by Pawling Rubber Corp., Pawling, N. Y.

How Much Reach In Your Range?



Do you find yourself falling short of your potential because of a lack of research and testing equipment? Without the necessary "tools of the trade" . . . wind tunnels, microwave and propulsion laboratories, modern electronic computing devices, . . . the reach and range of ability and initiative are definitely limited.

Our microwave laboratory is just one part of a \$20 million facilities program designed to give our engineers more opportunities for professional growth and advancement.

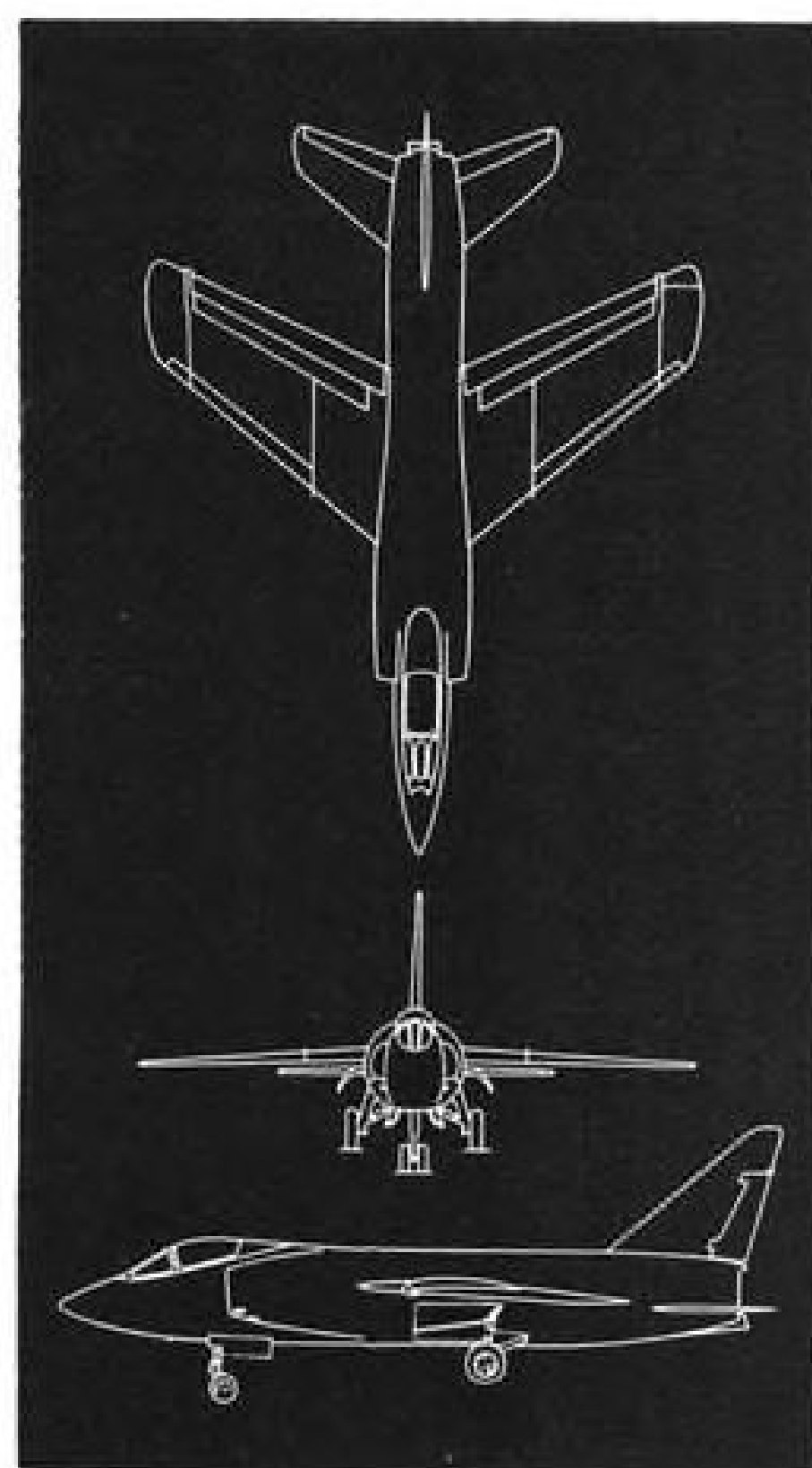
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BONANZA has its engine cleaned.

Portable Blaster Cleans Cylinders on the Plane

A Hiller UH-12B helicopter reportedly showed approximately 11% increased power and climb performance after its engine was treated by a new portable blast cleaner that speedily removes carbon and other foreign deposits without the need to dismantle the cylinders. The new device is called the Aero Power combustion chamber cleaner.

Operated solely by air pressure, the cleaner blasts a non-corrosive, non-abrasive agent through one of the cylinder's spark plug ports; unwanted deposits are blown out through an outlet hose attached to the other spark plug port and captured in a disposable filter bag.

Van Dusen Aircraft Supplies, Peterboro, N. J. (also Minneapolis, Washington, D. C. and Boston) is distributor of the device.

Three Small Motors for Servos, Missiles, Controls

A trio of tiny electric motors measuring just over an inch in diameter is being offered for use in guided missiles, autopilots, instrumentation and control devices, the maker notes. It operates from 115-v., 2-phase power; frequency is 400 cycles; no-load speed is 180 rpm.; full-load 135 rpm.; gear reduction is 28.4. It is continuous duty. Modifications include hysteresis-synchronous and capacitor-induction motors at various voltages and frequencies.

Eastern Air Devices, Inc., 389 Central Ave., Dover, N. H.
• Servo-gear motor, weighing about 4½ oz. and measuring 1½-in. diameter by 2 17/64-in. long, is adaptable to guided missiles, autopilots, instrumentation and control devices, the maker notes. It operates from 115-v., 2-phase power; frequency is 400 cycles; no-load speed is 180 rpm.; full-load 135 rpm.; gear reduction is 28.4. It is continuous duty. Modifications include hysteresis-synchronous and capacitor-induction motors at various voltages and frequencies.

Eastern Air Devices, Inc., 389 Central Ave., Dover, N. H.

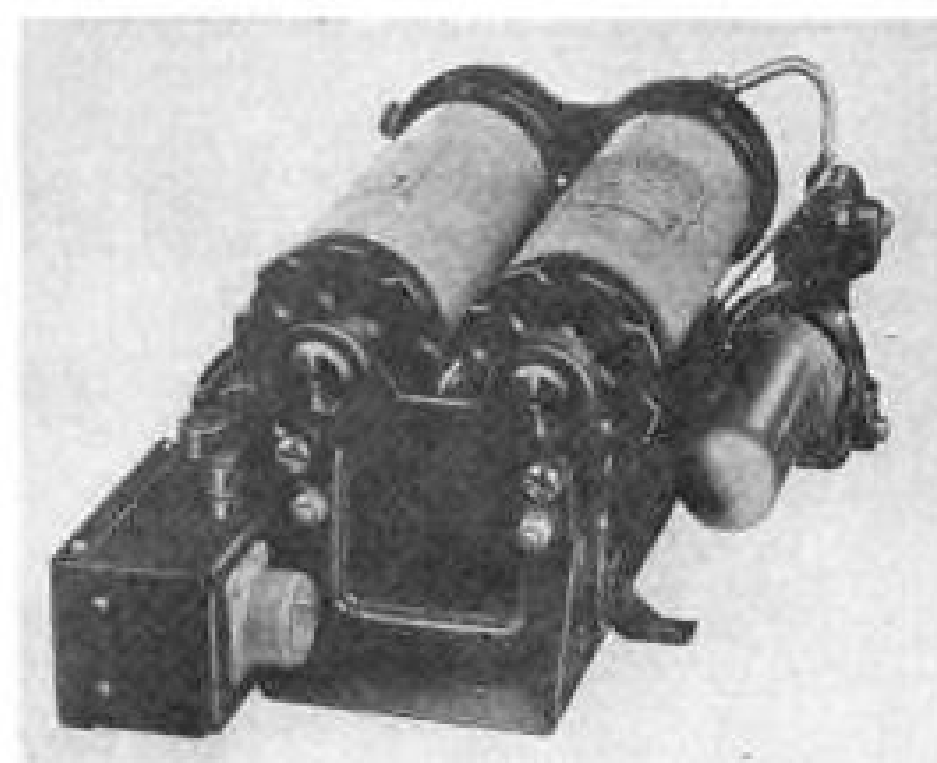
• Type SC is a 400 or 60-cycle a.c. motor, designed to include protection for military environmental specs, can read-

ily be modified to meet a wide range of applications, the manufacturer notes. It can be wound for single, two, or three phase, and can be furnished as an induction or hysteresis motor. Also available with a concentric spur-gear reducer.

Globe Industries, Inc., c/o Yale J. Holt, 1784 Stanley Ave., Dayton, Ohio.

• Permanent magnet d.c. motor, Model 1600-1, is designed as a drive for switches, cams, servos and similar applications. Weight is 5½ oz., diameter is 1½-in. and length is 2 7/8-in. Gear case diameter is 1½-in. and mounting flange has 2½-in. diameter. It is designed for six to 30 v. and for any input speed of 4-10 rpm. Maximum torque load at 4 rpm. is 50 in.-oz. Case is aluminum alloy with plastic molded brush housing. Ball bearings are sealed and greased for unit's life.

El Ray Motor Co., North Hollywood, Calif.



DESSICATOR unit weighs in at 14 lb.

Dryer Prevents Fogging Of Bombsight Lens

New dessicator system circulates and dries air in bombsight lens dome to prevent frosting of the lens.

The model RR-10040 dessicator consists of a 115-v. 400-cps. motor-pump unit and two dessicant jars containing anhydrous calcium sulfate as drying agent. The calcium sulfate turns pink when it is saturated and should be replaced.

The dessicator unit weighs 14 lb.; it is corrosion and fungus resistant.

Lear-Romec Div., Lear, Inc., Elyria, Ohio.

Battery Maintainer Adjusts Charging to Temperature

A new battery maintainer which automatically compensates for temperature variations has been developed by Fox Products Co.

The unit, labeled the C-10 Varitemp, incorporates an electronic sensing ele-

ment which determines the battery's discharge rate and automatically adjusts its charging current to the proper rate regardless of temperature changes.

Fox says the Varitemp will maintain as many as five 12-v., ten 6-v., or thirty 2-v. batteries. C-10's input: 110 v., 60 c., 2.5 amp.; output: 30-130 milliamperes over a temperature range of 0-100F. Weight is 3 lb., size is 5½x7¼x3½ in.

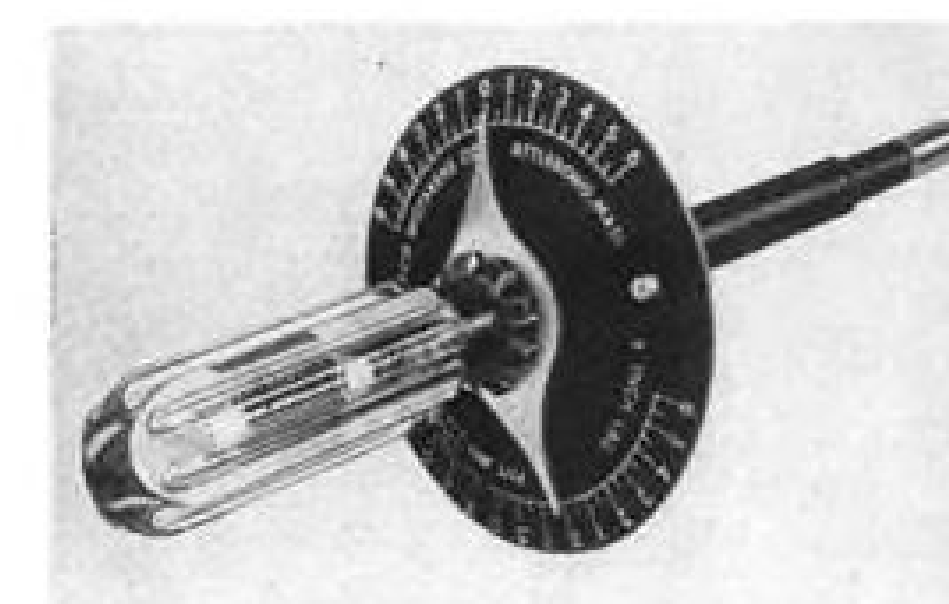
Address: 4720 N. 18th St. Philadelphia, Pa.

ALSO ON THE MARKET

Rigimesh porous metal is now available for use in transpiration cooling of afterburner liners, ramjet combustion chambers, gas turbine control plugs, turbine blades, etc. Rigimesh is made by a new process, said to result in improved mechanical characteristics. Warp and wool strands of layers of woven wire cloth are welded together, then mechanically treated to produce a homogeneous plate with much finer openings than the original material, but retaining its uniformity.—Aircraft Porous Media, Inc., 20 Sea Cliff Ave., Glen Cove, N. Y.

Lightweight hydraulic motor, designed and tested to MIL-M-7997, is suitable for operations to 4,000 rpm. and 3,000 psi. Employing only four bolts in entire assembly, motor utilizes a pressure-balanced carbon seal. One model weighs 7 lb. and develops 14.3 hp.—United Hydraulics, Inc., 110 Terrel Court, Dayton.

Tru-Trace tracing units convert obsolescent millers, planers and other cutting tools to modern, high-production, high-tolerance machines capable of following templates in three dimensions.—Island Machine Co., El Monte, Calif.



Two-Way Torque Tool

New torque tool measures either left or right torque, while previous equipment of this type measured right only, manufacturer says. The tool has interchangeable bits too, so it can be used as a torque screw driver or socket wrench. Maker is Apco Mossberg Co., Attleboro, Mass.



FANTASTIC...but true!

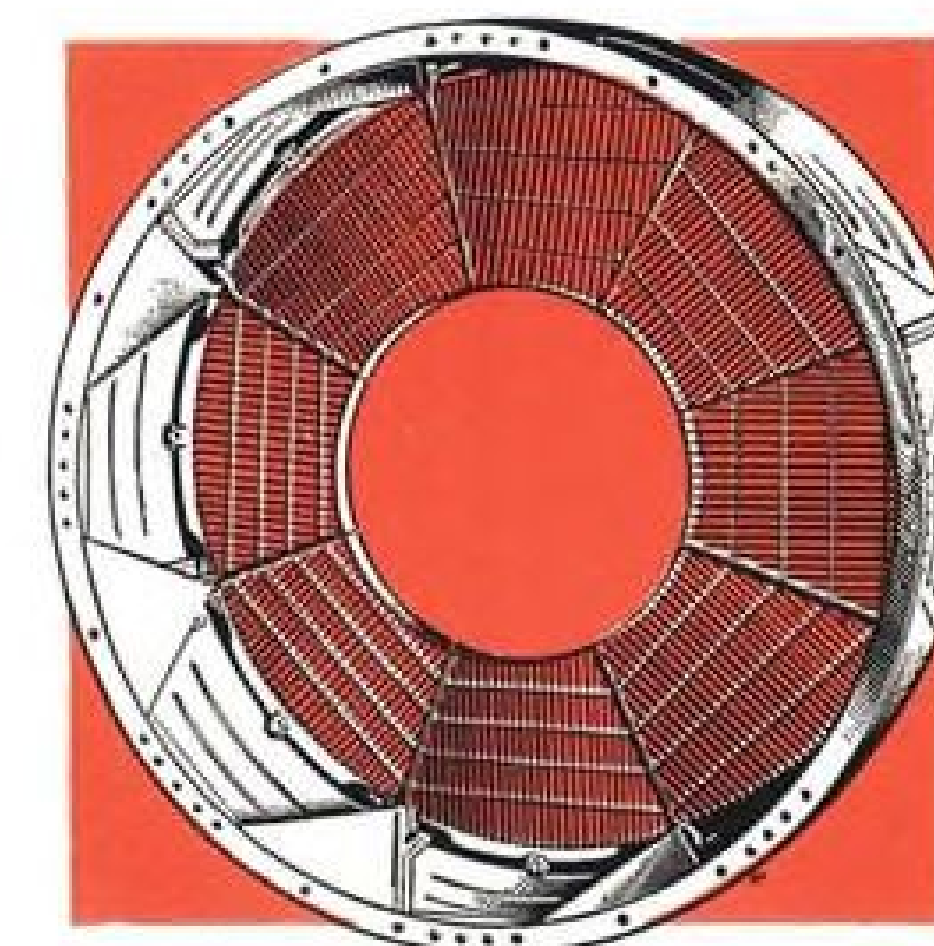
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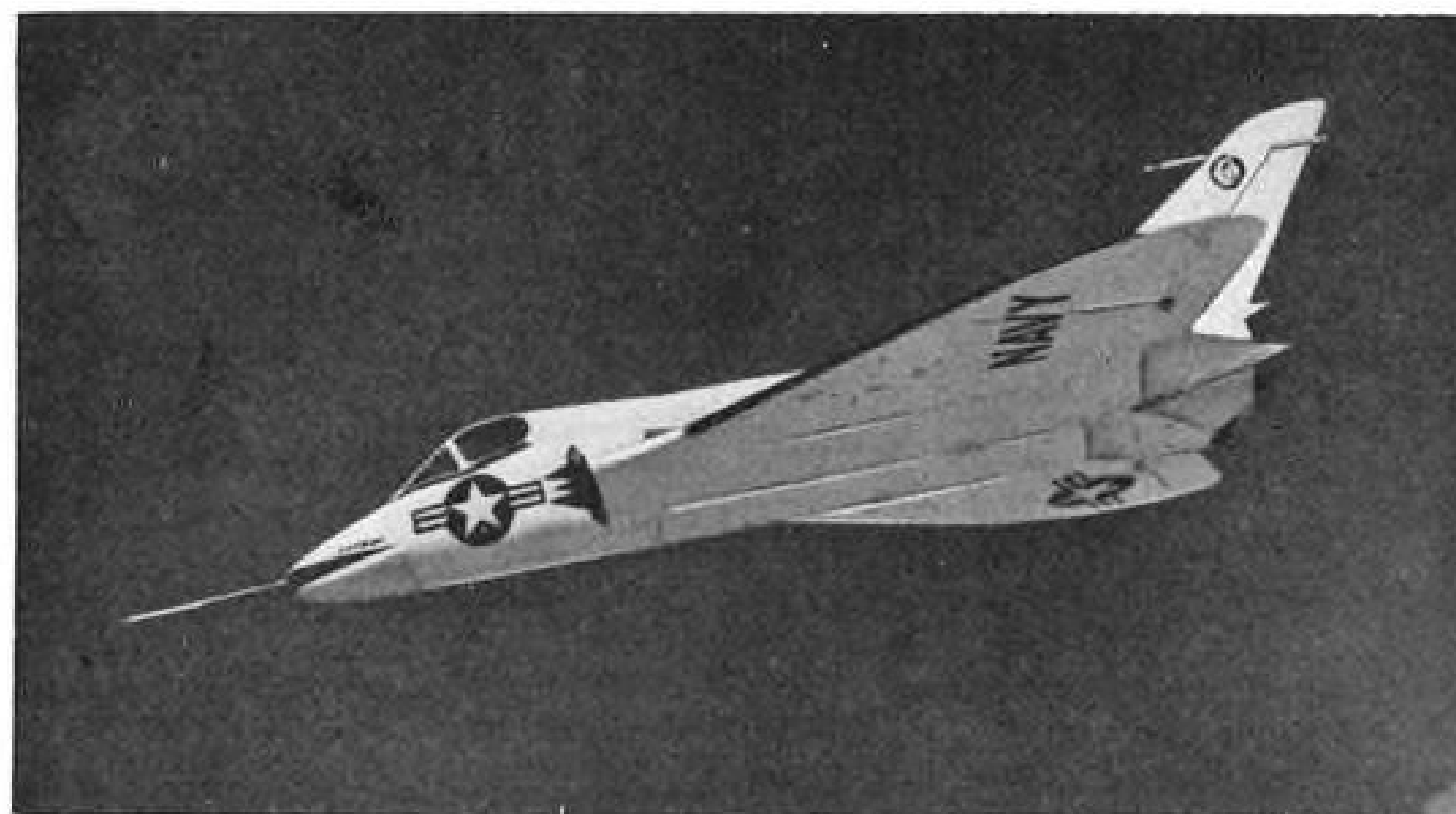
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AVIONICS



WOULD DOUGLAS TELL NORTH AMERICAN? Some observers say maker of F4D, for instance, would be naturally reluctant to give details of new plane to avionics experts of possible competitor, such as NAA. That's one brake on airframe industry's avionics expansion.



Avionics-Airframe Industry Dilemma:

When Is Your Customer a Competitor?

By Philip Klass

Despite the airframe industry's fast-rising capability in the avionics field, several powerful forces appear likely to act as a brake upon those airframe companies that are anxious to expand their avionics activities.

Some of these factors came to light in AVIATION WEEK's discussions with officials of seven major manufacturers of avionics systems, all of them outside the airframe industry.

Two of these officials are so bitter that they say they are through disclosing details of their new developments to one particular airframe manufacturer (which has a strong avionics group). In fact, these officials say their two companies have no intention of even attempting a joint program with this airframe manufacturer on his future aircraft.

► **If This Feeling Spreads**—If this bitterness were to spread to other avionics manufacturers, the airframe company in question might find itself without suitable outside sources for its avionic equipment. This could jeopardize the overall effectiveness of its future aircraft.

Several aroused avionics manufacturers hope to take some sort of collective action through their Radio-Electronics-Television Manufacturers Assn. It is reported that RETMA may ask the Defense Department to act to discourage further avionics expansion within the airframe industry.

However, even the officials most disturbed by the trend emphasize that, in most cases, they thoroughly approve of the idea of selling their avionic systems directly to airframe companies, where the military so desires. In fact, many appear to prefer this new approach because it greatly simplifies the integration of airframes and avionics.

What the larger avionics systems firms do object to is the increasing inroads of some airframe companies themselves into avionic R&D and manufacture, AVIATION WEEK's survey indicates.

► **Who Does What for Whom?**—One major factor restraining further air-

frame industry avionics expansion stems from the present situation, which one avionics manufacturer describes this way: "When we call on certain aircraft companies, we are not sure whether we are visiting a customer or a competitor."

As a result, this manufacturer is reluctant to disclose full details of new ideas—details which an airframe supplier may sorely need to evaluate competitive avionic systems for its own airframe or missile proposals.

However, the spokesman for another major avionics firm says that it discloses new ideas fully, but recognizes that it is "taking a calculated risk in doing so."

The problem first reared its head on a major scale five years ago during a USAF competition for an advanced interceptor. At that time, North American Aviation, Convair, and possibly other airframe companies submitted proposals on both the avionics and the airframe. In pre-competition discussions of their ideas, several avionics manufacturers reportedly played their cards close to their chest when they knew the aircraft company was planning also to go after the avionics business.

► **Fear Leaks**—Avionics activities at North American are centered in a completely separate division, Missile and Control Equipment (MACE), which is several miles removed from the airframe operations. This probably represents as great a physical separation

as exists anywhere in the industry.

Yet several avionics manufacturers told AVIATION WEEK that even under these favorable conditions, they feared that new ideas, disclosed to airframe people, would leak back to the company's avionics group. In fact, spokesmen for two avionics firms confided to AVIATION WEEK that they believed this had happened at one undisclosed airframe company within the past year, and both were quite bitter about it.

If such a leak occurred, it might have been inadvertent and innocent in intent, without top-level knowledge or consent.

For example, suppose that avionics manufacturer X had proposed to airframe manufacturer A a new fire control system which it claimed would have twice the range of existing sets. A's airframe people would logically ask for a similar system proposal from their own avionics group.

If A's avionics group proposed a system with only conventional range, the airframe people would tell it that outside competition had proposed a set with twice the range. When A's avionics group denied that such performance was possible, suggesting that the airframe people were victims of super-salesmanship, it might egg on the latter to disclose sufficient details of X's proposal to prove that the new system could indeed provide double the normal range.

At that point, the cat is out of the bag.

► **Could Backfire**—Most of the airframe companies with large avionics staffs engaged in R&D view them as a means of coming up with a better-performing, better-integrated weapons system. However, this could backfire if avionics manufacturers begin to shun these airframe firms as competitors, leaving them with a single source of major avionics systems—no airframe company likes to be dependent upon a sole source, even if within its own firm.

If an aircraft manufacturer were to find himself shunned by the avionics systems industry generally, the overall quality of his airframes might suffer in the long run. And most aircraft com-

Turnabout?

Despite the small aerodynamic research program which Collins has carried on for several years under the direction of Dr. Alexander M. Lippisch, company spokesmen disclaim any intention of their moving into the airframe business. Since Collins has no known missile program of its own, the program has caused considerable speculation.

Lippisch, well-known authority on tailless and delta-wing aircraft, and designer of Germany's World War II rocket interceptor Me-163, is known to be keenly interested in high-speed aircraft with low landing speeds. A recent classified Collins contract with the Office of Naval Research may be directed along these lines.

panies naturally view airframes (piloted or missile) as their major product.

► **Tough Sell Outside**—Another factor which may restrain airframe company activities in the avionics field are the obstacles involved in working with a customer who is also an airframe supplier.

This is particularly serious for equipments such as automatic flight control and fire control systems. The reason is that the design and integration of these equipments with the airframe requires that the avionics system engineers have access to considerable detail on new airframe configuration and performance.

In the early stages of airframe design, this is information which one aircraft company is naturally reluctant to give another's avionics group, particularly if the latter is a competitor in the same types of airframes. In fact, aircraft manufacturers are sometimes reluctant to divulge such information even to established avionics firms for fear it will find its way into competitive hands.

United Aircraft originally faced a similar problem with its Pratt & Whitney engine and Chance Vought air-

frame divisions, one of the factors which prompted UAC to set up CVA as a separate corporate entity last summer.

This suggests a possibility for airframe companies who are anxious to expand their avionics activities without jeopardizing their airframe business. However, this might defeat one advantage of having both avionics and airframe under one corporate roof—better overall integration.

► **Douglas Declines**—When North American (and its subcontractor RCA) approached Douglas Aircraft Co. to sell a new NAA-RCA fire control system for a new plane, a top Douglas spokesman flatly refused even to consider the system because of NAA's competitive airframe position, AVIATION WEEK was told on good authority.

On the other hand, Navy BuAer has authorized the NAA-RCA system for use on a new McDonnell all-weather attack-fighter. It remains to be seen how the arrangement works out here.

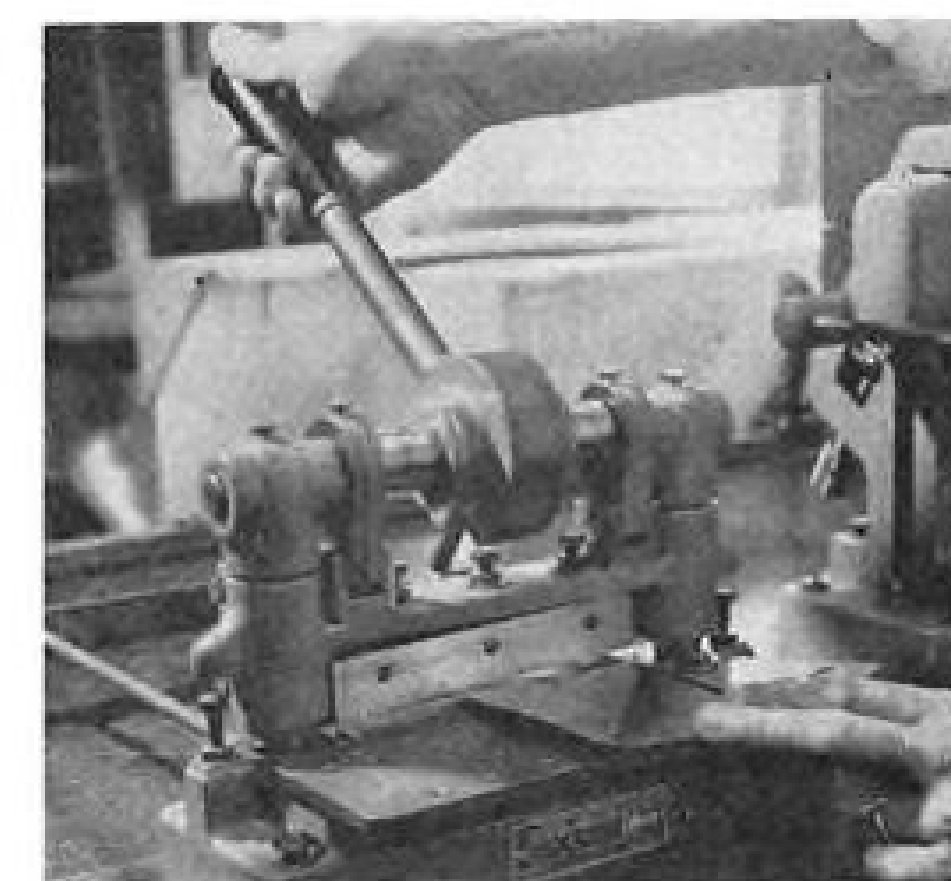
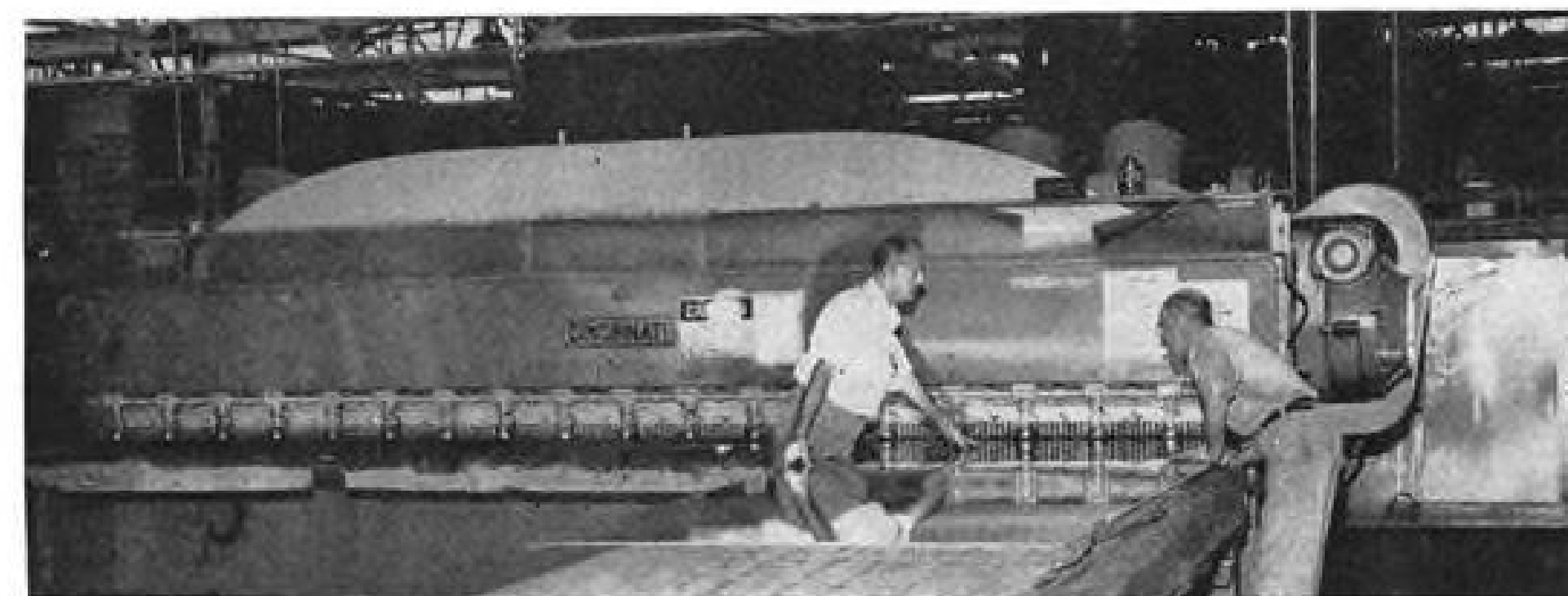
It was with this basic problem in mind that an Air Force official told AVIATION WEEK that if Hughes Aircraft Co. (major USAF avionics systems supplier) were ever sold, he personally doubted if it would go to an airframe manufacturer.

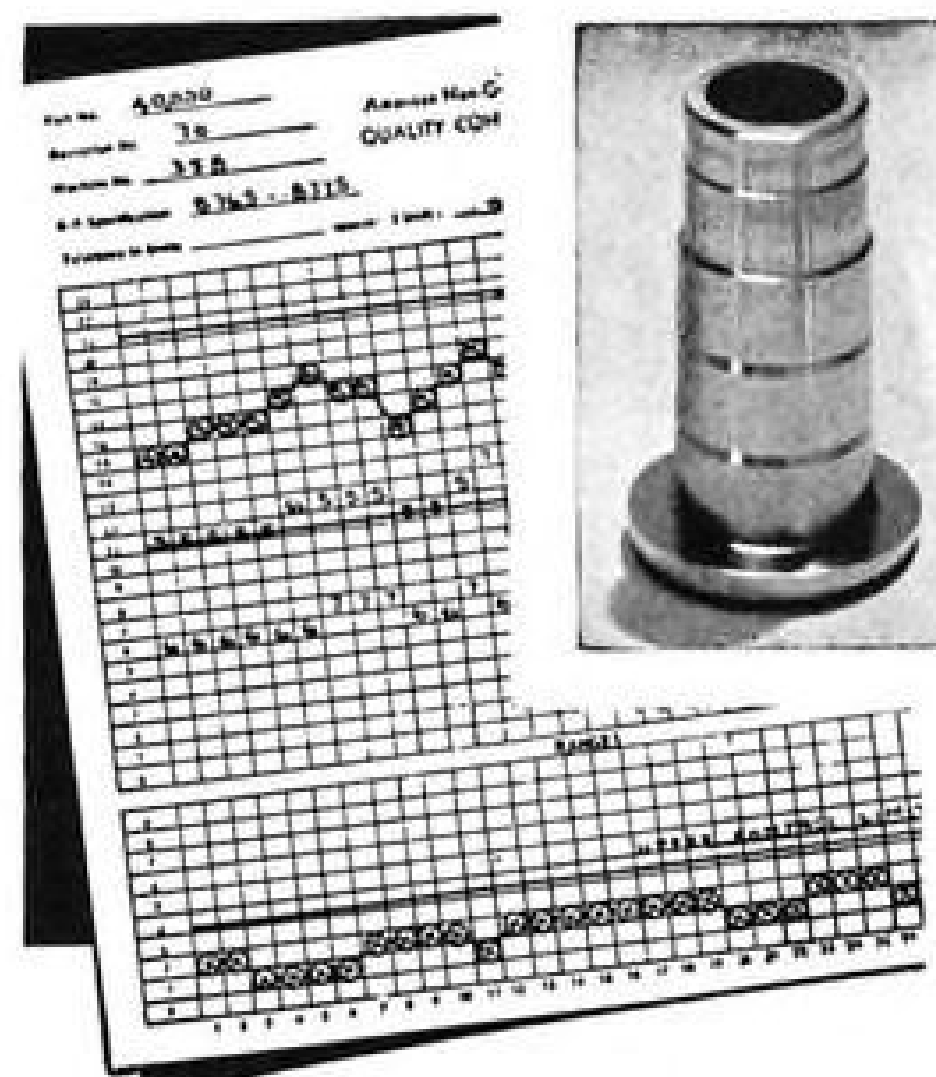
► **Tough Sell Inside**—An airframe company's avionics group does not always have an easy selling job even within its own firm, at least at present. The airframe people are always reluctant to risk the success of a new airplane with an unproven equipment or supplier.

North American's MACE group is known to have been a contender, along with Minneapolis-Honeywell and Lear, to build the autopilot for the F-100. MACE reportedly has designed auto-flight controls for missiles to requirements much more rigorous than the F-100 poses. However, MACE presumably has had relatively little experience with large-scale production of such equipments, whereas M-H and Lear have built thousands of autopilots.

It may be assumed that if NAA's air-

MARKED CONTRAST between machinery required for production of airframes and avionics is shown in these two Convair shears. Airframe one (below) takes two men to operate.





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frame people had insisted flatly upon use of a MACE-designed autopilot, the Air Force would probably have gone along. The fact that M-H got the nod for the F-100 suggests that NAA's airframe people did not go to such lengths, and also suggests that they may have been reluctant to ride an untried horse. However, this is speculation.

► **The Production Hurdle**—Examination of prototype avionic equipment turned out by NAA, Ryan, Convair, Martin, and other airframe firms indicates that their fabrication techniques are as advanced as any to be found. (Because of security, it is impossible to evaluate the all-important quality of circuit design.)

However, there are some in the avionics industry who question whether the airframe people can bridge the gap between prototype and large-scale avionic production without serious difficulty.

One observer sums it up this way: "Too many electronics people in the aircraft companies think that the job is 90% done when they build one breadboard equipment that works. Actually at that point the job is less than 50% done."

It is interesting to note, however, that some observers in the avionics industry were saying the same thing in 1948 about Hughes Aircraft Co. HAC successfully got over the large-scale production hurdle, but in so doing took itself out of the airframe business.

► **Licking Production Problems**—Convair was one of the first aircraft firms (not counting Hughes) to cut its teeth on full-scale avionic production, with its Terrier missile program for the Navy. By some reports, it was a very prolonged and painful teething process.

However, Convair expects to profit from its Terrier experience. It also hopes to grease the skids for future avionic production by the pilot-production line which it has set up in its San Diego experimental factory. The company is currently building an airborne search radar on this line.

Convair says it has installed "the very latest production techniques for everything from stocking raw materials to final inspection. Information gained here will be applied to setting up similar lines as volume increases."

► **Lot of Difference?**—Avionics industry observers claim there is a whale of a lot of difference between building airplanes and avionics. For example, look at the difference in size of the two Convair shearers, one used in airplane fabrication, the other for avionics operations, shown on p. 57.

These observers say that even the kind of organization (project-type), widely used in the airframe industry, is

No Names, Please!

To many avionics manufacturers, some airframe companies are both customers and competitors.

When Aviation Week asked officials of seven major avionics firms for their frank comments on this problem, it was with the assurance that neither they nor their companies would be identified, lest it jeopardize their position with their customer/competitors.

not best suited for an avionics operation.

It is interesting to note that Convair has developed a new hybrid project-group type of organization at its Pomona missile plant, which does considerable avionics work. The problems of organizing to build missiles, and the new hybrid organization, were described by Charles F. Horne at the recent Western Electronics Convention (WESCON) in Los Angeles. Horne is general manager of the Pomona plant.

Northrop is another airframe company heavily engaged in avionics, which has reorganized its engineering staff along similar lines (AVIATION WEEK Nov. 22, p. 39).

► **WSM Limitations**—To prevent airframe manufacturers with weapons system management-type contracts from using them to make inroads into established avionics (and other) industry domain, USAF inserts the following type of clause in its WSM contracts:

"The government is not hereby approving any increase by the contractor of its normal manufacturing functions. However, the government expects and requires the contractor to increase its management function as required in assuming overall responsibility for the weapons system involved."

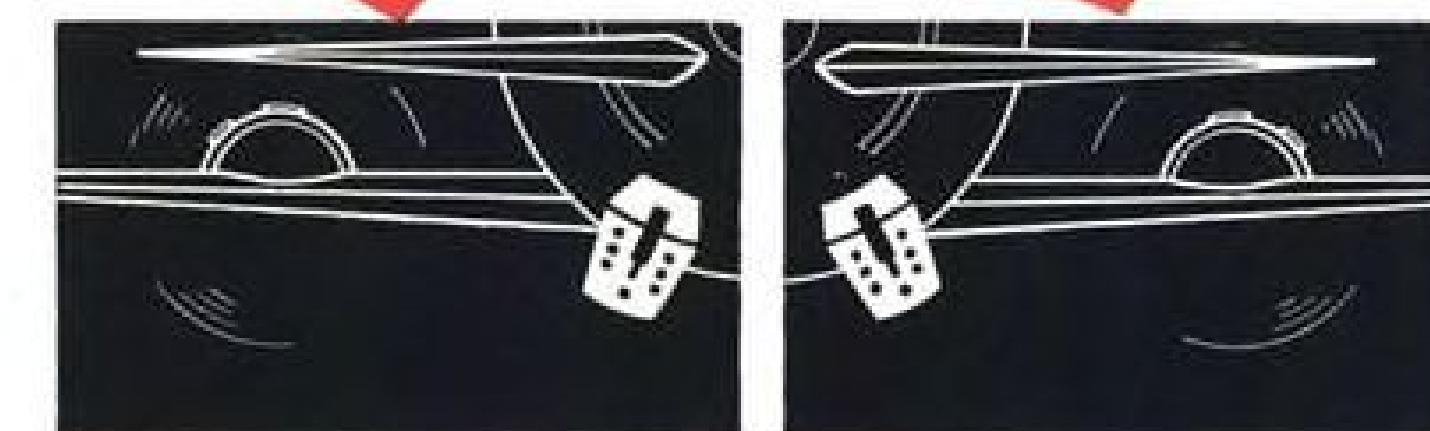
The intent is to indicate that USAF will not approve a WSM contractor's request for government financing of new production facilities if they are beyond its current scope.

However, with many airframe firms already in the avionics field, very few avionics industry people find much comfort in such reassurance. They also fear that avionics engineers brought in to perform the "management function" will sooner or later find their way into R&D activities.

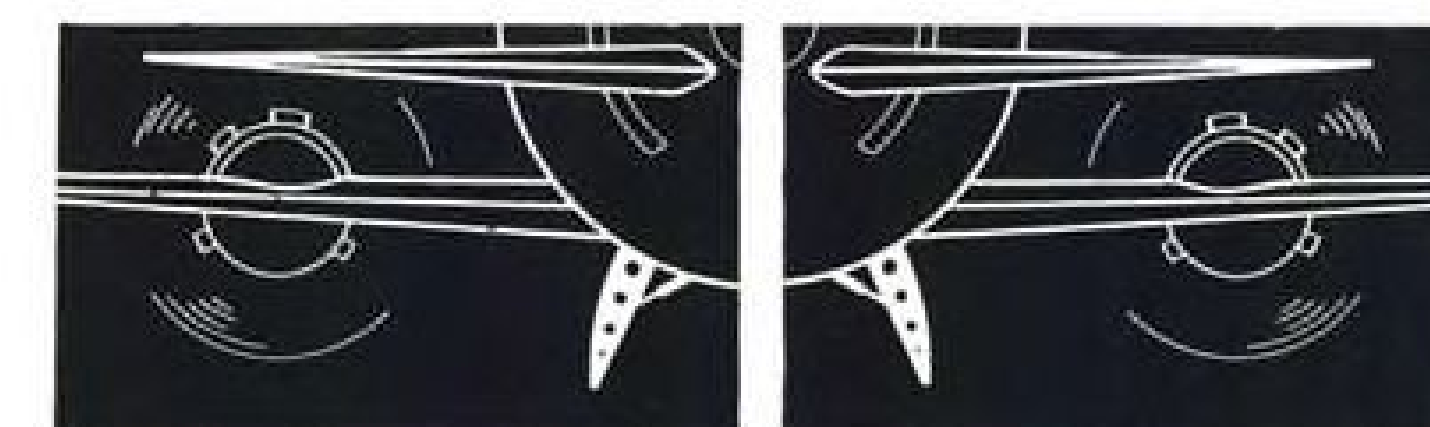
► **Avionics Industry Reaction**—AVIATION WEEK's talks with officials of major avionics systems firms, asking for their reactions to the present state of affairs, produced answers running the gamut from "serious concern" to "we were much more concerned 9-12 months ago, but now think the trend is reversed." All seven companies inter-



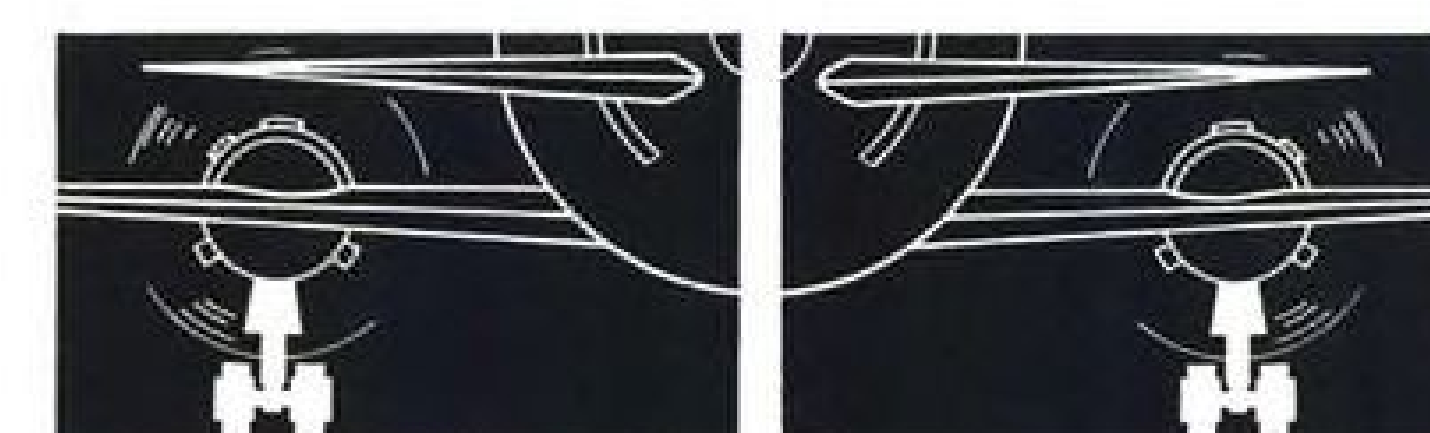
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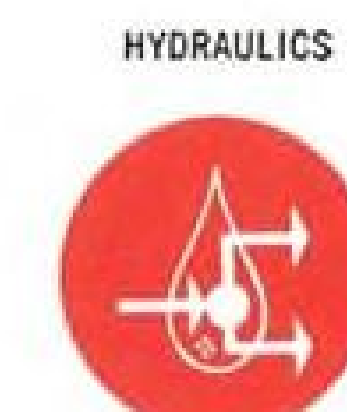
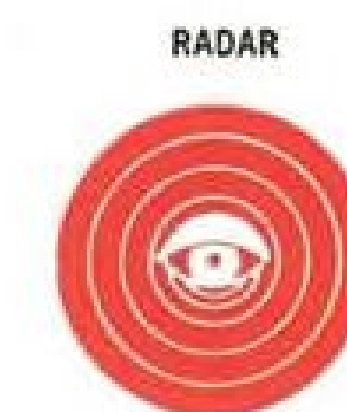
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Date 8-5-58 St. Louis, Missouri Report

Engineering Report

10³ INTEGRATING GYRO
SPECIFICATIONS
SECTION I
GYROSCOPIC ELEMENT

1. Outline Dimensions
Diameter 1 inch
Length 2 1/32 inches (less connections)
2. Weight
4 1/2 ounces (maximum)
3. Angular Velocity Range
± 1 Radian/second
4. Power Consumption
Spin Motor 0.5 watts (maximum)
5. Gimbrel Deflection
± 6° (Maximum)
6. Drift Rate
Less than 0.5 milliradian/second
a. Mass unbalance 0.5 milliradian/second, per G maximum
7. Operating Temperature
200° Fahrenheit

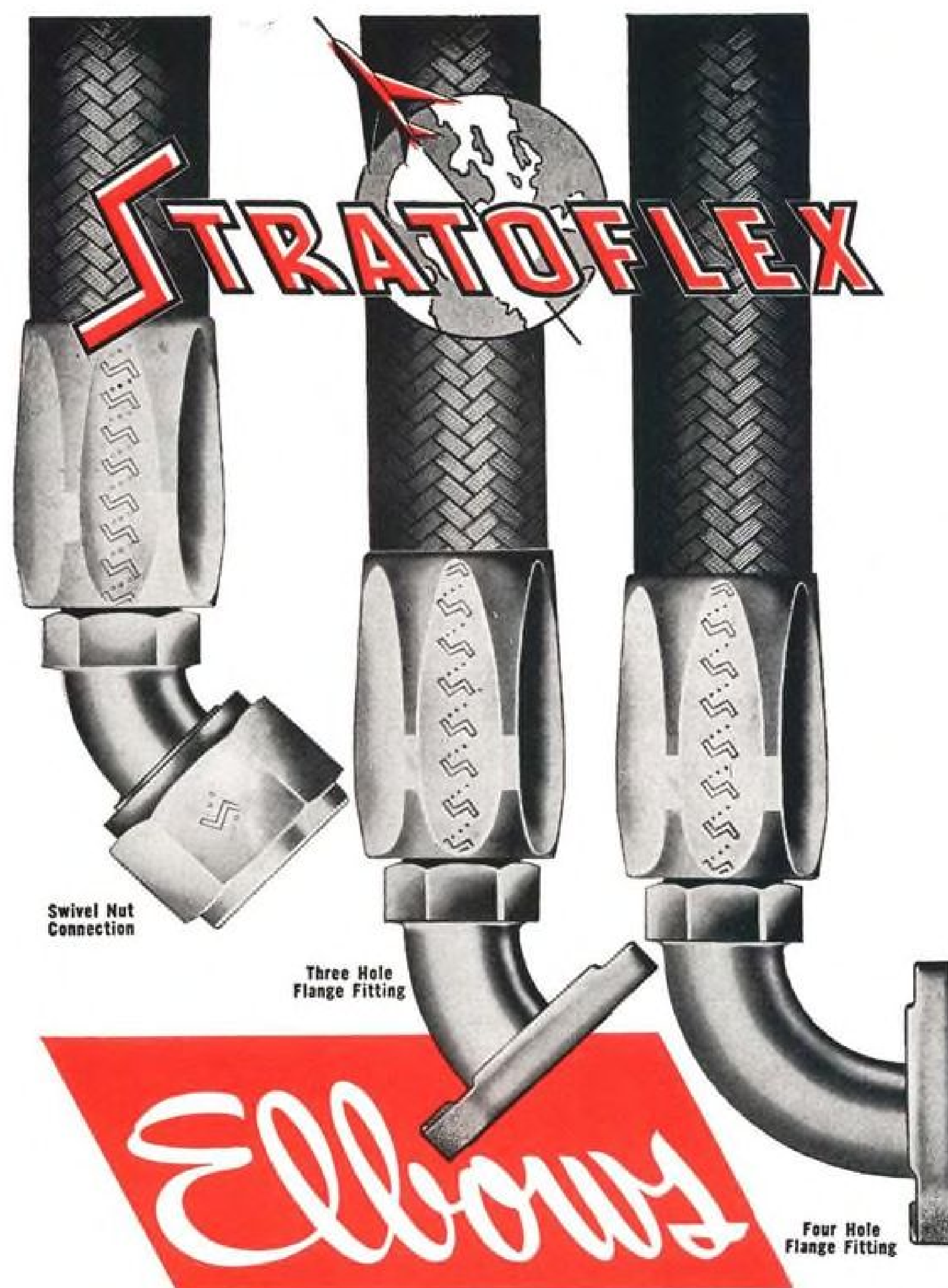
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viewed indicated a keen awareness of the problem and most indicated that they were giving it considerable thought.

Officials of avionics firms that had recently experienced direct competition from aircraft companies were naturally the most alarmed. Officials of companies whose fields had not yet been invaded by the airframe manufacturers were less perturbed. In one such instance, the official showed more concern over the potential threat rather than the immediate one.

► **What Are They Doing?**—A question as to what these avionics companies intended to do to counteract the threat brought these kinds of answers:

- **Develop superior products and systems**, which excel those developed in the airframe industry. One official believes that avionics manufacturers, by their freedom to work with many airframe people, with resulting cross-pollination of ideas, should be able to do a better, lower-cost job.

- **Collective industry pressure** for the Defense Dept. to disallow airframe companies' avionics R&D activities as an item of expense in their airframe contracts. This is suggested by one avionics company official who feels that his firm's tax dollars are going to subsidize its own competition.

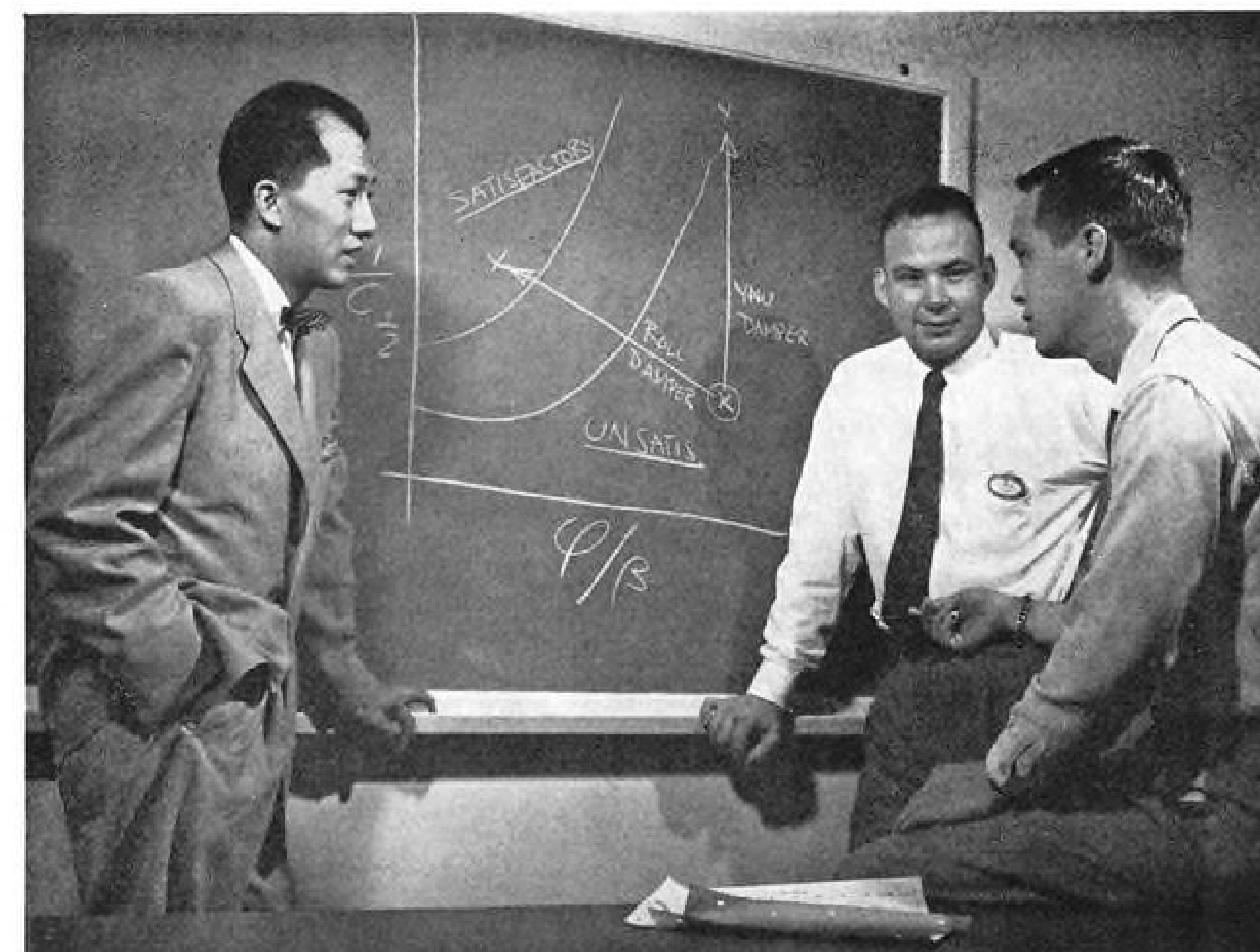
- **Organized campaign** to acquaint military and airframe people with the know-how and investment which exists in the established avionics industry and which could be choked off if the present trend continues.

► **Go West . . .**—For Eastern and Mid-western firms, some observers believe that a partial answer to the problem is to set up West Coast subsidiaries. Object is to improve service and provide closer integration with a major segment of the airframe industry, making it more attractive for these companies to buy their avionics rather than design and build it themselves.

Several firms, including RCA, Servomechanisms, Lear, Motorola and Collins Radio, have set up such West Coast operations. Spokesmen for two of these companies tell AVIATION WEEK that they are convinced that this has appreciably strengthened their competitive position.

► **M-H Goes South**—Minneapolis-Honeywell is quite enthusiastic over the results of a small subsidiary operation in Dallas. This group, numbering around 25 engineers and designers, originally was set up to work with Chance Vought as a second source of auto-flight controls for CVA's Regulus missile. When this second source procurement was cut out, M-H decided to keep its Dallas group in business designing a new line of auto-flight controls for missiles.

An M-H spokesman says the com-



Jim Hong, Aerodynamics Division head (left), discusses effects of auxiliary damping devices on roll-to-yaw ratio requirements for desirable flying characteristics of a supersonic fighter with Richard Heppe, Aerodynamics Department head (center), and Aerodynamicist Bob Scott (right).

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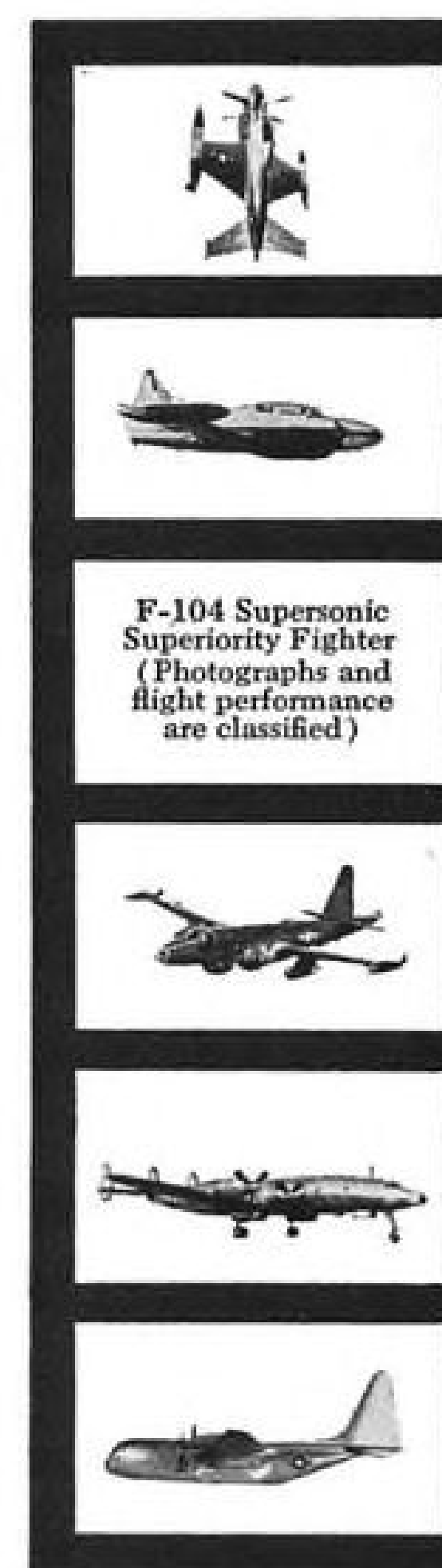
Jet Trainer
In development: Jet trainers which will simulate flight characteristics of any plane.

In development: Jet fighters with speeds far exceeding those of present-day aircraft.

P2V-7 Neptune Patrol Bomber
In development: (Projects in the bomber field are classified).

R7V-2 Turbo-Prop Transport
(world's fastest propeller-driven plane)
In development: Advanced versions of the Super Constellation.

C-130 Turbo-Prop Transport
In development: Jet transports, other types of cargo planes.



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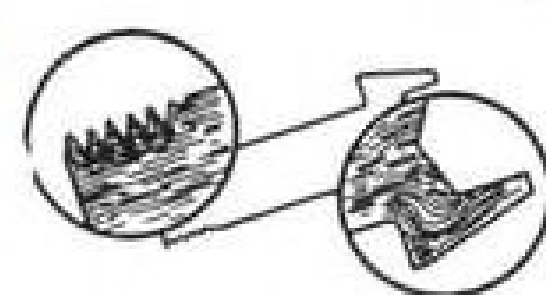
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Dallas, Texas EDWARD SOSTETKE

pany gets more results per dollar spent in its Dallas operation than at its main Minneapolis plant. His explanation: the splendid esprit de corps which exists in a small independent operation of this type. M-H says it might set up similar groups elsewhere, although it has no specific plans at present.

The Dallas operation has model shop facilities only. Any large scale production of its designs would be handled at Minneapolis. The main Aeronautical Division plant also provides Dallas with experts for consultation, when and as needed.

(M-H is not one of the seven major avionics firms whose officials' views are anonymously expressed elsewhere in this article.)

► **Not the Answer for All**—Spokesmen for several other avionics systems firms say they have considered the possibility of setting up West Coast operations, but have rejected the idea. Their reason: For complex systems work, a subsidiary operation requires a large engineering staff and would spread overall company engineering capability too thin.

► **Summing It Up**—The phenomenal growth of the airframe industry's avionics staffs and activities during the past five-10 years, in the face of an amazing expansion within the avionics industry itself, poses many problems for the entire aviation industry, as well as the Defense Dept. There is an added threat for avionics firms engaged in industrial and business electronics because some airframe manufacturers also are eyeing these fields.

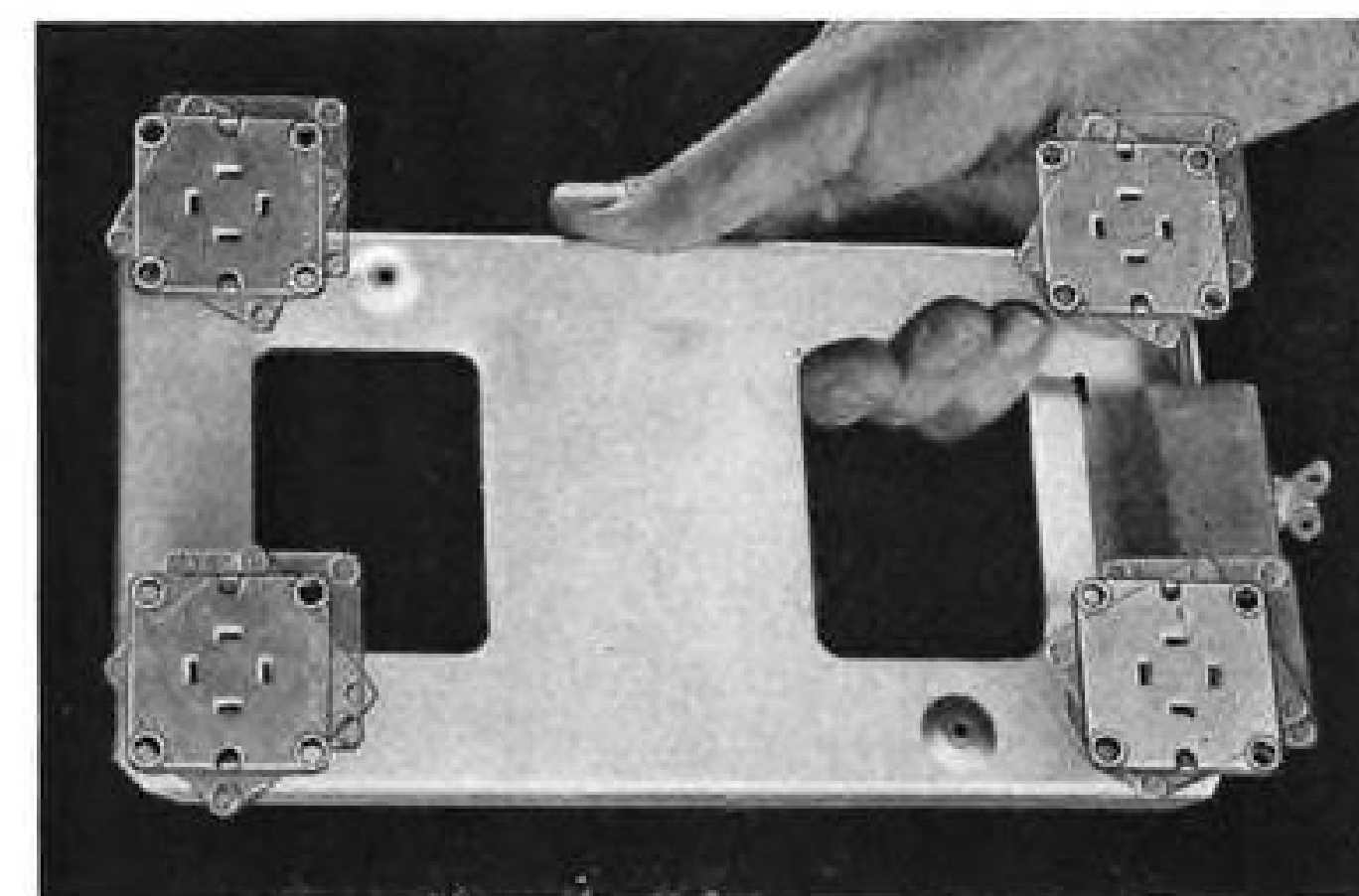
One avionics industry official believes that eventually aircraft companies will content themselves with their traditional role, using their avionics staffs primarily to integrate airframe and avionics. However, he is concerned about the interim period during the next several years.

This official warns that if aircraft companies are able to use government funds to attract avionics engineers away from established manufacturers, transferring know-how from what he calls "proven producers to unknown quantities," he believes that the whole avionics industry could be seriously disrupted.

Whether the high mark has already been reached, as some more complacent observers believe, or whether airframe competition in the avionics field will get tougher in the next five years, as more observers believe, will be determined by a variety of factors.

With the transition from piloted aircraft to missiles picking up momentum, and the much higher percentage of total missile cost going into avionics (sometimes estimated at 50-75%), both the airframe and avionics industry have an important stake in the outcome.

PLAIN FACTS ABOUT VIBRATION AND SHOCK MOUNTINGS FOR AIRBORNE ELECTRONIC EQUIPMENT

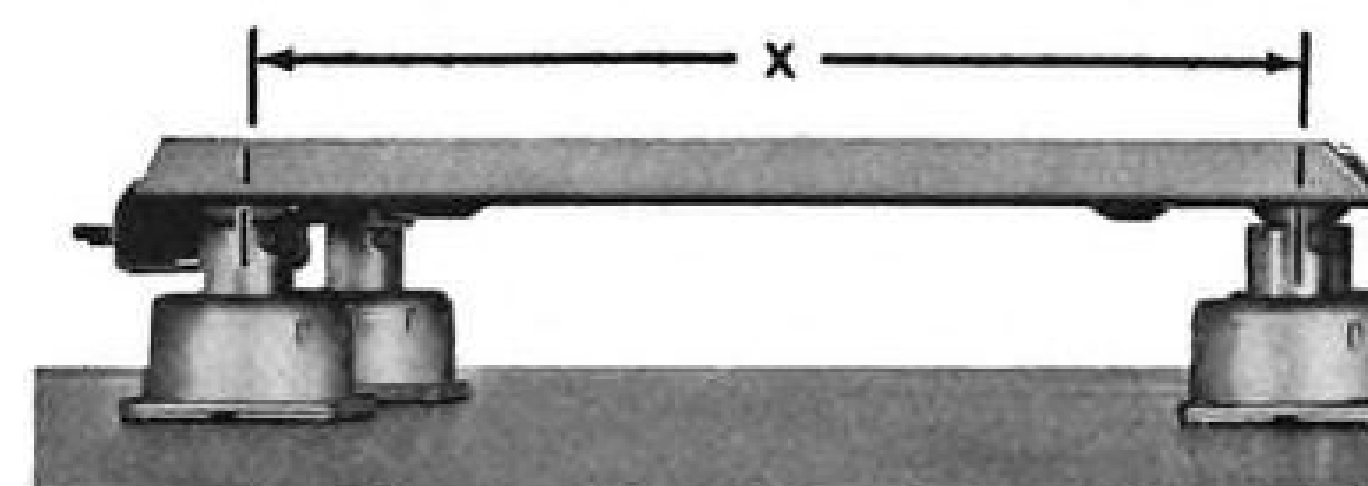


OUT-DATED UNIT MOUNT BASE

16 mounting holes and 16 bolts required.

Unit mountings may be improperly attached to the rack, and are very likely to be seriously misaligned during attachment to aircraft or missile structure.

Even minor discrepancies in spacing and attachment of unit mounts can defeat the whole purpose of the mounting base, and result in poor performance and deterioration of equipment.



Excessive height required. Unit mount bulk imposes reduced spacing (X) between support centers, resulting in impaired stability (critical in lateral direction). Greater sway space required.

Well Designed Electronic Equipment,

If Poorly Mounted,

Too Often Operates Inefficiently and Unreliably

Failure also can result from use of inadequate mountings which are not engineered for the particular equipment and purpose. Conventional shock mounts or so called "isolators", reasonably effective when installed under ideal laboratory conditions, become dangerous trouble makers when installed by usual production line methods.

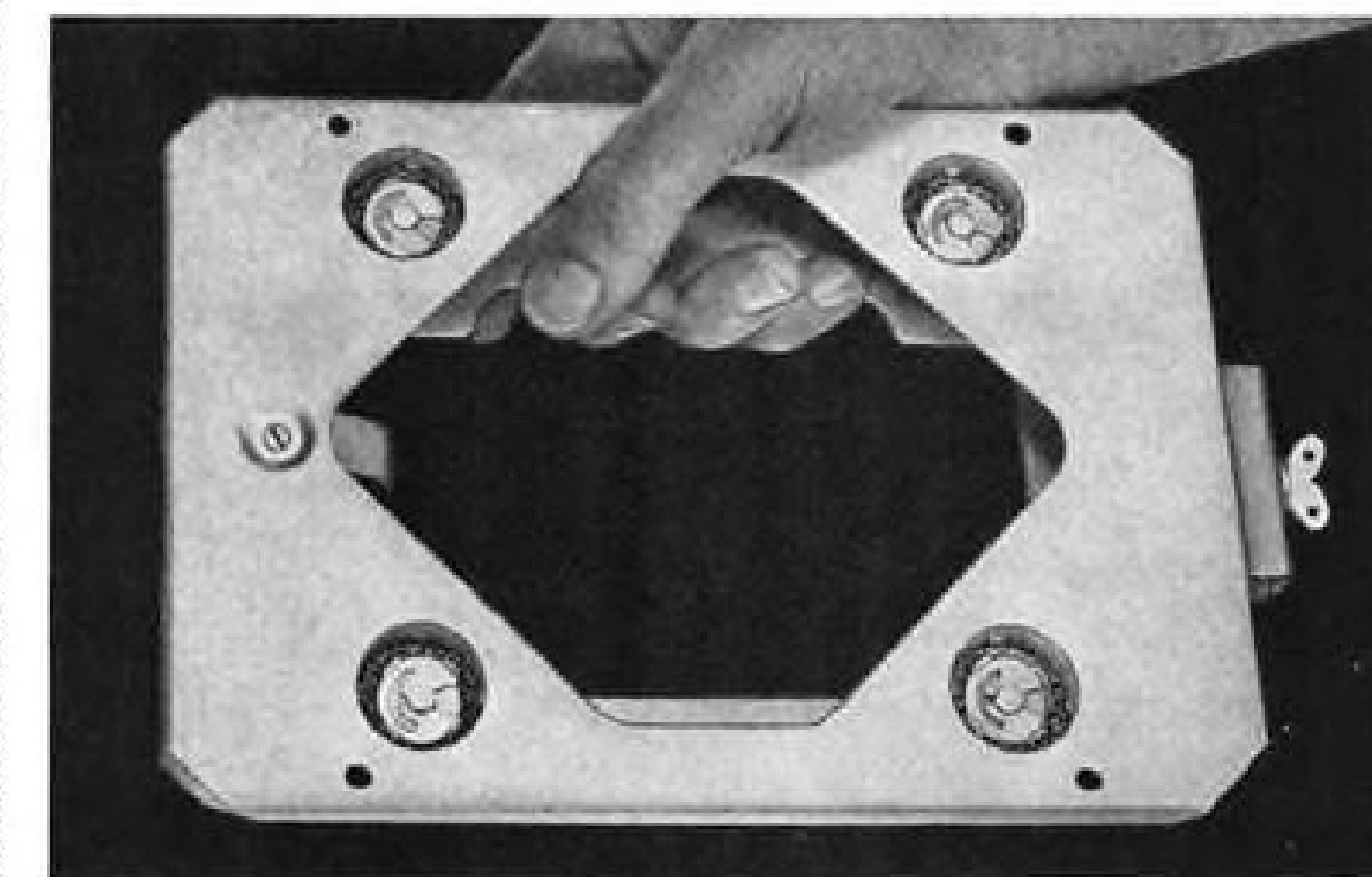
Attachment of a base plate to unit mounts to achieve spacing control is a makeshift arrangement resulting in excessive weight with no height reduction.

Failure also can result from obsolescent unit mounts employing internal rubber, organic or synthetic materials which deteriorate rapidly and are susceptible to temperature and environmental changes.

The importance of today's electronic equipment surely justifies the use of integrated mounting systems designed to meet specific problems rather than the unreliable application of assembled "catalogue" mounts.

USE OF ROBINSON ENGINEERED MOUNTING SYSTEMS results in:

- Reliable and uniform performance in every installation under all types of environmental conditions.
- Reduced cost through "de" ruggedization of equipment — substantial reduction of size and weight is possible by simplified and compact design.
- Simplified installation — only four attachment holes required — pre-spaced to save time and assure accuracy.

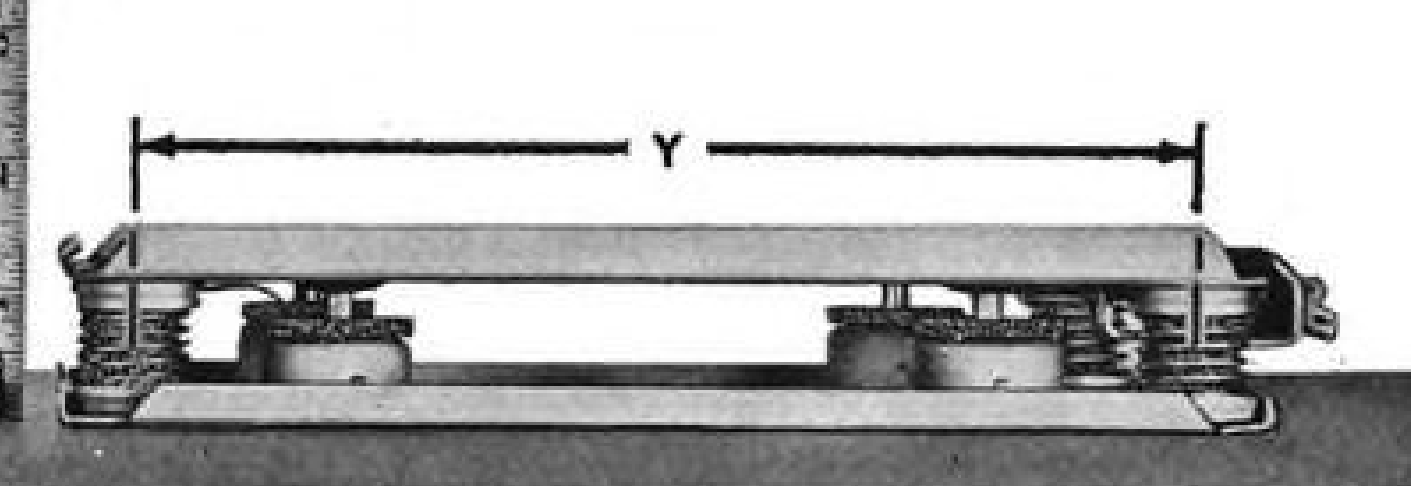


TODAY'S ENGINEERED MOUNTING SYSTEM

Only 4 mounting holes required.

Prespaced holes in a one piece base plate assure quick, accurate attachment. Relationship of all 4 holes is definitely fixed (holes spaced for interchangeability with unit mounts).

No installation errors or misalignment can occur to disturb the precise performance of the mounting system as checked and approved on acceptance tests.



Note reduction in mounting height. Important space saved. Maximum spacing (Y) of resilient elements at extreme corners provides stability. Less sway space required.

Robinson All-Metal Engineered

Mounting Systems Assure Outstanding Performance
and Reliability of Equipment

The Robinson concept of vibration and shock control is the design and application of 100% all-metal mounting systems. Engineered with careful understanding of the equipment to be protected and performance expected, Robinson mounting systems come to you completely manufactured, ready to receive the electronic equipment or instrument.

The integration of these mounting systems into the electronic equipment of aircraft and missiles results in reduction of elapsed design time and basic development cost.

Robinson Mountings utilize, as main resilient elements, metal wire cushions (MET-L-FLEX), exclusive with Robinson. This construction has been thoroughly proven by years of use in nearly all military and commercial aircraft.

Some other important characteristics of Robinson Mountings: inherent high damping, non-linear spring rate, performance unaffected by grease, oil, water, dust, extreme temperatures or environmental changes.

For full information about this new concept of vibration and shock control, write or wire today.

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TETERBORO, NEW JERSEY
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Openings are available for junior and senior research engineers to work in two supersonic wind tunnels and one hypersonic wind tunnel (under construction) as test project engineers. Duties include responsibility for pre-test planning, calibration, test supervision, data reduction, and report preparation.

This is an unusual opportunity to participate in diversified types of tests and to gain experience in testing techniques, use of electronic test equipment, IBM and electronic data handling and computing, automatic machine plotting, etc.

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B.S. with major in electrical power plus two years or more experience in laboratory testing. Must be able to organize and conduct laboratory investigations in A.C. and D.C. systems for aircraft, including inverters, alternators and related components. Will direct lab tests and prepare engineering test reports.

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BSME or equivalent with a minimum of 2 years experience in one of the following:

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(Stress Background)

Sealants (Fuel & Pressure
Applications)

to assist in material and process specification preparation, design applications and development, and testing of materials.

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NORTH AMERICAN AVIATION
Columbus 16, Ohio

Avionics Companies Report Expansions

The world's first synthetic mica plant, being constructed in Caldwell, N. J., by a new subsidiary of Mycalex Corp. of America, is one of several recently announced expansions and changes in the avionics industry.

The new Synthetic Mica Corp. plant is intended to reduce U.S. dependence on foreign sources for highly strategic mica, which is widely used as insulation in tubes, capacitors, and other electrical devices. The new 150,000-sq. ft. plant, being built with private funds, is scheduled to begin production early this year.

Other avionics industry expansions: **• Motorola** has opened a new 22,000-sq. ft. lab for guided missiles and ordnance operations research and systems analysis in Riverside, Calif. New lab is staffed by a nucleus of 40 scientists and engineers formerly employed by the National Bureau of Standards in missiles research and development. Staff is expected to grow to 200.

• Helipot Corp., division of Beckman Instruments, Inc., will manufacture precision pots and other avionic components in new Canadian plant recently opened in Toronto.

• Kearfott Co. is building a new 100,000-sq. ft. plant in Asheville, N. C. to manufacture synchros and servo motors. New facility is expected to be in production next spring.

• Ketay Instrument Corp. has purchased majority stock interest in the

Vari-ohm Corp. of Amityville, L. I., N. Y., manufacturer of small function-generating pots. Vari-ohm will be operated as a subsidiary.

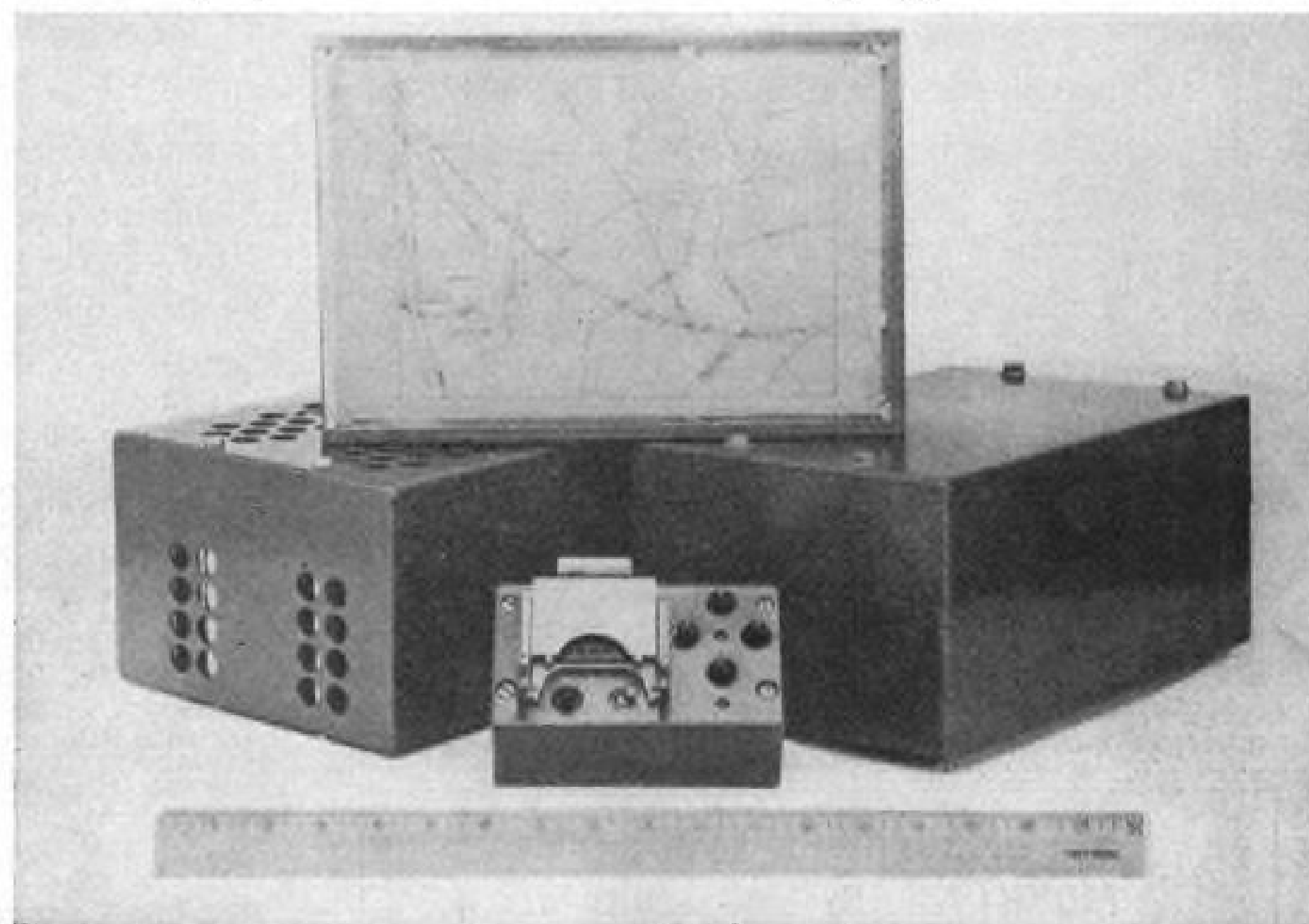
• Remler Co., Ltd. of San Francisco, and Telectro Industries Corp. of Long Island City, N. Y., have been elected to membership in the Radio Technical Commission for Aeronautics.

New Tube May Boost Civil DME Power

A new type of klystron tube, reportedly several times more powerful than other tubes designed for use in distance measuring equipment ground stations, has been announced by Eitel-McCullough. The new Eimac X566 is capable of delivering 20 kw. peak pulse power with only 100 mw. driving power (53 db. power gain) at frequencies of 900 to 1,400 mc. The tube has a 1-kw. average power capability, permitting a 5% duty cycle at 20 kw.

Developed for military use, probably for the new Tacan distance-bearing navaid system, Eimac is hopeful that the X566 may find use in civil DME ground stations, currently rated at 5 kw. peak power. There has been some interest in boosting civil DME power as evidenced by Air Navigation Development Board-sponsored program to develop a 20-kw. transmitter.

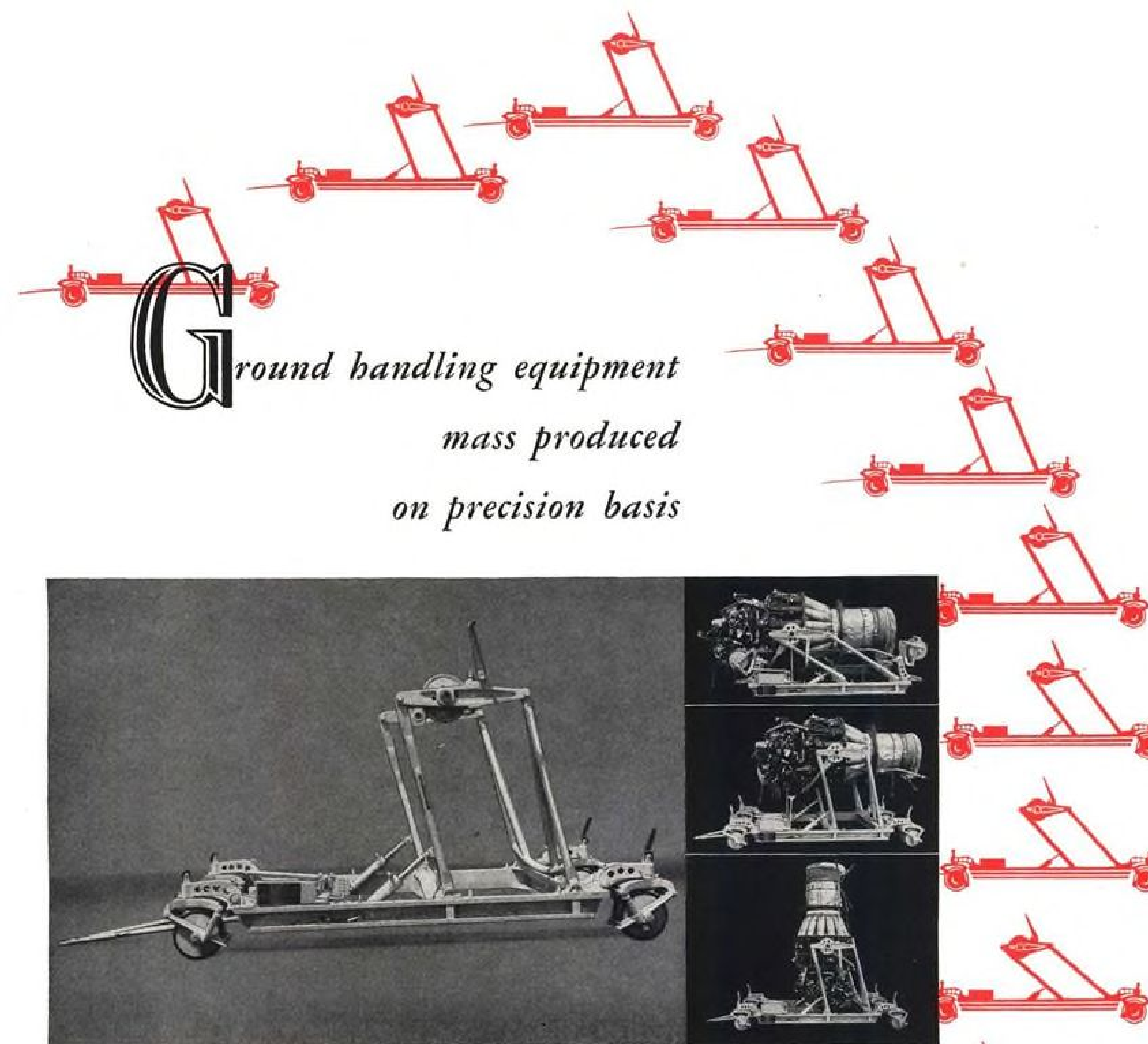
► New Modulating Anode—Interesting design feature of the X566 is that its beam current can be varied by changing the voltage applied to a new modulat-



Copter Navaid?

Lightweight Decca Navigator may see use as helicopter navigation aid. Bendix Aviation's Pacific Division has obtained U. S. manufacturing and sales right to the British navaid (Aviation Week Nov. 15, 1954, p.

17). It consists of flight log (top, center) which graphically shows pilot his position, control box (lower, center), plus receiver and computer (l. and r.). Low-altitude coverage is a Decca feature.



Ground handling equipment
mass produced
on precision basis

The economical handling and transportation of large bulky items, such as engines, wings, and tail sections, to and from field repair bases, have necessitated the use of tactical ground handling or ground support equipment.

Loud's production "know how" and complete facilities have made it possible to mass produce this type of equipment with complete interchangeability of all parts through the use of well designed and precision built tooling.

"PRODUCING TODAY...TOMORROW'S AIRCRAFT REQUIREMENTS"

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Bell offers structures engineers challenging assignments involving the so-called "thermal barrier" in supersonic and hypersonic flight. By helping to insure the success of tomorrow's revolutionary aircraft, you will have the opportunity to demonstrate your ability to the fullest. Excellent positions are now available for the following:

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ing anode, located between the tube's cathode and drift tube section. This modulating anode permits the tube to be pulse or amplitude modulated from low-level driving signals with considerably higher overall tube efficiency.

For example, when operated as a modulated RF amplifier, the carrier can be 100% modulated with an efficiency of 30%. This is more than three times the efficiency possible with older klystrons not equipped with the modulating anode, Eimac reports. The new anode also makes a very efficient switch for pulse operation, company says.

Another advantage of the new klystron is that RF circuit elements are separate from the tube, permitting its replacement without disturbing the pulsing or modulating circuitry. Eimac estimates the new X566's operating life at 10,000 hours.

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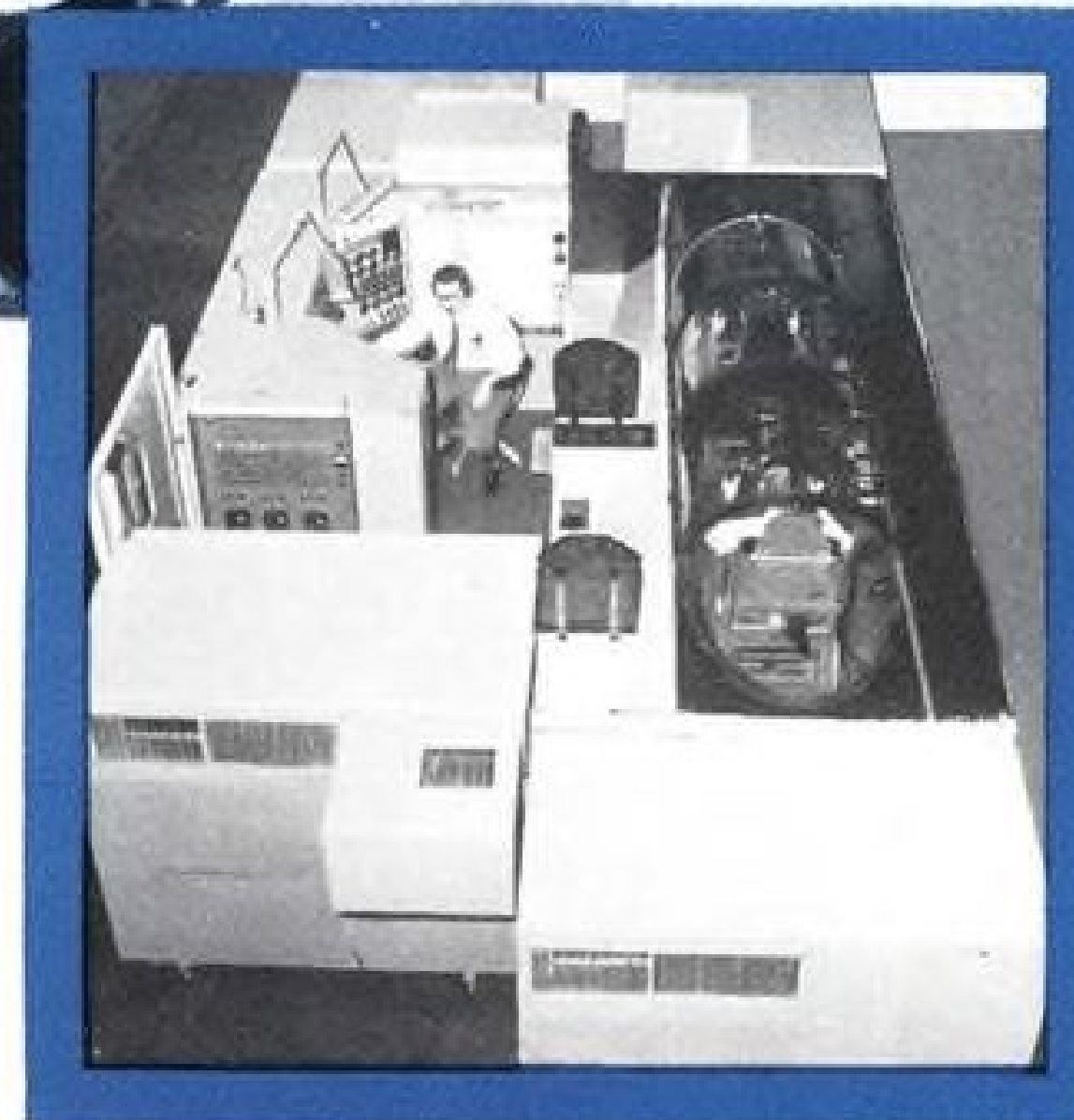
► **Tiny New Integrating Gyro**—Possibly the world's smallest integrating gyro, the HIG-3, measuring only 1 in. in diameter by 2 in. long, and weighing only 4½ oz., has been announced by Greenleaf Mfg. Co., which is now in pilot production on the devices. Technical details on the HIG-3 are given in a two-page ad elsewhere in this issue. Device is an outgrowth of a USAF-sponsored development by MIT.

► **Wanted: Avionics Engineers**—Recent Sunday issue of The New York Times carried almost two full pages of display ads seeking avionics and electronics engineers, mostly the former. This is nearly as much space as was devoted to all other "men wanted" display ads, including approximately ½ page for aeronautical and propulsion engineers.

► **Radar Testing Made Easy**—Hillyer Instrument Co. has developed series of more than 20 modular units which can be assembled into equipment capable of performing wide variety of tests on radar systems. For example, Hillyer equipment permits simulation of single or multiple targets, closing of tracking loops, evaluation of system response, checking of ranging circuits. Where IF amplifier characteristics affect system performance, input signal can be converted to RF frequency and injected into IF amplifier. Bulletin No. 12 gives full details. Company address: 54 Lafayette St., New York 13, N. Y.

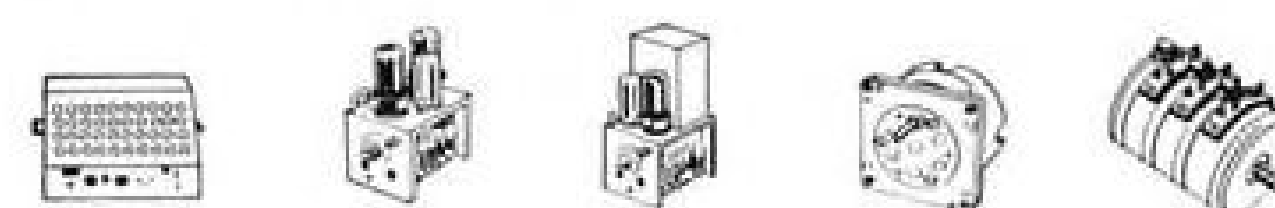
► **Sylvania Missiles to Boston**—Sylvania Electric's Missile Systems Lab, presently located at Whitestone, Long Island, N. Y., will move to larger quarters in the Boston area next summer. —PK

WHEREVER YOU FIND AIRPOWER, YOU'LL FIND LINK!



Engineered and built by Link, the world's first jet bomber simulator duplicates precisely flight conditions of the Boeing B-47 Stratojet. This simulator was developed under Link basic patents.

LINK INVITES APPLICATIONS FROM QUALIFIED ENGINEERS AND DRAFTSMEN.



Manufacturers of the world-famous Link Trainers and Simulators
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A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

Western Europe's Watchdog Against Sneak Atom Attack

Powered by the Javelin is the fastest fighter in the world. Its production and first deliveries are being made to the Royal Air Force.



Pearl Harbour was a good lesson for all of us. We doubt that the next war will start with weeks and months of diplomatic tea parties. The chances are that it will come like sudden death. And, if you were the enemy, with all the chips down, a sneak attack on London would seem like a pretty good opening tactic.

Defence against this sneak attack is not an easy job. Certainly an early warning radar network in Europe is vital, but even single high-flying, high speed atomic bombers can wreak immediate destruction. And if, and when they try, the prime defensive weapon is the Gloster Javelin. Here is an aircraft second to none in the world. It flies and fights at altitudes higher than ever before. It has a destructive power tough enough for any bomber, but the most important thing of all is that it carries in it the most complex search radar gear, a British invention, which is unparalleled in any other aircraft.

Fair weather or foul, night or day, the Javelin can track down and engage in combat any bomber. The Javelin carries a two-man crew—one to fly the aeroplane and the other to operate the complex radar gear.

Very little can be said about the delta-wing Javelin because Security prevents it, but airmen know it for what it is—the most important aircraft in Western Europe. It is powered by twin Armstrong Siddeley Sapphires and is made by Gloster, who made the first successful jet aircraft and comes from the Hawker Siddeley Group, makers also of the Hawker Hunter interceptor and the Avro Vulcan four-jet Delta bomber.

DAY AND NIGHT ALL WEATHER FIGHTER
Gloster Javelin

GLOSTER AIRCRAFT CO. LTD., GLOUCESTER, ENGLAND. Member of the Hawker Siddeley Group/Pioneer...and World Leader in Aviation

AIR TRANSPORT

ATA's Year-end Report on U. S.-Flag Airlines Says . . .

Everything Higher in '54 but the Profits

- Total revenues will be about \$359 million.

- But expenses will eat up some \$329 million.

Frank Shea, Jr.

U. S.-flag airlines, riding the crest of the aircoach and pay-later booms, continued to register substantial gains in 1954.

According to Air Transport Assn.'s year-end estimates, total traffic should hit the 519.7-million revenue ton-mile mark for a jump of 11.3% over 1953, while total revenues will tally around \$359 million for a 6.4% increase. These figures compare favorably with gains expected for the domestic carriers (AVIATION WEEK Dec. 6, p. 107).

All U. S. scheduled carriers, both international and domestic, will gross approximately \$1.25 billion, a jump of about 8% over the previous year. They flew nearly 2.5 billion revenue ton-miles of traffic for a gain of 15.3% over 1953, more than doubling the total revenue ton-miles flown in 1949.

► **'Charity' Gains**—Like their domestic brothers, the U. S. international airlines continued to be plagued by a progressively narrowing profit margin.

All gains since 1949 have been, in a sense, "for charity." The net realized for 1954 will be the same, if not less, than that reported four or five years ago.

If total revenues hit \$359 million, as expected, about \$329 million of this will be chalked off for expenses.

But, unlike the domestics, the flag carriers are plagued by other equally weighty problems particularly peculiar to them. Chief among these:

- **Growing criticism** of their increasing dependence on subsidy.

- **Uneconomic duplication** on many segments of their route structure.

- **Intense competition** from foreign-flag airlines.

► **Subsidy Bill**—Critics of the subsidy program legitimately wonder why, with domestic airlines practically off subsidy, the bill for the flag carriers goes up appreciably every year. They cannot understand how commercial revenues can nearly double over a seven-year period, 1947-1954, while subsidy dependence makes a parallel increase.

U. S.-Flag Airlines Boxscore for '54*

TRAFFIC	1953	1954	Percentage change
Revenue passengers	2,682,219	2,812,000	+ 4.84%
Revenue passenger-miles (000)	3,381,124	3,700,000	+ 9.43
U. S. mail ton-miles	24,467,569	33,600,000	+37.32
Foreign mail	6,370,804	7,233,000	+13.53
Cargo ton-miles	74,643,683	82,300,000	+10.26
Excess baggage	8,209,270	8,950,000	+ 9.02
Nonscheduled revenue ton-miles...	7,699,689	10,000,000	+29.88
Total revenue ton-miles	466,774,043	519,680,000	+11.33%
REVENUES AND EXPENSES			
Passenger revenues	232,539,000	253,105,000	+ 8.84%
U. S. mail revenues	53,747,000	56,173,000	+ 4.51
Foreign mail revenues	9,556,000	9,400,000	— 1.63
Cargo revenues	27,331,000	29,531,000	+ 8.05
Excess baggage revenues	5,245,000	5,720,000	+ 9.06
Nonscheduled revenues	3,340,000	4,500,000	+34.73
Total revenues	337,286,000	358,789,000	+ 6.38%
Total expenses	317,907,000	329,000,000	+ 3.49%

* ATA year-end estimates.

They point questioningly to the respective requirements of \$24 million in 1947 and \$44 million in 1954.

Many have noted that approximately three-fourths of this total subsidy for flag airlines is applied to support operations in areas throughout the world where commercial revenues are weak. In these areas, they wonder why they find not one but two or three U. S. airlines flying the same uneconomic route when the traffic justifies service by only one. This is plus a number of foreign airlines flying the same routes.

Certain government officials, with the taxpayers on their conscience, are becoming increasingly aware that this uneconomic duplication is costing plenty—more every year. The only really satisfactory picture, in their opinion, is in the north Atlantic, where the growing traffic adequately justifies the existence of several U. S. carriers flying parallel routes.

► **"Essential Tool"**—There is growing pressure for rapid implementation of the Air Coordinating Committee's report on air policy, heralded as the Administration's basic doctrine for arriving at an established air transportation policy.

On subsidies, the report specifically

says: "On the constructive side they can be an essential tool for stimulating the development of essential services" but, "on the negative side, they can be a means for preserving an uneconomical structure within the industry. By shielding carriers from the full impact of economic forces, they can weaken the normal business incentives for maximum economy and efficiency."

The report further holds that national interest factors require many international routes despite subsidy requirements. It emphasizes, however, that international route decisions should recognize the necessity of avoiding or eliminating uneconomic duplication of service between U. S. carriers.

► **Monopoly Vs. Savings**—Critics of the ACC report say it fosters monopoly. Supporters counter with the argument that the ultimate benefactor is not so much the remaining carrier on present duplicating routes, but the taxpayer.

These supporters are fast becoming impatient, however. This question is asked frequently: "If the ACC report is to be the basis for our national air policy, as set forth, when are some of its recommendations going to be implemented?"

So far, it is a moot question. The

boxscore to date shows little indication of implementation.

► **Strong Barometer**—A year-end look at the route case picture gives ample evidence. At present, there are no less than a dozen international route cases involving U. S. airlines pending before either Civil Aeronautics Board or President Eisenhower. Most of these are not newly filed applications. Taken together, they represent a total of more than 20 years of hearings, re-hearings, deferred decisions, etc.

Many of these—such as the Trans-Pacific certificate renewal, Balboa through service, States Alaska, and numerous others—actually can be called test cases as far as implementation of the ACC report is concerned. All involve uneconomic duplication of routes by U. S.-flag carriers. All have been delayed considerably. All are ready for decision.

Taken together, these decisions will be considered a strong barometer in estimating whether or not the ACC report actually will be the base for establishment of a firm national air policy.

As one observer puts it: "Above the interests of individual airlines, national prestige and the fate of the heavily milked U. S. taxpayer hang in the balance."

IATA Airlines Make Big Gains in 1954

The substantial continued gains registered by U. S. scheduled airlines in 1954 are typical of air transport industry gains throughout the world.

► **\$2-Billion Business**—International Air Transport Assn. estimates that its 71 member airlines achieved an overall increase of 10% in revenue traffic operations on a global basis during the year.

According to IATA, these carriers did a total business of about \$2 billion, accounting for about 90% of all scheduled air transportation in the world (excluding the U.S.S.R. and Red China).

On a single route, the lucrative north Atlantic, expansion of traffic during 1954 meant operation of 15,000 flights by 12 IATA airlines—an average of one trans-Atlantic air connection virtually every half hour, every day.

But, similar to the U. S., the average net profit for the world's airlines remained "dangerously low."

► **1954 Achievements**—Sir William P. Hildred, IATA director general, points to the brighter side, however. He cites these noteworthy achievements by IATA members during 1954:

- It was the first year in which the number of passengers traveling across the oceans by air exceeded those who went by sea.

- For the first time scheduled air serv-

ices were begun over the North Pole.

- The helicopter boom continued to flourish, with the spread of copter services increasing for passengers, cargo and mail in many countries.

- IATA members carried 77% of the world's air cargo during 1954 and 93% of all airmail.

- Passenger traffic on IATA airlines increased 10% over 1953 to a total of about 44 million passengers who traveled approximately 28 billion passenger-miles.

- Cargo transport on IATA carriers totaled 527.4 million ton-miles for an increase of 4%.

- Mail carriage jumped 14%, with 199 million ton-miles flown.

- On the north Atlantic route, 12 airlines carried 580,000 passengers, 7,200 tons of mail and 12,000 tons of cargo—all new peaks.

► **Vulnerable Position**—"While the amount of travel and shipment on the airlines has increased, reductions in cargo rates and the fact that more and more passengers fly on the cheaper tourist services have retarded a corresponding increase in airline revenues during 1954," Sir William says.

He again sounds a note of caution on narrowing profit margins. "The profit margins of airline operation—out of which we must pay shareholders, service debts and put aside reserves for the future—are little more than 1% on a global basis.

"We are extremely vulnerable, therefore, to the effects of even a slight recession in trade or travel, a slight increase in our own costs, or a slight rise in taxes or charges by governments."

Feeder Barrier

- **CAB reveals yardsticks for certificate approval.**

- **Majority claims ratings back up negative stand.**

The four Civil Aeronautics Board members who believe local service airlines do not merit permanent certificates have revealed 15 yardsticks for feeder performance to back up their stand.

The four—Chairman Chan Gurney, Harmar D. Denny, Oswald Ryan and Josh Lee—give a list of criteria for local service performance and the ratings of each airline.

Their yardsticks are as follows:

- **Financial operating results.** (1) Do commercial revenues equal operating breakeven need? (2) Is total mail pay per revenue plane-mile flown lower than the local service industry average for 1953? (3) Is total mail pay per dollar of commercial revenue lower than the industry average for 1953? (4) Is commercial revenue per revenue plane-mile higher than the preceding year's industry average?

- **Measurements of traffic density.** (1) Is average passenger load per revenue plane-mile higher than the local industry average during 1953? (2) Is the average passenger-miles per route mile per day higher than the 1953 industry average? (3) Is the average passengers per station per day higher than the average

for the previous year? (4) Is the average passenger-miles per station per day higher than the industry average for 1953?

- **Measurements of Progress.** (1) Was there a decrease from the preceding year in total mail pay per revenue plane-mile? (2) Was there a decrease in total annual mail pay per dollar of commercial revenue? (3) Was there an increase in commercial revenue per revenue plane-mile? (4) Was there an increase in yearly passenger load per revenue plane-mile? (5) Was there an increase over the preceding year in passenger-miles per route mile per day? (6) Was there an increase in passengers per station per day? (7) Was there an increase in passenger-miles per station per day?

In these three categories, this is how CAB rates the local service airlines:

	Financial	Traffic	Progress
Mohawk	4	4	7
Southwest	4	4	6
Allegheny	3	3	7
North Central	2	4	7
Bonanza	4	1	7
Piedmont	4	4	3
Pioneer	4	4	2
Ozark	—	—	7
West Coast	2	—	5
Frontier	—	—	6
Lake Central	—	—	5
Central	—	—	3
Trans-Texas	—	—	3
Southern	—	—	2

NBAA Group to Take New Look at Policies

National Business Aircraft Assn. has appointed four committee chairmen to expand membership participation and increase services to members.

Appointed were Cole H. Morrow, J. I. Case Co., Racine, Wis., Technical Committee; Walter C. Pague, Armco Steel Corp., Middletown, Ohio, Awards and Convention Committee; Gerard J. Eger, International Harvester Co., Chicago, Administrative Committee, and Joseph B. Burns, Fuller Brush Co., Hartford, Conn., Reorganization Committee.

The four chairmen all are members of NBAA's board of directors.

Henry W. Boggess, NBAA board chairman and aviation director for the Sinclair Companies, Tulsa, Okla., says: "The rapid growth and development of business flying during the past year has necessitated a careful study by these committees of NBAA policies, organizational structure and general activities."

Navaid Site Survey

Airways engineers from Civil Aeronautics Administration are making site surveys at 14 locations where very-high-

frequency omni-directional ranges will be installed by the Navy for military use.

Request came from the Navy for CAA assistance because of experience gained by the agency in installing 392 VORs on civil airways.

Best PAA Year

- **Airline's 1954 business volume sets new record.**

- **Flag carrier estimates gross at \$226 million.**

Pushed by strong tailwinds from its Rainbow tourist service and pay-later plan, Pan American World Airways carried the largest volume of business in its history during 1954.

Gross volume, including mail payments, is estimated at \$226 million compared with \$217.9 million for 1953. Total passenger revenue, led by aircoach, jumped 9%.

► **Aircargo Potential**—The increase in cargo carried across the Atlantic is expected to hit 25%. The company as a whole probably will show a freight increase of about 14%.

"The maximum potential of the cargo market, however, was not realized," according to president Juan T. Trippe. "During recent years, the trans-Atlantic carriers and certain interested governments have continued to hold divergent opinions concerning the extent to which, if any, air cargo rate reductions should be made available to shippers.

"We are hopeful that all concerned will soon be able to reconcile their differing views and that major cargo tariff reductions will become effective in the spring of 1955," Trippe says.

The PAA president indicates that if this comes to pass, Pan American will operate daily all-cargo flights across the Atlantic before the end of the year.

► **Turboprop Freighters**—Trippe says the company always has emphasized air cargo and air express, noting the purchase of DC-6As for the future daily Atlantic service and PAA's intense interest in a "large, fast turboprop cargo aircraft now being designed to meet the requirements of national defense."

Trippe forecasts that when these transports become available over the next few years, they will provide still better and cheaper service to shippers. "In addition," he says such service "... will make an important contribution to national defense."

Pan American's most immediate new equipment, he reports, will be the seven DC-6Bs slated for delivery within the next six months. The PAA chief says these aircraft will be the fastest trans-

ocean transports in commercial use when they are introduced.

► PAA also is looking forward in Latin America. Wilbur L. Morrison, executive vice president in charge of the Latin American Division says an intensive streamlining of sales programs and other operations is underway to keep pace with Latin America's "phenomenal economic growth."

In an LAD traffic and sales conference just concluded, lengthy discussion was devoted to a 1955 sales program that will include efforts to stimulate travel to politically reoriented Guatemala, operation of PAA's "Canalift" for U. S. employees of the Panama Canal Zone on home leave, promotion of new, through flights between California and Brazil and the trend toward greater group travel and new air cargo drives.

Morrison emphasizes that air cargo today represents one of the most fruitful fields for increased revenues, noting that PAA's cargo tonnage in 1954 is expected to exceed 1953's record-breaking total by a wide margin. "I fully expect that within the next 10 years air cargo will equal passenger revenue in our Latin American Division."

► **15-Year Forecast**—Mario J. Martinez, division traffic and sales manager, predicted that "if the 20 Latin American republics maintain their present rate of economic growth," we may expect within the next 15 years:

- Almost tripled exports to the U. S.—up to \$8 billion annually.
- A population increase of 60% to 275 million—"a rising population with rising living standards."
- Almost tripled economic activity, with a value of all goods and services of more than \$100 billion.

Civil Airlines to Get All Military Airmail

Department of Defense is switching all military airmail to scheduled commercial airlines in a move that the department maintains is in line with its policy of keeping government competition with private enterprise to a bare minimum.

Commercial airlines already carry a good portion of the mail; but this move, which sets a firm policy, is expected to more than double the volume.

Defense estimates it will pay about \$18.4 million a year for the service. This income is expected to contribute to subsidy reduction for U.S. international carriers.

Civil Aeronautics Board has anticipated the increased business in two recent decisions, one cutting trans-Atlantic and trans-Pacific service mail rates and the other setting trans-Atlantic rates for Trans World Airlines and Pan American World Airways.

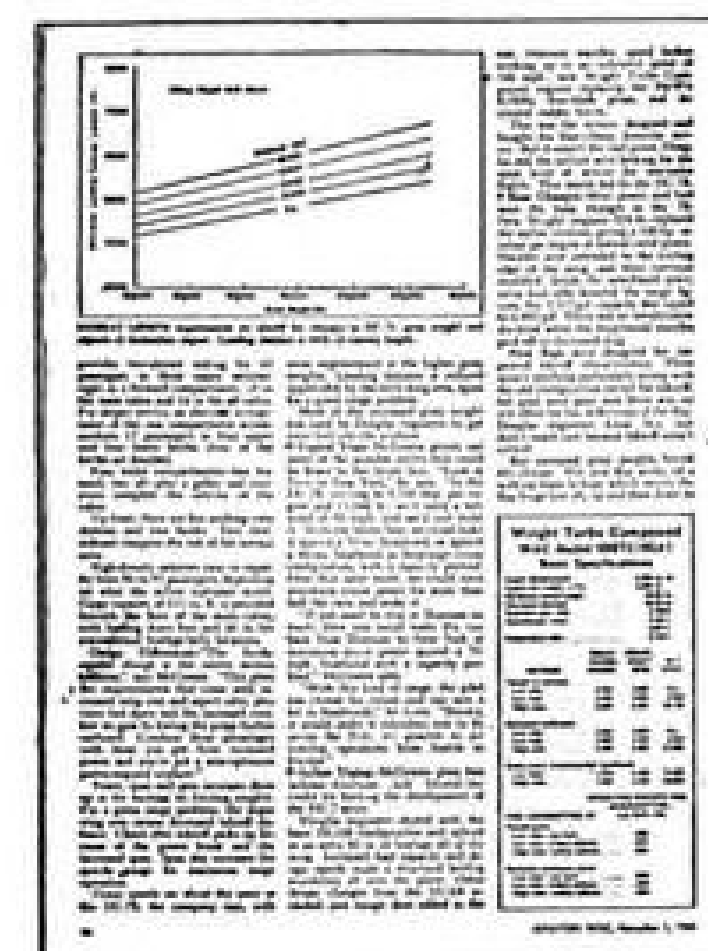
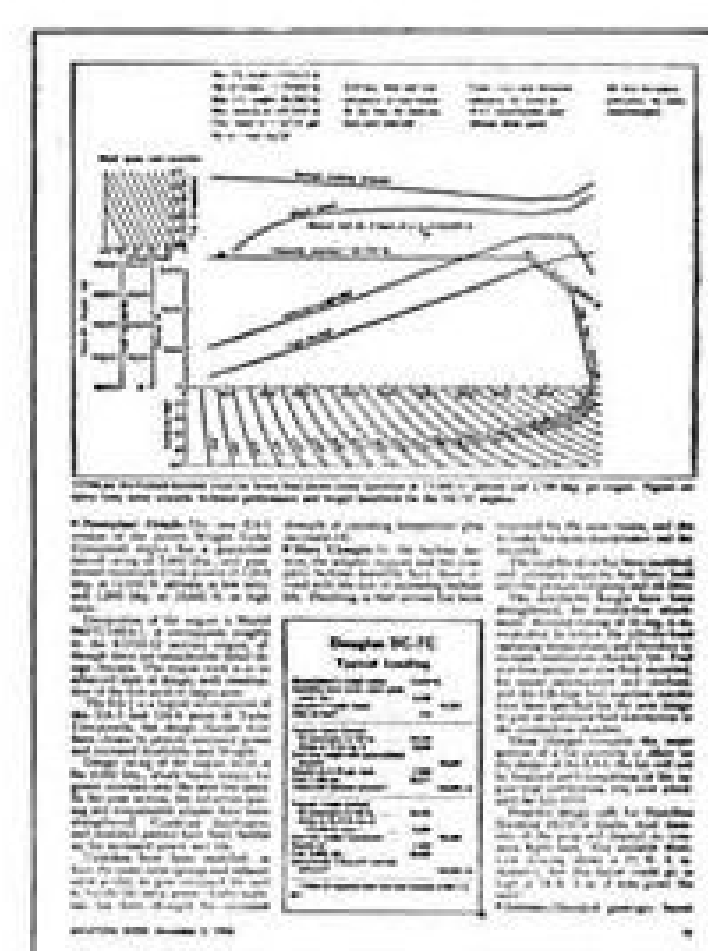
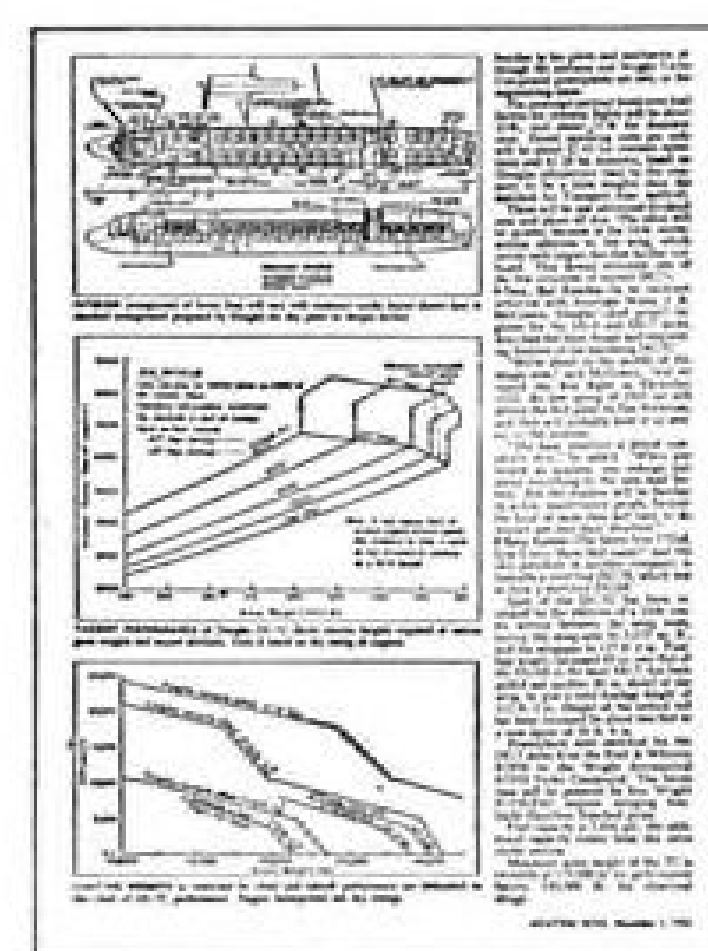


Air Force Generals Take Hop in Boeing 707

Maj. Gen. P. W. Timberlake (second from left), commanding general of the USAF Air Proving Ground, Eglin AFB, Fla., and Brig. Gen. J. S. Holtoner, commander of AF Flight Test Center, Edwards AFB, Calif., chat before going aloft in the Boeing 707 jet Stratoliner-Stratotanker during

the craft's flight test program. Also on the flight (left to right): Ralph L. Bell, Boeing sales director, Lt. Col. Guy M. Townsend, USAF flight test representative at Boeing; Fred P. Laudan, vice president-manufacturing, and R. L. (Dix) Loesch, senior experimental test pilot.

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"DC-7C CHALLENGES TURBINE TRANSPORTS"

This highly informative technical article is typical of the outstanding engineering reporting made available to AVIATION WEEK subscribers . . . by the largest and most highly skilled staff of graduate engineer-editors serving any aviation publication. In this case the story was written by David A. Anderton, Senior Engineering Editor, whose biography appears in this advertisement.

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DAVID A. ANDERTON, AVIATION WEEK's senior Engineering Editor, holds a Bachelor of Aeronautical Engineering degree from Rensselaer Polytechnic Institute, and has completed additional post-graduate studies at Princeton University and Union College. His professional experience began in 1941 with Grumman Aircraft Engineering Corp., where he was a production group leader on wing design of the TBF-1 torpedo bomber. While at Grumman, Mr. Anderton served in various capacities as Liaison Engineer Between Grumman and Eastern Aircraft Division of General Motors Corp.; in work on aircraft performance and powerplant problems in Grumman's Aerodynamics Department; and in Grumman's Preliminary Design Group on pioneering work with jet aircraft layouts. After his work at Grumman, Mr. Anderton served as Aerodynamicist for the Lark guided missile at Ranger-Lark Division of Fairchild Engine & Airplane Corp.

Mr. Anderton joined the General Electric Company in 1946, on GE's Hermes guided missile project. During his first 14 months with GE, he worked alone on preliminary design for a long range rocket missile. He was then named Project Engineer on GE's Hermes B missile with responsibility for its overall design and successful functioning. After completing his work on the Hermes project, Mr. Anderton joined the editorial staff of AVIATION WEEK.



Mr. Anderton is a member of the Institute of the Aeronautical Sciences, Society of Automotive Engineers, American Rocket Society, Sigma Xi (national honorary engineering society), and Aviation Writers Association.



Pan American World Airways markings proposed by Douglas.

AVIATION WEEK

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CAB ORDERS

(Dec. 16-22)

GRANTED:

Ozark Airlines permission to inaugurate service at certain airports on or about Jan. 3, subject to any necessary amendment of Ozark's certificate concerning such service.

Los Angeles chamber of commerce leave to intervene in the Guatemala City-Los Angeles renewal case.

Transocean Air Lines an exemption to operate one flight from Hamburg, Germany, to Seattle.

Inlet Flying Service an exemption to employ pilots as an Alaskan pilot-owner, subject to certain conditions, until final decision in the investigation of intra-Alaskan air services case.

City of Mitchell, S. D., leave to intervene in a case involving amendment of Western Air Lines' certificate for Route 35.

APPROVED:

Intercompany agreements involving Trans World Airlines and Braniff Airways, Mohawk Airlines and E. W. Wiggins Airways and various other carriers.

Air Cargo Expeditors and Air Cargo Consolidators' interlocking relationships involving Harry J. Phieffer, subject to certain conditions.

Western Transportation Co., doing business as W. T. C. Air Freight, and Eckdahl Warehouse Co.'s interlocking relationships involving A. Meyers and R. Meyers, subject to certain conditions.

Continental Forwarding Service and Public Express Service's interlocking relationships involving Paul P. Braungart, subject to certain conditions.

AUTHORIZED:

Trans-Canada Air Lines use of Kinross Airport, Mich., extended to June 30, 1955, and its permit to navigate between Mexico City and Tampa, Fla., extended to Sept. 30, 1955.

Conferences between members of International Air Transport Assn. and the CAB staff on proposed agreements relating to carriage and related traffic regulations.

AMENDED:

Braniff Airways' certificate for Routes 9 and 26 suspending service at Joplin, Mo., and Muskogee, Okla., while Central Airlines serves those points.

Lake Central Airlines' exemptions authorizing service to Kokomo-Logansport-Peru and Lima, Ohio, to terminate Dec. 31, 1955.

DISMISSED:

Lake Central Airlines, Capital Airlines and Northwest Airlines' applications to perform extra service during the American Airlines pilot strike, since AA's service has been resumed.

ORDERED:

National Airlines' proposal regarding filing of loss and damage claims on baggage be suspended until Apr. 5, 1955, and an investigation instituted into the matter.

Central Airlines to show cause why proposed temporary mail rates should not be set pending fixing of final rates.

Northern Consolidated Airlines' temporary mail rate fixed at the rate proposed by CAB.

Alaska Airlines' temporary mail rate fixed at the rate proposed by the Board.

Trans-Texas Airways' final mail rates fixed retroactive to July 1, 1953, at the rate proposed by CAB.

CAB Reopens Three International Rates

Final mail rates for Latin American service were reopened last week by Civil Aeronautics Board.

The action includes Pan American-Grace Airways, Pan American World Airways' Latin American Division and both Latin American and domestic operations of Braniff Airways.

► **Rate Reductions**—Show cause orders also were issued proposing temporary rates that would reduce mail pay for Panagra and the Latin American operations of Braniff. The orders were made because of excess earnings reported by both airlines for the year ended Oct. 31, 1954.

PAA's Latin American Division did not receive a rate cut, but the rate was reopened to determine whether it will become excessive in the future year.

The Board points to higher load factors and operating economies "reasonably to be anticipated" in an operation of the size of this division.

► **Earnings Picture**—Panagra's rate was reopened because earnings reports indicated "the current rate may result in an undue subsidy burden on the government unless reopened at this time."

Panagra reported a profit after taxes for the year ended Oct. 31, 1954, of \$1,022,000, a return of 12.74% on investment.

The mail rate is designed to give a return of 10% or \$732,000 a year. The new temporary rate, effective Jan. 1, 1955, will pay \$2,290,000 annually.

Braniff also reported excess earnings for the same period. Total after taxes was \$639,000 or a 14.58% return on investment in international operations. Braniff's rate is designed to yield a return of 10% on Latin American operations and 8% on domestic.

No current excessive earnings have been found in the domestic operations, but the rates have been reopened in view of various encouraging factors to determine whether they might become excessive in the future.

► **Pay Requirement**—All three carriers must file with the Board a forecast of traffic and financial results for affected divisions for the year beginning Jan. 1, 1955.

Forecasts are to include a statement of mail pay requirements and rates the airlines believe reasonable. They must be filed in 30 days.

CAB Blames Storm For Braniff Crash

A Braniff Airways DC-3 crash last August probably was caused by very heavy rains, divergent winds and strong downdrafts of a thunderstorm, Civil Aeronautics Board reports.

The transport crashed near Mason City, Iowa, Aug. 22 while operating on VFR on a Memphis-Minneapolis flight. Twelve persons were killed and seven seriously injured. The DC-3 was destroyed.

In its report, CAB says the forecast issued by the Weather Bureau and Braniff did not indicate the severity of the storm in the DC-3's path.

Investigators found evidence of strong downdrafts in the storm. Damage to the aircraft indicated it hit the ground with considerable downward velocity and low forward speed.

SHORTLINES

► **British Overseas Airways Corp.** will increase passenger seat capacity 17% in 1955. Boeing Stratocruisers will be used exclusively in first-class and aircoach service across the Atlantic.

► **Capital Airlines** has signed a four-year contract with Shell Oil Co. to supply kerosene for the carrier's 60 Vickers Viscounts on order, claimed as the first major order in the U.S. for turboprop fuel.

► **KLM Royal Dutch Airlines** is offering two types of trans-Atlantic service—deluxe and aircoach. The new deluxe service, which replaces first-class, offers Sleepair lounge chair service at no extra cost.

► **Lockheed Aircraft Service-International** is inaugurating courses in Spanish to aid relations with Iberia, Avianca and LAV.

► **Seaboard & Western Airlines** logged 456,354 revenue-miles across the North Atlantic during October. The cargo carrier also made its 5,459th crossing since May 1947.

► **United Air Lines** set a company record Dec. 15, flying 352,886 mail and cargo ton-miles. United's fleet has 20% more cargo-mail space available this year than it had last Christmas season.

► **Pioneer Air Lines** carried 14,340 passengers 3,718,127 revenue passenger-miles in November with a load factor of 49.17%. Passenger traffic increased 36% over November 1953.



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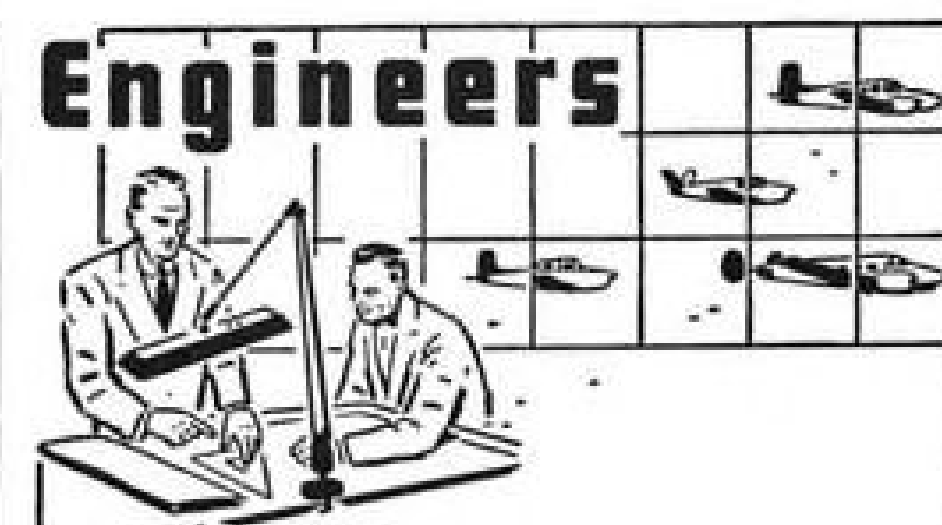
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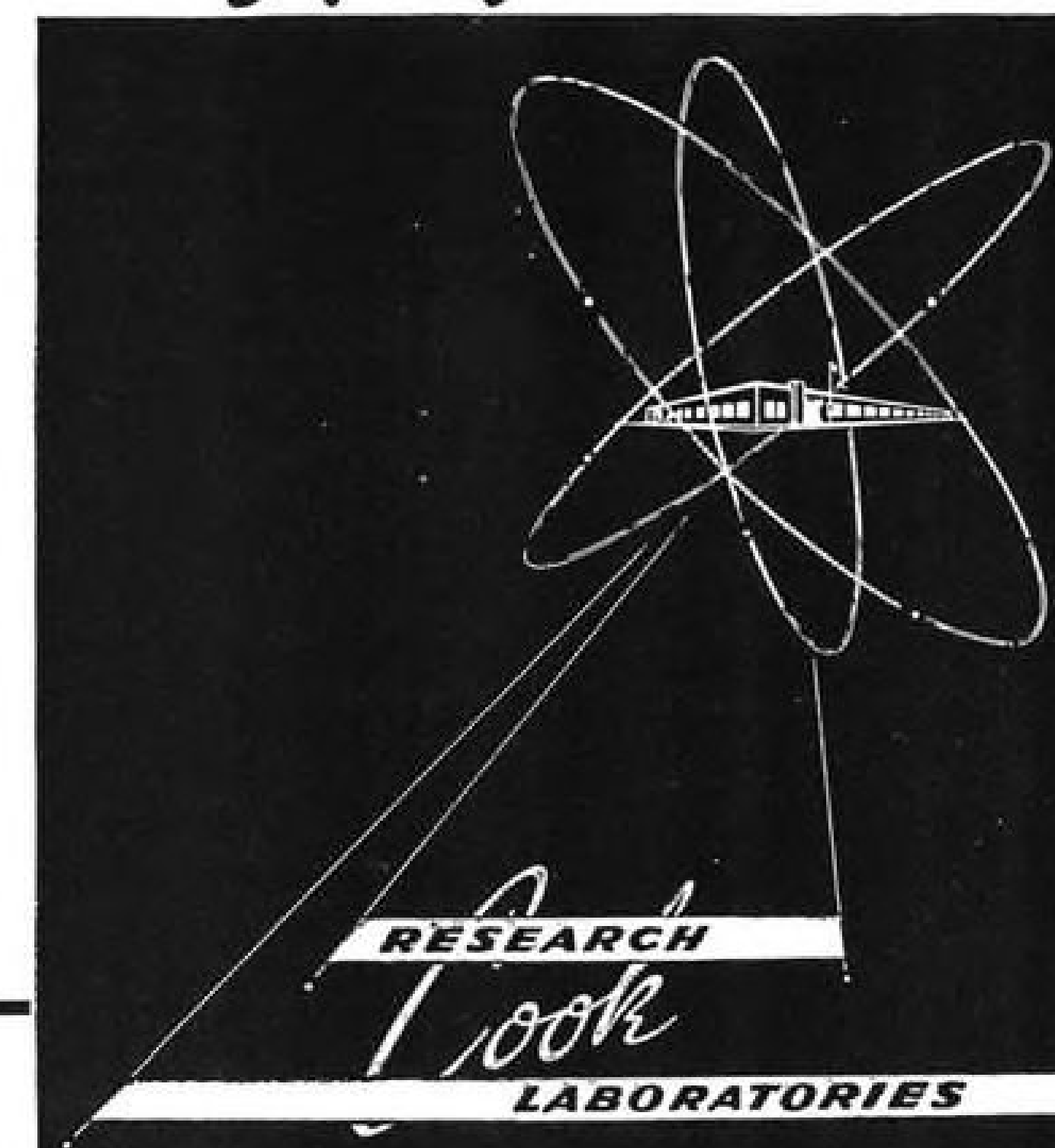
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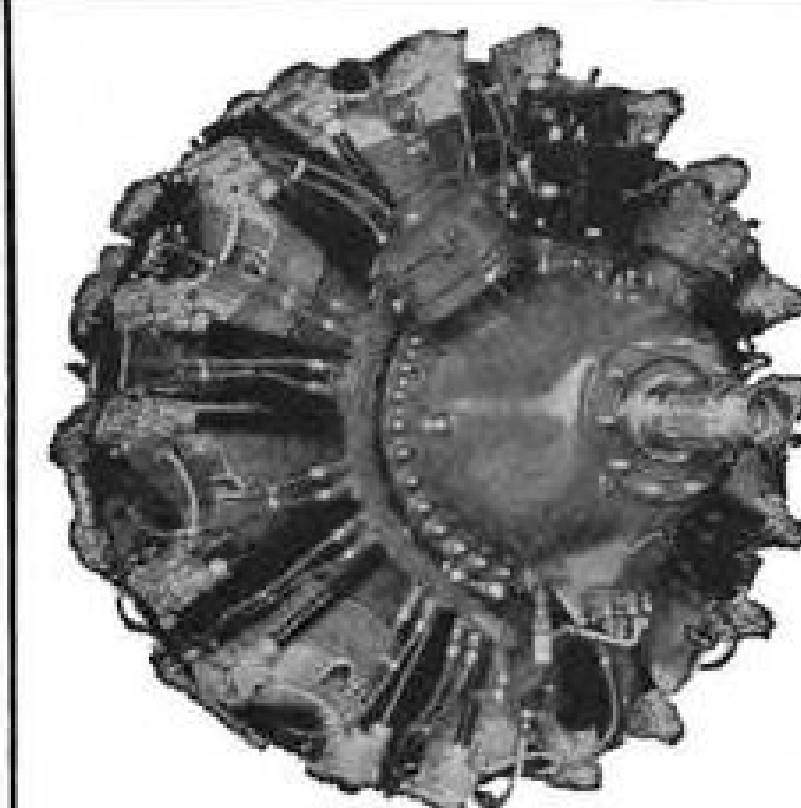
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News Sidelights

Automobile contests may be held on airports, provided areas closed to flying are properly marked and proper notice has been given airmen using the fields, Civil Aeronautics Administration reports in instructions to its aviation safety agents. Says CAA: "The airport is an important local facility and it should be useful to all people in the community. We insist only upon insuring safety of those who fly."

European arms salesmen are underselling the U.S. on surplus lend-lease military equipment in Latin America. Example: U.S. offered to sell F-51s in Nicaragua at \$39,000 each. Nicaragua bought from Sweden at \$24,000 each. Swedes picked planes up at war surplus sales in Europe. Under Western Hemisphere Defense Pact, U.S. must train Nicaraguan pilots to fly the planes—gratis.

Latest flying saucer report comes from Australia, where an RAAF pilot and a Canberra Airport radar operator collaborated to get a fix on two unidentified objects. Pilot was flying a Hawker Sea Fury when he spotted the objects. He radioed the radar operator who followed the objects on his screen until they disappeared. No other aircraft were in the vicinity, they said.

A helicopter crew put out a fire in an automobile last month. Kaman Aircraft's chief test pilot Al Newton and crew chief Bill O'Donnell spotted the fire in a moving car as they were flying along the New Jersey Turnpike. When the driver pulled over and stopped, the two men landed their copter, grabbed the aircraft's portable fire extinguishers and went to the rescue.

Largest mass paratroop of men and materiel ever attempted in Alaska will be held Jan. 13 to Feb. 13 during Exercise Snow Bird, joint Army-Air Force training maneuver. Troops will construct a snow-compacted runway on frozen tundra under simulated combat conditions.

Delay in obtaining certain test and overhaul equipment is "causing difficulties" in overhaul and maintenance of Pakistan's Super Constellations, the government's Dept. of Civil Aviation reports. Pakistan International Airlines and Orient Airways, Ltd., have partially combined their ground staffs and reallocated personnel to improve the maintenance organizations.

Free eight-day stay in Venice is offered by organizing committee of Aero Club de Venice which is holding a lightplane, helicopter, glider exhibition in that city early next summer. Not only are there no registration fees, but the club says it will pick up all tabs for fuel and hotel bills. This includes any passengers arriving with the exhibition aircraft. Write Vico Rosaspina, Via Rossini 1, Milan, Italy, for further details.



SUPERSONIC SPEED is claimed by the French for this twin-jet, sweptwing Sncaso S.O.4050 Vautour, which features a bicycle-type main landing gear under the fuselage and outrigger wheels retracting into side of jet nacelles. Bomber version is third Vautour prototype; first is all-weather fighter, second a tactical ground-support model. Company is building 70 Vautours at its St. Nazaire, Nantes plants.

AVIATION CALENDAR

- Jan. 10-11—Helicopter Association of America, seventh annual meeting, Warwick Hotel, Philadelphia.
- Jan. 10-14—Society of Automotive Engineers, annual meeting, Sheraton-Cadillac and Hotel Statler, Detroit.
- Jan. 19-23—Miami International Aerorama, Miami (Fla.) International Airport.
- Jan. 20-21—Institute of Radio Engineers and Radio-Electronics-Television Manufacturers Assn., Symposium on Printed Circuits, University of Pennsylvania, Philadelphia.
- Jan. 20-22—Conference on High-Speed Aerodynamics, organized by the Department of Aeronautical Engineering of the Polytechnic Institute of Brooklyn, Engineering Societies Building, New York.
- Jan. 24-27—American Meteorological Society, 135th national meeting, New York University College of Engineering, New York.
- Jan. 24-27—Plant Maintenance & Engineering Show and three-day conference, International Amphitheatre, Chicago.
- Jan. 24-28—Institute of the Aeronautical Sciences, 23rd annual meeting, Honors Night Dinner, Hotel Astor, New York.
- Jan. 27-28—Southern California Meter Assn., fourth annual Instrument Short Course, Los Angeles Harbor Junior College, Wilmington, Calif.
- Jan. 31-Feb. 4—American Institute of Electrical Engineers, winter general meeting, Hotel Statler, New York.
- Jan. 31-Feb. 4—American Society for Testing Materials, annual Committee Week, Netherland Plaza Hotel, Cincinnati.
- Feb. 8-10—Society of the Plastics Industry, 10th Reinforced Plastics Division Conference, Hotel Statler, Los Angeles.
- Feb. 10-11—Society of American Military Engineers, military-industrial conference on manpower, Conrad-Hilton, Chicago.
- Feb. 20-22—Fourth annual Texas Agricultural Aviation Conference, A&M College of Texas, College Station, Tex.
- Mar. 11—Institute of the Aeronautical Sciences, National Flight Propulsion Meeting (restricted), Hotel Carter, Cleveland.
- Mar. 14-16—Society of Automotive Engineers, production meeting and forum, Netherland Plaza, Cincinnati.
- Mar. 14-18—American Society of Tool Engineers, first Western Industrial Exposition, Shrine Auditorium and Convention Hall, Los Angeles.
- Mar. 21-24—Institute of Radio Engineers, national conference, Waldorf-Astoria Hotel and Kingsbridge Armory, New York.
- Mar. 28-Apr. 1—American Society for Metals, ninth Western Metal Exposition and Congress, to include the American Welding Society's technical session on aircraft and rocketry, Pan Pacific Auditorium and Ambassador Hotel, Los Angeles.
- Apr. 5—International Air Transport Assn., technical conference, San Juan, P. R.
- Apr. 5-7—Radio Technical Commission for Aeronautics, spring assembly, Los Angeles.
- Apr. 18-21—American Society of Mechanical Engineers, Diamond Jubilee spring meeting, Lord Baltimore Hotel, Baltimore.

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EDITORIAL

Aid for Flight Safety

Laurance S. Rockefeller has contributed another gift to the Flight Safety Foundation, approximating \$20,000. This brings Mr. Rockefeller's aid to the foundation to just under \$100,000 since 1948.

This is a valuable contribution to a vital cause. It is another convincing demonstration of faith in this non-profit organization. It also is a distinct public service by Mr. Rockefeller.

In announcing his decision to contribute again to the foundation, Mr. Rockefeller wrote its president, Admiral John Towers, "Under the joint stewardship of Jerry Lederer and yourself, the Flight Safety Foundation has in my opinion during the past year continued to warrant the confidence of its many supporters. I am hopeful that as time goes on a larger segment of the aircraft manufacturing industry will come to recognize more fully the contribution that you are making, and that you will thereby gain the broader recognition and support the foundation so clearly deserves. . . . I shall continue to follow with interest the valuable work that you are doing."

The foundation was established in 1945 to anticipate flight safety problems, study flight safety procedures, and disseminate flight safety information, all of which it has accomplished with increasing skill and judgment. It directs its efforts to all levels of flying, from management to mechanics.

A new brochure on the foundation significantly titled "160,000,000 Americans Have a Stake in Flight Safety," cites a few of the important problems studied, interpreted and reported to industry:

Cockpit complacency: The sustained effort to combat complacency—the "it-won't-happen-to-me" attitude—has materially advanced aviation since its beginning. This crusade to combat complacency is a continuing objective.

Sensory illusion: For years "optical illusions" troubled pilots. Now for the first time in aviation history, the facts have been uncovered and disseminated.

Mechanics creed: Aviation long recognized the need to improve the professional status of mechanics. The foundation sets forth a creed of professional conduct for them.

Crew relationships: Tendencies toward personal animosities which may create difficult and even hazardous conditions in the cockpit have for years been a "hidden factor" in flight operations. The foundation offers the opportunity to exchange experiences among pilots and crew members without fear of any punitive action being taken.

Interchange of experience: The waste and danger of accidents that "repeat themselves" have long plagued aviation. Now with assurance of anonymity from the foundation, pilots and mechanics willingly report information on near-accidents that will help avert the real thing.

Refueling hazards: These have been decreased by flight safety bulletins.

Ditching procedures: Through specific flight safety bulletins, the Merchant Marine now has access to full information.

Mental hazards: Problems such as panic on the part of passengers have been studied by the aviation industry and the Air Force for many years, but it required flight safety studies to make the hazards readily understandable to the flight crew.

Medical standards: Medical and physical standards promote safety. The foundation has encouraged tests for color blindness for refueling crews because fuels of different octane ratings have different colors.

Another indication of the growing acceptance of the foundation is the list of more than 70 organizations—literally a who's who of aviation—that sent representatives to its most recent annual three-day seminar, in November.

The airline participants were American, Colonial, Continental, Eastern, KLM, Pan American Grace, Pan American, Scandinavian, Trans-Canada, Trans World, Transocean and United.

Aircraft manufacturing participants were Bell, Boeing, Cessna, Chance Vought, Convair, Douglas, Fairchild, Grumman, Lockheed, Martin, McDonnell, North American, Northrop, Republic, Ryan and Temco.

Other firms included Air Cruisers, General Motors, Lear, Raytheon, Sinclair and U. S. Steel.

Association and government turnout was impressive: ALPA, British govt., RCAF, Coast Guard, Navy, ATA, Flight Engineers, CAA, CAB, NACA, Port of New York Authority, IAS, Lovelace Foundation, University of California, University of Southern California, Harvard School of Public Health, Crash Injury Research, Cornell-Guggenheim Aviation Safety Center and 14 USAF commands.

This is signal recognition of Flight Safety Foundation. It is to be hoped that all of these groups who benefited—and many more—will make provision for its financial aid before the new year gets any older. Mr. Rockefeller has set the example again.

John Stapp's Contribution

Those courageous experiments of Lt. Col. John P. Stapp under almost incredible rates of acceleration and deceleration win the admiration and appreciation of the aviation world.

The general press is interested in the colonel's achievement in breaking his old "land speed record" of 421 mph. and setting a new one of 632 mph., in the Northrop-built, rocket-propelled sled at Holloman Air Development Center. But the medical and aeronautical significance is that Col. Stapp is furnishing valuable information on body stresses and reactions which probably will save the lives of pilots in aircraft subjected to sudden loads or of those who must abandon aircraft at high speeds.

It was revealed officially that the wind blast Col. Stapp encountered on the latest run was equivalent to that hitting a man ejected from a plane flying at more than a thousand miles an hour at 35,000 ft. altitude.

Col. Stapp recently won an award from Flight Safety Foundation for his outstanding contribution to aviation. The award was richly deserved.

—Robert H. Wood



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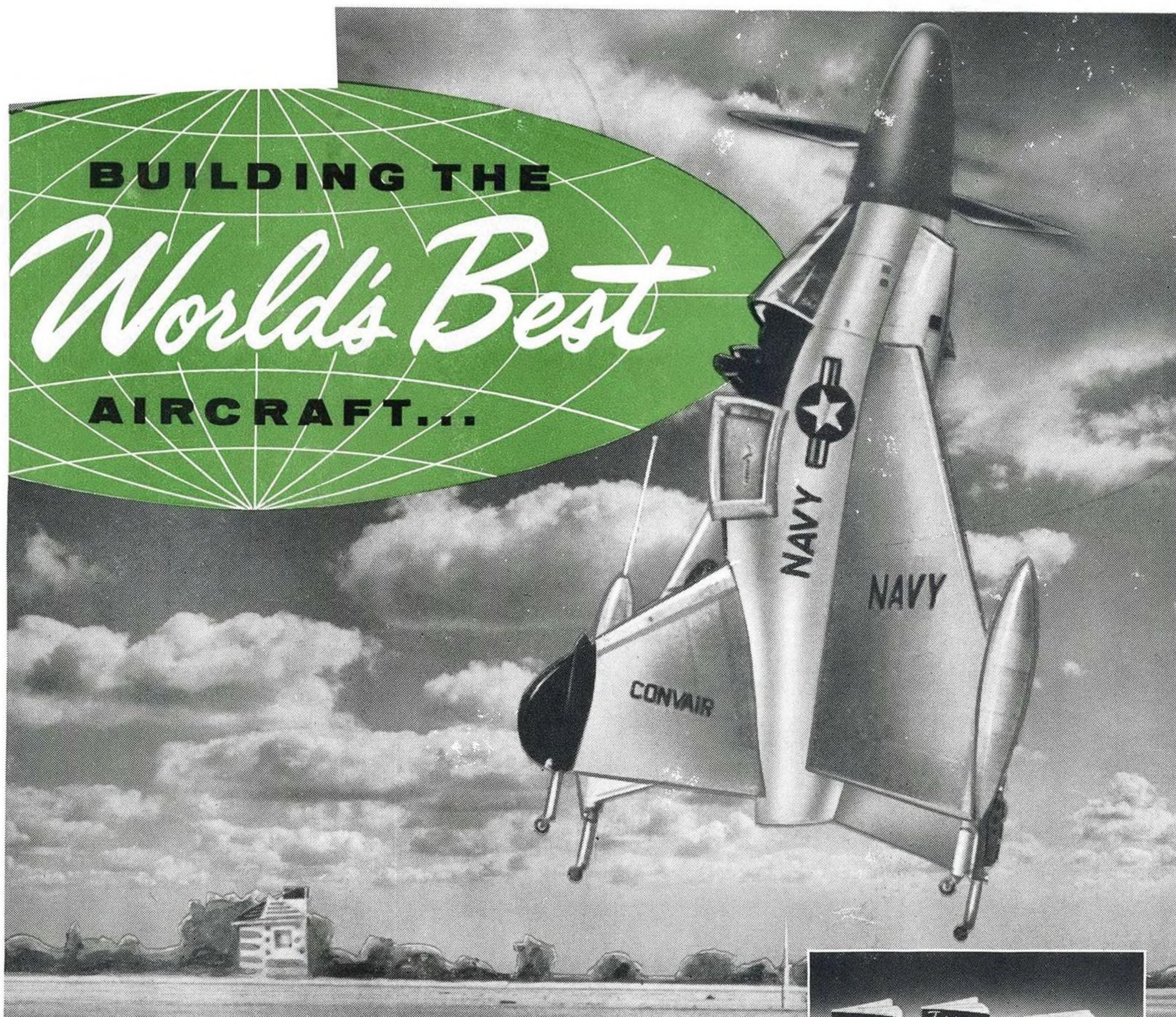
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