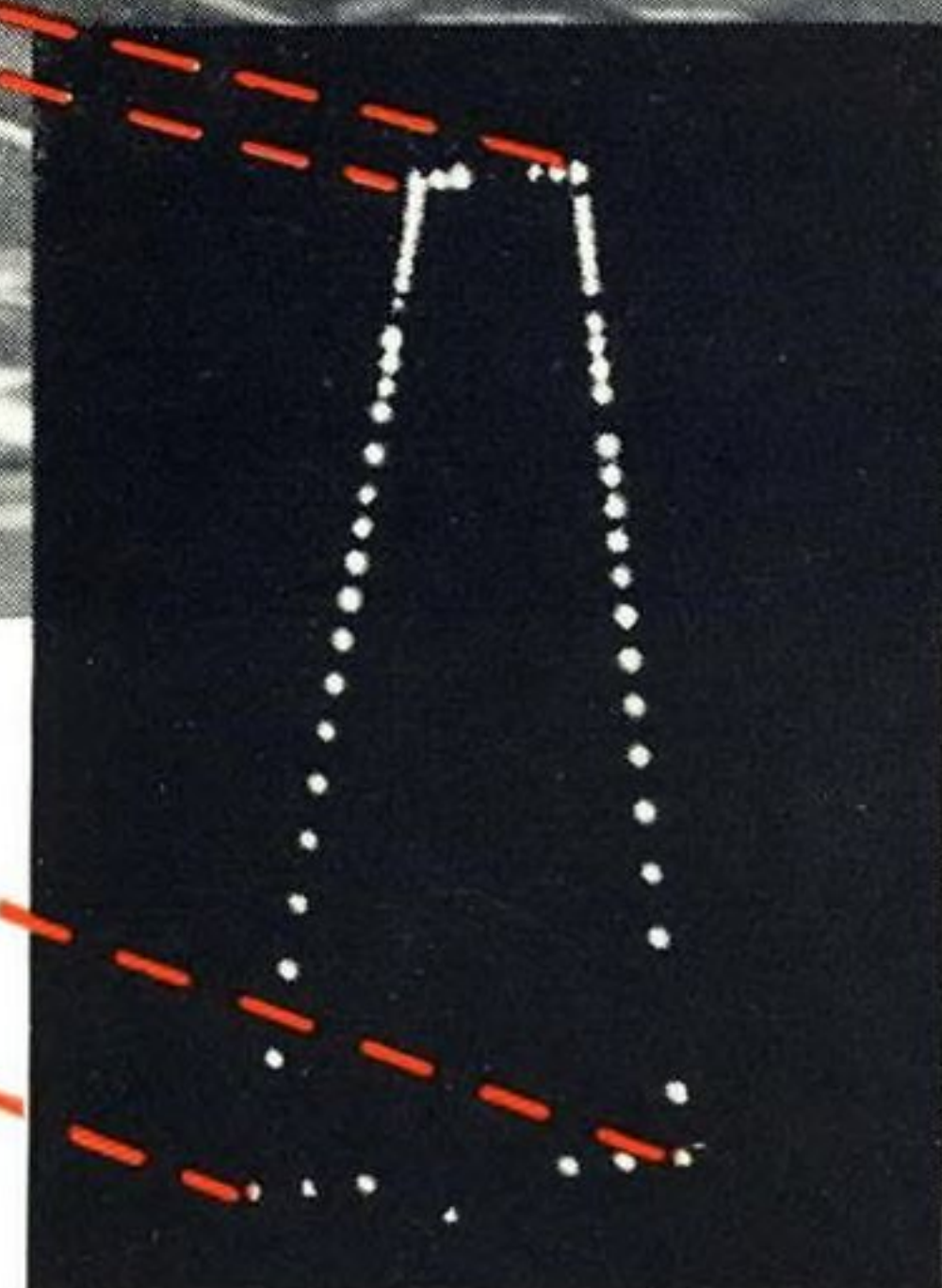
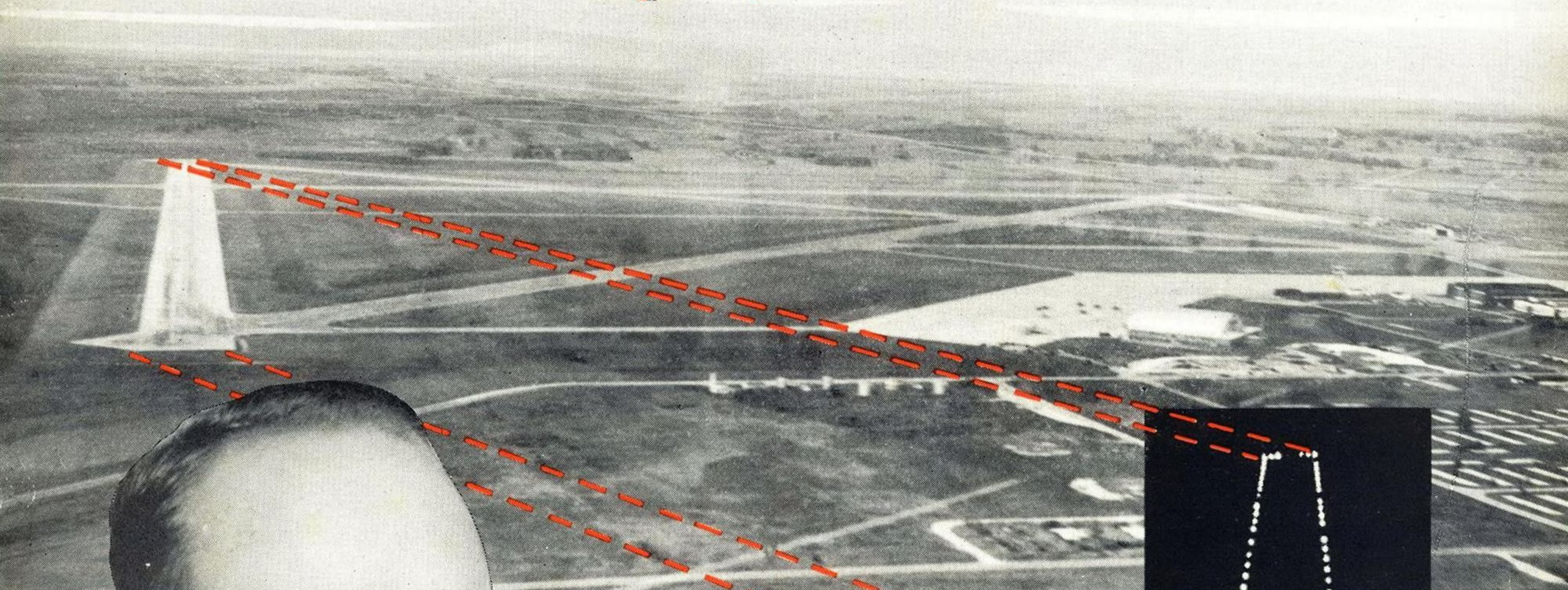


AVIATION WEEK

A MCGRAW-HILL PUBLICATION

DEC. 18, 1950

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A YEAR



BOB SKULDT of TRUAX FIELD

"Pilots like the controllable beam"

"Our new high-intensity runway lighting is solving many problems for us," says Robert Skuldt, manager of Truax Field, Madison, Wis. "The airport is built on reclaimed swamp land, almost completely surrounded by low hills. The combination gives us lots of fog, especially in spring and fall. Pilots of both Northwest and Wisconsin Central Airlines are enthusiastic about the lights. The controllable beam feature is particularly appreciated. We expect maintenance costs to be much lower than on our old medium-intensity system."

Mr. Skuldt is a pilot himself. He spent considerable time flying the "Hump" in the China-Burma theatre, and is a captain in the 176th Fighter Squadron, Wisconsin Air National Guard, based at Truax.

At Truax there are 60 of the latest 180,000 candlepower L-M High-Intensity Lights (right), with L-M's famous controllable beam which eliminates glare. These are installed on the main 6000-foot N-S runway, which will also soon have a new ILS system.



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B.F. Goodrich



100-foot rubber band seals pack and plane together

DESIGNS of the new Fairchild Pack-plane called for a seal to close up the two-inch space between the cargo pack and fuselage against wind and rain.

Trouble was, ordinary inflated seals or compression-type seals wouldn't work. They would put up to a 3½-ton separating force on the plane, which is much too much. What's more, the seal would get damaged in positioning the pack for attachment.

B. F. Goodrich engineers were given the job of developing a 100-foot band of rubber that would provide the

weather seal between pack and plane—and at the same time answer those problems.

They started with an inflatable tube, made of rubberized fabric with a soft rubber base. To the top of this tube they cured a special rubber strip, forming a lip-type seal which was attached to the pack.

In flight and ground tests, the new B. F. Goodrich inflatable seal proved the perfect answer. Its deflated height, only ⅜", allows plenty of clearance during attachment of the pack. It inflates to 8½ times its deflated height, provid-

ing an airtight seal. Because contact with the plane is made by the thin rubber lip instead of the tube itself, separating force is practically eliminated.

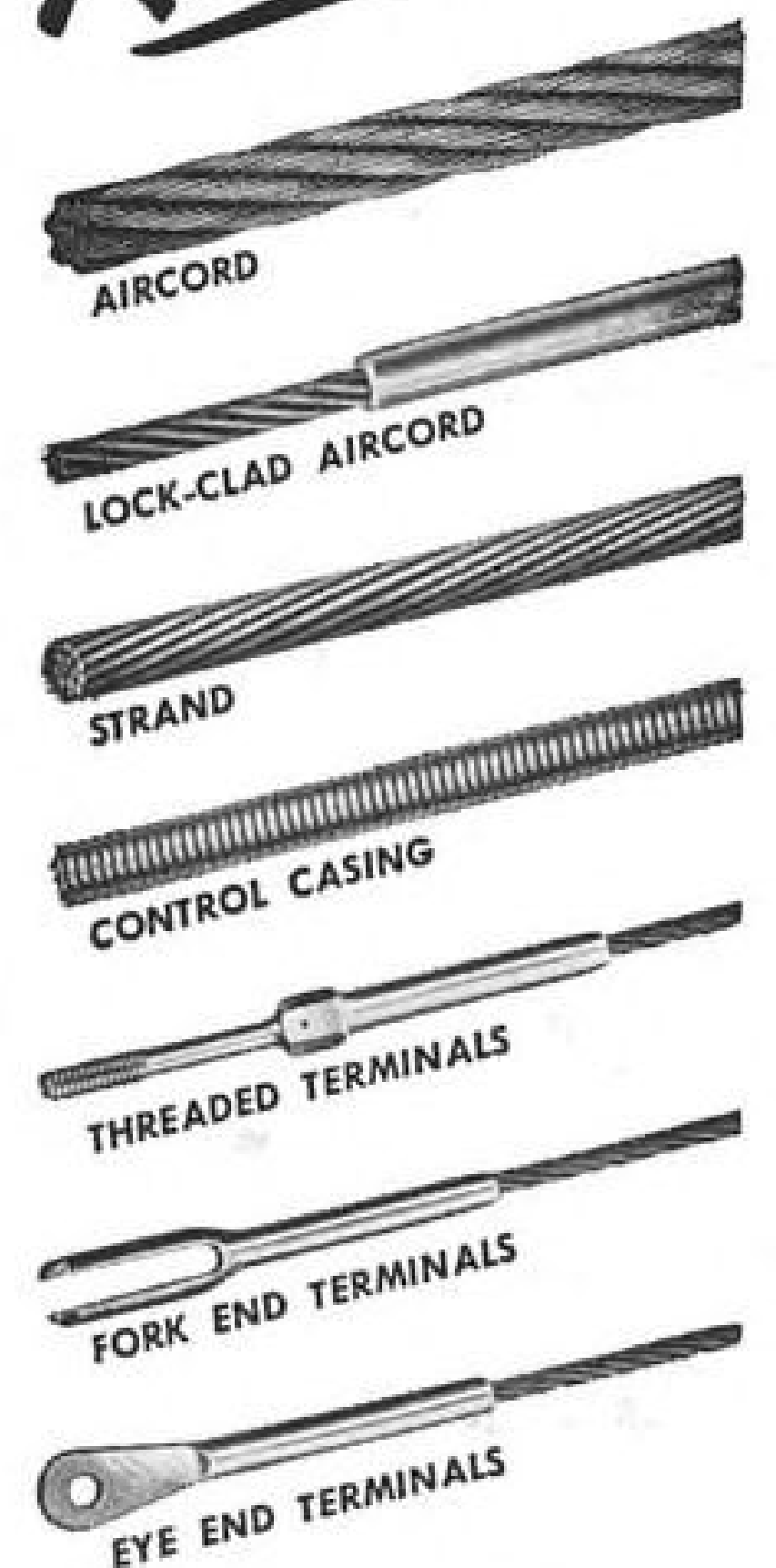
If you have a sealing problem—or any other problem that B. F. Goodrich engineering and research might solve—remember that BFG is *first* with the latest developments. *The B. F. Goodrich Co., Aeronautical Division, Akron, Ohio.*

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Aviation Week



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Number 25

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Domestic News Bureaus: Atlanta 3, Rhodes-Haverty Bldg.; Chicago 11, 520 N. Michigan Ave.; Cleveland 15, Hanna Bldg.; Detroit 26, Penobscot Bldg.; Los Angeles 17, 1111 Wilshire Blvd.; San Francisco 4, 68 Post St.; Houston, 514 South St. Correspondents in more than 60 major cities.

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December 18, 1950

AVIATION WEEK
Member ABC and ABP

Vol. 53—No. 25

Published weekly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. Publication Office: 99-129 North Broadway, Albany 1, N. Y. Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 18, N. Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation. Subscriptions: Address correspondence to AVIATION WEEK—Subscription Service, 99-129 N. Broadway, Albany 1, N. Y., or 330 W. 42nd St., New York 18, N. Y. Allow ten days for change of address. Please indicate position and company connection on all subscription orders. Single copies 50¢. Subscription rates—United States and possessions, \$6 a year; \$9 for two years; \$12 for three years. Canada, \$8 a year; \$12 for two years; \$16 for three years, payable in Canadian currency at par. Pan American countries, \$10 a year; \$16 for two years; \$20 for three years. All other countries, \$20 a year; \$30 for two years; \$40 for three years. Entered as second-class matter, July 16, 1947, at the Post Office at Albany, N. Y., under Act of Mar. 3, 1879. Printed in U. S. A. Copyright 1950 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Cable address "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.

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NEWS DIGEST

DOMESTIC

Republic F-84 Thunderjets have gone into action in Korea, with planes having been ferried from the U. S. by carrier and pilots and ground crews going across in MATS transports. Planes are from the 27th Fighter Escort Wing, Tex. Powered by Allison J-35s, the F-84 will provide the first full-scale test of U. S. axial-flow engines in combat.

Air mail—subsidy payment separation bill was passed by House last week and sent to Senate. Bill proposes limiting subsidies to airlines carrying air mail.

Negotiations for sale of Airborne Instruments Laboratory were nearing completion last week. Prospective buyers are: a group of executives and employees of Airborne; Laurance Rockefeller and some of his associates; and the American Research and Development Corp. of Boston. The three would share nearly equally in ownership of capital stock which is being acquired from Aeronautical Radio Inc. Hector R. Skifter would continue as president and general manager of Airborne.

Bell Aircraft's modified B-50, to be used for testing later models of the supersonic X-1, was flown away from the company's plant by USAF Maj. Frank K. Everest who made 10 flights in the X-1.

Convair B-36F, a new and more powerful model of the USAF's longest ranging bomber is now being flight tested at Ft. Worth. The plane has 3800-hp. P&W R-4360-53 engines, a development of the 3500-hp. Wasp Majors powering the B-36D. USAF has placed orders for the new B-36F.

Sheldon B. Steers, former director of aviation in Michigan and well-known aviation figure, died of a heart attack.

Annual wage increase agreement signed by American Airlines and CIO Transport Workers Union provides four-cents-an-hour raise each year for three years for AA's approximately 4000 maintenance and stores personnel, retroactive to Dec. 2. Included is a cost-of-living escalator clause to be adjusted quarterly, granting two cents hourly for each 2.35 points increase in the Bureau of Labor Statistics index. The initial payment is to be made Jan. 1. The airline will also grant the wage benefits to the line's 3500 employees not covered under union agreements. After Dec. 2, AA's wage scale for inspectors will be \$2.18 hourly, for lead mechanics \$2.06, senior mechanics, \$1.94.

R. W. Richardson, manager, Aviation Products division of Goodyear Tire & Rubber, has been elected president of Aviation Distributors & Manufacturers Assn. George W. Jalonick, III, vice president-sales of Southwest Airmotive was again elected vice president and L. W. Trees, service manager of Scintilla Magneto was elected vice president.

First production F3D Skyknight has been delivered by Douglas to Navy Composite Squadron VC-3 at Moffett Field. The big all-weather fighter carries 1000 lb. of radar. Preliminary design started in 1945.

Lower losses of jet fighters compared with piston-engine fighters operating in Korea are indicated in a comparison of the F-51 and F-80, covering sorties through Oct. 31. F-51 has flown 12,000 or 44 percent of the sorties, the F-80 has made 15,500 (56 percent). Losses from all sources show the F-51 suffered 69 losses (62 percent), the F-80 suffered 42 (38 percent). Losses due to enemy groundfire were: F-51, 34 (75.5 percent); F-80, 11 (24.5 percent).

Personal and executive plane exports for October totaled 86 craft valued at \$288,509, ATA reports for nine member companies.

FINANCIAL

Westinghouse Electric Corp. shows an operating profit of \$85,496,723 on net sales billed of \$735,621,366 for nine months ending Sept. 30. Net income per common share, after taxes, is \$3.37.

Cessna Aircraft Co. reports \$227,052 net profit on sales of \$7,158,499 for year ended Sept. 30. Earnings dropped from 1949's \$299,936 as a result of 45 percent drop in sales volume.

INTERNATIONAL

Percival Prince 12-seaters have gone into service for Brazilian feederliner, Empresa de Transportes Aereos Norte-Brasil Ltda. The line will connect Ceara state with the capitals of Piaui, Maranhao and Bahia states.

Swissair DC-4 crashed on final approach to landing at Sidney, Nova Scotia, with preliminary reports indicating destruction of the aircraft but no fatalities among the crew or 20 passengers. The plane was scheduled to land at Gander, but was diverted to Sidney because of weather.



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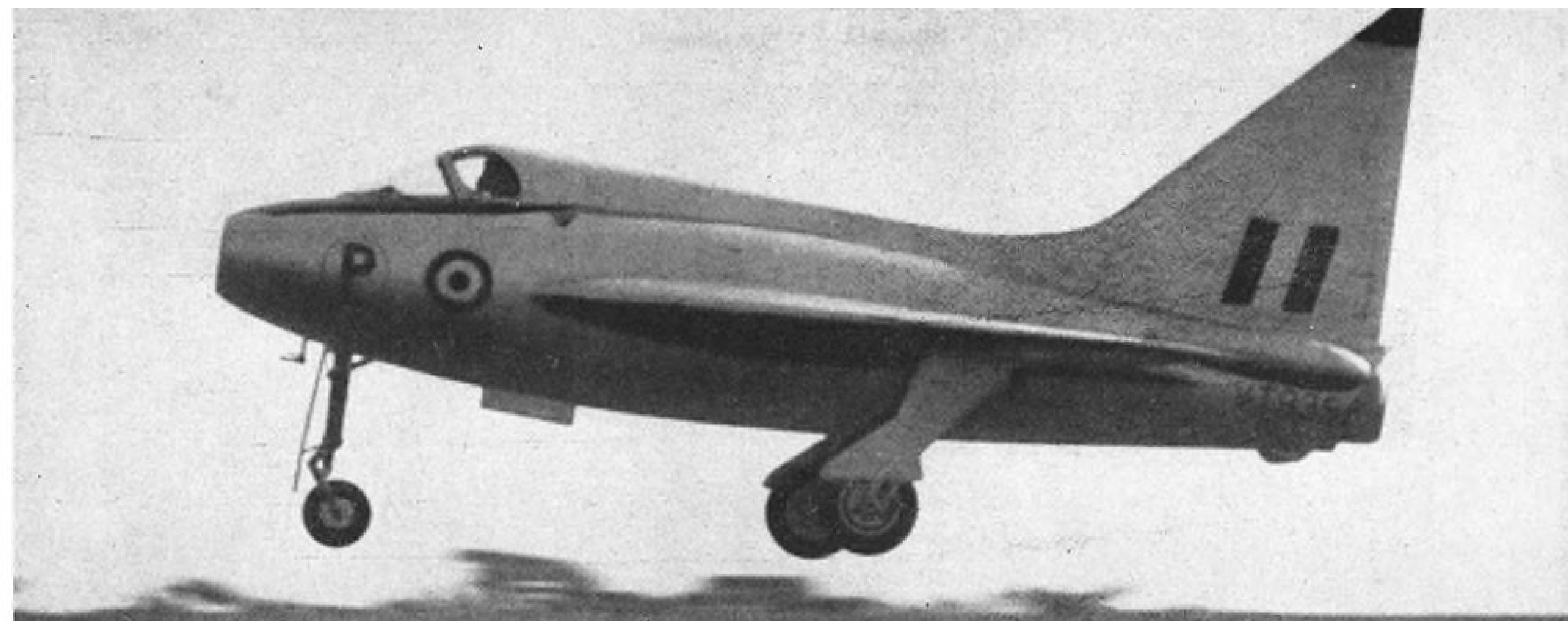
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AVIATION CALENDAR

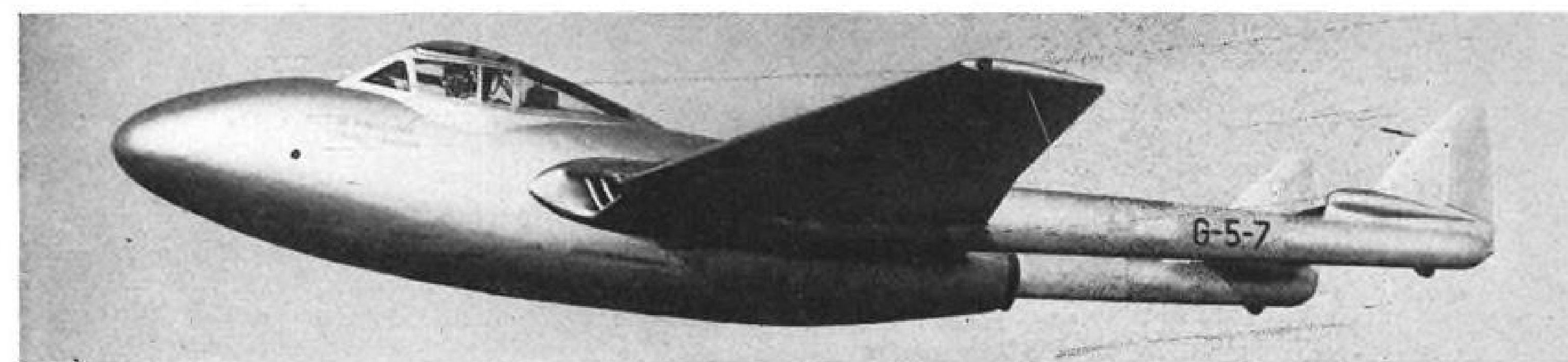
- Dec. 16—Annual Wright Day dinner of the Aero Club of Washington, Presidential Room, Statler Hotel, Washington, D. C.
- Jan. 2-7, 1951—Miami Aviation Week, Miami, Fla.
- Jan. 5-6—Third annual Kansas aerial spray conference, engineering lecture hall, Kansas State College, Manhattan, Kan.
- Jan. 6-7—Florida Air Pilots Assn. air show and exposition of planes and equipment, Opa Locka Airport, Miami, Fla.
- Jan. 6-7, 13-14, 20-21—First soaring contest of the Northern California Soaring Assn., Warm Springs Airport. Write Emil Kissel, contest committee, Warm Springs Airport, Warm Springs, Calif.
- Jan. 8-10—Eighth annual air cruise Miami-Havana, and return, of Florida Air Pilots Assn.
- Jan. 8-12—1951 annual meeting of the Society of Automotive Engineers, Hotel Book Cadillac, Detroit.
- Jan. 9-26—Third annual Institute of Industrial Transportation and Traffic, Washington, D. C.
- Jan. 15-18—Plant maintenance show and concurrent conference on plant maintenance techniques, Cleveland, Ohio.
- Jan. 21—Air education day, sponsored by the Palm Springs Junior Chamber of Commerce, Palm Springs Airport, Calif.
- Jan. 22-26—Winter general meeting, American Institute of Electrical Engineers, Hotel Statler, New York.
- Jan. 29-Feb. 1—19th annual meeting of the Institute of Aeronautical Sciences, Hotel Astor, N. Y.
- Feb. 1-2—Annual spring management conference, sponsored by the Society for Advancement of Management and Northwestern University Centennial Committee, Chicago Campus, Northwestern University, Chicago.
- Feb. 19-20—Meeting covering agricultural research as related to aviation, sponsored by the Flying Farmers of America, Memphis.
- Mar. 16—Sixth annual flight propulsion meeting, Institute of Aeronautical Sciences, Hotel Carter, Cleveland.
- Mar. 19-23—Seventh Western Metal Exposition, Oakland Auditorium and Exposition Hall, Oakland, Calif.
- Mar. 22-23—Short course on uses of aerial equipment in agriculture, Purdue University, West Lafayette, Ind.
- Apr. 24-26—ATA annual engineering and maintenance conference, Hotel Drake, Chicago.
- May 17-19—Annual convention of the Women's Aeronautical Assn. of the U. S., Little Rock, Ark.
- June 11-15—Second annual conference on industrial research, conducted by Columbia University Dept. of Industrial Engineering, New York.
- June 15-July 1—International aviation display, Grand Palais and Le Bourget Airport, Paris.

PICTURE CREDITS

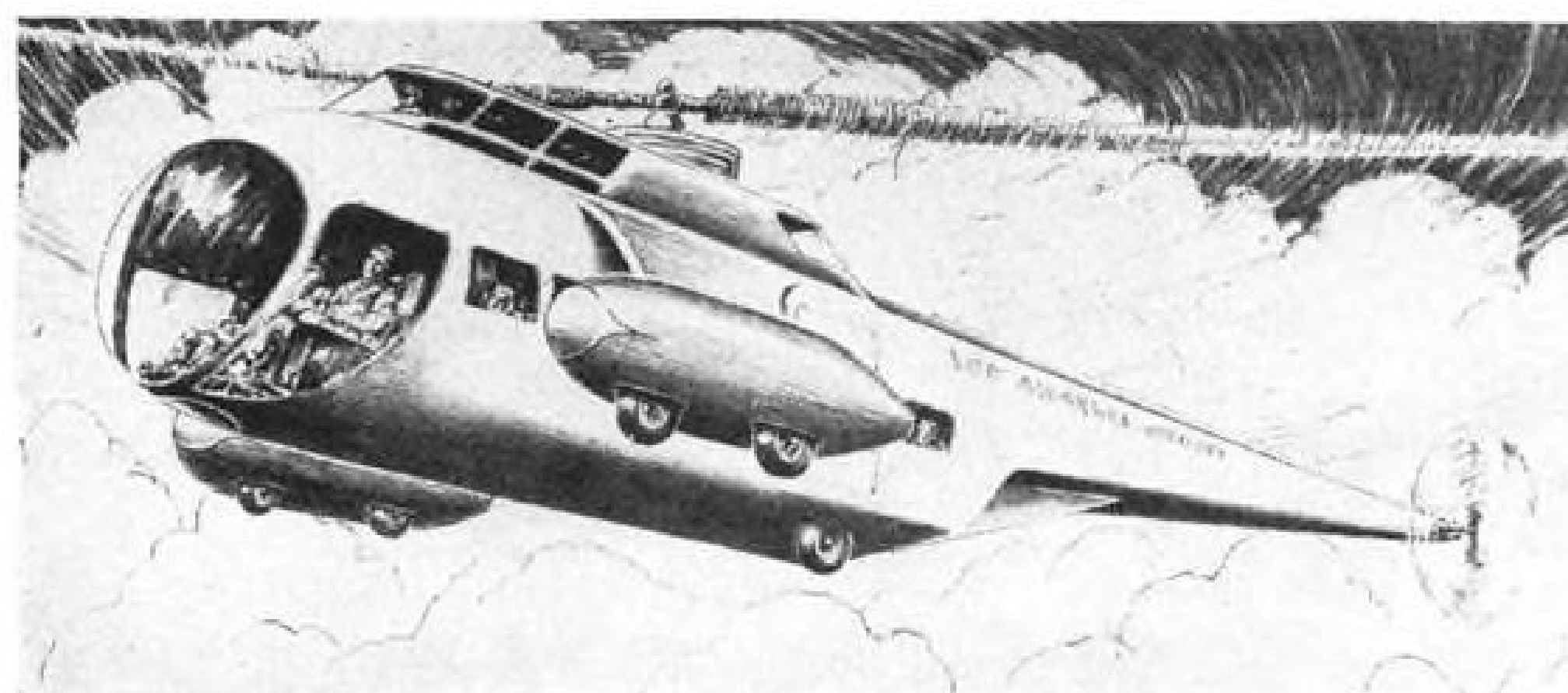
9—(upper center) de Havilland Aircraft Corp.; (lower center) Wide World; 16, 17—Convair; 20, 21—(top) Aircraft Industries Assn.; 29—U. S. Navy; 40—RCA Laboratories; 46—Northwest Airlines.



TRYING A TRIANGLE—Boulton Paul's P. 111 delta-wing single-seater takes off on a flight test. The craft, believed designed for transonic regime (AVIATION WEEK Nov. 27), has a Rolls-Royce Derwent of 5000-lb. thrust. Note anti-spin chute bulge near tail.



REVAMPED VAMPIRE—Two-place side-by-side de Havilland Vampire jet trainer has controls, instruments, gun and bomb sights fully duplicated. Vampire's good handling qualities make it very suitable for training. It is powered by a 3300-lb.-thrust DH Goblin 3.



News Picture Highlights

LAA PROPOSAL—Artist's view of a 24-place eight-ton transport helicopter as seen in Los Angeles Airways by 1953. The twin-engine craft would have a speed of 125 mph.

NEW FLYING FARMER—Texas A&M's designed-for-the-purpose agricultural plane is examined by designer Fred Weick prior to first flight (see also page 32). The 200-hp. Lycoming-powered plane features excellent visibility and spray tank storage within thick wings.



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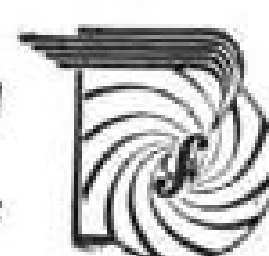
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WHO'S WHERE

In the Front Office

Philip M. Willcox has been named a vice president of Lockheed Aircraft Service International. Since joining the Lockheed subsidiary in 1949, Willcox has been manager of the company's overhaul and maintenance base at N. Y. International Airport.

What They're Doing

William H. Graham, former aviation trade and technical journal editor, has been named editor for a new daily aviation column in the New York Journal of Commerce.

James M. Verner has been appointed acting executive director of CAB. Verner was with CAB in 1940, NATS and Chicago & Southern Air Lines. He rejoined CAB in 1949.

Changes

Stanley H. Bogaczyk has been named Curtiss-Wright director of supervisory training. . . . Robert T. Daily has been promoted to field engineer in charge of the Chicago office of Lord Manufacturing Co.

Honors and Elections



SPOTLIGHT ON SPAATZ—Gen. Carl (Tooe) Spaatz gets plaque from Denver Post editor-publisher Palmer Hoyt (right) for leadership in the civil air education. Award was by Denver School of Aeronautics.

Lord Hives has been elected chairman of the Board of Rolls-Royce Ltd., succeeding the late Capt. Eric Smith.

Dr. Theodore von Karman, chairman of the Scientific Advisory Board to the USAF Chief of Staff, has been awarded the Kelvin Gold Medal by a special award board consisting of the presidents of eight major engineering societies of the United Kingdom.

Amon G. Carter, Ft. Worth, Tex., publisher has been awarded the eleventh Frank M. Hawks Memorial Award by American Legion Post 501 for his "many contributions to the development of aviation in America."

INDUSTRY OBSERVER

► Aeroproducts div., General Motors Corp., has signed a contract with Boeing Airplane Co., Wichita, to build actuator gear box assemblies for the B-47 jet engine bomber.

► K. T. Keller, director of Office of Guided Missiles, is nearing completion of a tour of major U.S. industries and facilities engaged in rocket research and development. Visited last week were Convair, Lockheed and Hughes. Pentagon office is not functioning as yet. Personnel on duty, so far, are one director, one major general and one sergeant.

► Certificated prototype Aero Commander entered in USAF liaison competition at Wright-Patterson AFB has been refitted with two 260-hp. geared Lycoming engines in place of the original 190-hp. engines.

► Flight tests of the de Havilland Vampire two-place trainer are being monitored by USAF. The trainer is the first to employ side-by-side seating arrangement for jet pilot instructor and pupil. Controls, instruments, gun and bomb-sights are fully duplicated. The plane is powered by a single de Havilland Goblin 3 engine developing 3300 lb. static thrust.

► Columbus AFB, World War II pilot training base in Mississippi, will be reopened as a basic flight school within a few weeks. It is the second of three bases to be established for civilian contract training programs of USAF. Greenville AFB, Miss., has opened earlier. Each will train about 400 students per year. USAF civilian contract training program currently envisions training of 1490 students in test of civilian contract training versus military training.

► Section XIV of Armed Services Procurement Regulation establishing uniform policies for inspection and acceptance of supplies and services has been issued by Dept. of Defense. Regulations apply to contracts issued after Jan. 1.

► Production schedule of the A. V. Roe, Canada, Ltd., Orenda 7000-lb. static thrust engine, slated for installation in Avro's CF-100 and Canadair's U.S.-designed F-86E is reported in military circles aimed at too high a figure to be met initially.

► Sikorsky is developing a 16-24 passenger S-65 helicopter weighing 8 tons. Passenger compartment will be 55 ft. long; 9 ft. 6 in. wide; and, 18 ft. 6 in. high. The 73-ft. rotor blades will be driven by two 800-hp. piston engines. Pilot and copilot will sit in cockpit above passenger compartment.

► Rocket flight tests of the Republic XF-91, postponed by delay in installation of satisfactory rocket engines, will begin in January. Plane had been scheduled for installation of a Curtiss-Wright rocket engine but USAF scrapped CW's engine in favor of Reaction Motors, Inc., engine.

► De Havilland Beaver has an advantage in the forthcoming liaison plane competition at Wright Field. Some Pentagon sources say that the specifications for the competition and those of the Beaver are remarkably similar.

► Piper and Northrop are reportedly quite interested in licensing the Beaver for U. S. production for military use. But de Havilland of Canada is not eager to get into a licensing deal unless it finds out for sure that the Buy America Act will not be waived to permit the Beaver to be built for the USAF and Army in the home plant at Toronto. Such a waiver was obtained for the first four Beavers which the USAF has already ordered.

► Royal Canadian Air Force may buy 100 de Havilland Doves for radio and navigation trainers and photographic planes. Five radio training stations can be installed in the Dove passenger compartment.

► Airframe manufacturers are experiencing considerable difficulty in sealing against leakage of AN-F-58 jet fuel. Low viscosity and surface tension of the fuel is the problem.

Washington Roundup

\$15 Billion for USAF

Department of Defense budget for 1952 fiscal year is now pegged at \$50 billion, but this is highly tentative—depending on international developments. It would mean over \$15 billion for USAF. USAF's slice of the \$41.8 billion for the armed services for the current year including the \$16.8 billion additional now pending in Congress is \$13.8 billion. Naval Air's slice: \$3.7 billion. The \$41.8 billion is all the services will be able to spend efficiently, Secretary of Defense George Marshall reports.

\$100 Billion for Defense?

Prospects for a \$100 billion defense program—it would include up to \$25 billion for European arms aid—have been discussed among top State and Defense Department officials. But it's out—unless the U. S. is ensnared into a major war with China, which is unlikely. Washington knows Russia, not China, is the No. 1 enemy, that it would be catastrophic to allow a wholesale dissipation of military strength in a secondary conflict.

Services' strength

Money-wise, USAF is second in strength of the three services: in manpower, its last. The \$13.8 billion that will go to USAF this year compares with \$16.4 billion for Army and \$10.7 billion for Navy. Under the program for an armed services strength of 2,770,000 by next June, 1,164,000 will be in the Army, 855,000 in Navy—only 651,000 in USAF.

JCS Chairmanship

Gen. Omar Bradley's designation of Adm. Forrest Sherman to represent him at the London meeting of the Military Committee of the North Atlantic Treaty organization has increased speculation that Sherman will succeed Bradley as chairman of the Joint Chiefs of Staff. Bradley's term expires next August. It is understood he doesn't want to serve another two-year term.

McNeil's misinformation

Plane engine manufacturers are said to be irritated over Assistant Secretary of Defense William McNeil's report to a closed-door session of the House Armed Services Committee that they are holding up aircraft production by leisurely moving along on an eight-hour workday. It brought a protest at the session from the Committee's Chairman Carl Vinson that they should be on round the clock operation. Vinson later said he was glad to receive information that most engine manufacturers are working two or three shifts—and that the only companies working the 40-hour week are doing so simply for lack of orders.

NACA Build-up

NACA will add 600–150 engineers, plus supporting personnel—to its staff in the near future. Out of the \$5 million supplemental asked for by NACA to buttress the stepped-up research and development programs of USAF and BuAer, \$1.8 million is for new facilities at Lewis Laboratory.

Security Slip-up

Confidential aeronautical information from NACA was found on the sidewalks of Washington by a reporter—who promptly published the story. An investigation by NACA developed that its duplicating room was throwing rejected sheets of confidential documents in trash baskets for garbage collection. Some of them were blowing away. The committee has ordered that all trash from its duplicating room be directly routed for burning.

Civil Air Mobilization

New Civil Defense Administration may purchase planes, sponsor training of pilots for evacuation duty in the event of a bombing attack. The program now blue-printed contemplates a \$200 million expenditure—equally by CDA and states—for evacuation, including transportation, equipment. Legislation giving legal sanction to establishment of CDA—now operating by executive directive—authorizes it to sponsor training programs for all types of evacuation work. Congress hopes to pass the measure and appropriate funds, probably around \$80 million, before the year's end.

Transportation Tax Boost?

An increase in the 15 percent tax on passenger traffic may come next year. The new Congress convening in January will set to work promptly on legislation to raise additional tax revenue across the board. But most of the additional money "will have to come through increases in income and excise taxes," Chairman Walter George of the Senate Finance Committee reports. A side objective: to discourage travel as stepped up defense mobilization increases traffic. Outlook is good for prompt legislation exempting furlough travel of servicemen from the transportation tax. It already has passed the House.

War Risk Insurance

Government insurance for airlines whose operations for the armed services involve war risk will go through Congress shortly after the turn of the year. Industry and government are generally agreed on a draft of a bill. Similar legislation covering the war risk operations of the Merchant Marine was enacted in August. Airlines didn't need government insurance in the last war because the planes they operated were government-owned.

Flying van?

Transit Van Corp.—under a tight cloak of secrecy—is developing a flying van that could revolutionize air cargo. The Redwood City, Calif., firm is headed by former Assistant Secretary of Commerce for Air, John Alison. The principle is similar to that of the Fairchild Pack-Plane, in which the pack, by hydraulic lift, is attached to the plane. The van would attach to the underbelly of the plane, drive off when the plane landed. Its capacity would be four truckloads, compared to the pack-plane's one truckload. It holds forth the prospect of mail and cargo shipments at a 10-cent-a-ton-mile rate. This could mean that a substantial part of the \$300 million a year mail business—99 percent of which now moves by rail—would take to the air.

AVIATION WEEK

VOL. 53, No. 25

DECEMBER 18, 1950

Congress Questions Contract Slow-Down

Investigation may ask why USAF decides what planes to buy, but doesn't order.

By Ben Lee

Congress is becoming impatient with the slow commitment of funds for aircraft by USAF procurement officials after dire predictions before Congress as to what would happen to the national safety if funds were not immediately appropriated.

While Air Force officials guard prime aircraft contractor procurement data under a cloak of "security" the industry and interested public are acutely aware in general, of actual contracts let.

Air Force officials have previously stated that funds for all airframes and engines have been allocated. Actually, only about 75 percent of the \$4.1 billion USAF has for procurement is now obligated.

► **Investigation Ahead**—Congressional sources have told AVIATION WEEK that "procurement procedures of the Air Force are going to be looked into shortly after the first of the year." (This probably will come as part of the impending investigation into Army-USAF coordination in ground support matters.)

Nearly three months ago Air Force summarily dropped out of a joint evaluation of trainer aircraft at Randolph AFB, Tex. Purpose of the evaluation was to enable USAF and Navy to come up with a joint set of specifications for an ideal trainer for use by both services and probably U. S. Allies.

The reason USAF dropped out of the evaluation was immediate requirement of Air Training Command for trainer aircraft. As a result, the Congressional source said, USAF began a "paper" evaluation of trainer aircraft involved and made a decision indicating the Fairchild T-31 as nearest to requirements. But there still is no order out, despite an urgent need by ATC for training planes (AVIATION WEEK Dec. 11).

► **Assault Transports**—Other contracts have been delayed similarly. Assault transports to fill a current and vital role for Army are still not on order, the spokesman said. Evaluation of current assault transport types: Northrop C-125, Fairchild C-82 and Chase XC-123 and YC-122, delayed four times this year and finally conducted at Eglin AFB, Fla., has been completed and decided in favor of the Chase XC-123. There has been no indication of proposals to

order despite the fact that Chase has already leased a plant at Birmingham and awaits only the go-ahead signal.

Fairchild Engine & Airplane Co., Air Force sources have told AVIATION WEEK, is being asked for preliminary cost estimates for two prototype assault transports. Despite heavy commitment for C-119 Packets, feeling in military circles is that the entire assault transport situation may be due for another review next spring, regardless of current international tension.

► **Fighters**—Fighter contracts are similarly up in the air. Recent evaluation of long-range escort fighter planes at Edwards AFB, Muroc, Calif., between the McDonnell XF-88, the Lockheed XF-90 and the North American F-93, was completed and decided in favor of the McDonnell XF-88. No fighter contract has resulted from the Muroc evaluation.

► **Helicopters**—Helicopter contracts are also being held back in many instances because of the obscurities in the Air Force procurement programming, AVIATION WEEK learns. While no official comment could be obtained, unofficial sources stated that the entire question of helicopter and liaison aircraft, for Army use primarily, was under review.

► **Fighter Bomber**—USAF currently has no new light bomber types on order although there is an urgent requirement for that category. It has ordered and completed evaluation of several light bombers including the Martin XB-51, the British Mark II Canberra and the North American B-45. Of the latter, approximately 150 are now flying for USAF and the plane is out of production.

The Martin XB-51, considered by Army to be the hottest of the light bombers for ground support mission, is still not on order despite USAF Materiel concurrence that production of the plane is to be requested.

Production of the British Canberra is

Kaiser Bids for C-119 License

A proposal by Henry J. Kaiser to produce the Fairchild C-119 Packet under license in his Willow Run-Mich., automobile plant reportedly is being studied by the Air Force.

Kaiser's interest in aircraft production, in which his record in World War II and immediately thereafter fell far short of his success at shipbuilding, was touched off by the terms of a recent Reconstruction Finance Corp. loan to his automobile company. In return for the \$25-million loan, Kaiser had to agree to cut his auto production and devote to defense work the facilities thus freed.

He then apparently consulted the office of Lt. Gen. K. B. Wolfe, USAF deputy Chief of Staff for Materiel, in Washington. An officer on Wolfe's staff telephoned Fairchild's Hagerstown plant, saying that he and Kaiser would be in Hagerstown in an hour. On arrival, it developed that the purpose of the visit was to discuss the C-119 licensing agreement.

► **Fairchild's Offer**—Fairchild previously had proposed to the Air Force that it take over the former Douglas plant in Chicago to produce Packets. The production rates it

had proposed were the same figures that Kaiser in his talk at Hagerstown suggested he could attain at the Willow Run plant.

Fairchild and other aircraft industry officials aware of the Kaiser offer are disturbed over the sweeping implications. They point out that there is unused aircraft production capacity—such as the Chicago plant and the World War II B-29 plant at Marietta, Ga.—that can be re-opened by experienced people.

These aircraft officials take the view that higher production can best be obtained by using the know-how of existing companies to capacity—as was done in World War II—before non-aviation firms, no matter how influential politically, are brought into the field.

Washington observers also pointed out that if emergency licensing is to be sought, it is up to the Air Force rather than the individual companies to take the initiative. It is also up to the Air Force to make known to manufacturers which license agreements it favors. Approval by the prime manufacturer for licensees to produce Air Force planes for the Air Force then becomes merely a formality.

also scheduled to meet U. S. Mutual Defense Assistance Program commitments to the North Atlantic Treaty Organization. Order will be limited and is designed primarily to pay tooling up for Canberra production. None have been placed so far.

► **Bomber Air Force**, despite gradual phase-out of the present B-36, is still undecided as to the future of the strategic bomber. While procurement schedules are aimed for phase-out in 1954, com-

mitments as to the successor must be made soon if production is to cope with requirements.

Executives of Boeing (manufacturers of the B-47 and the proposed XB-52) and of Consolidated Vultee (with a swept wing version of the B-36) are in Washington again this week with more proposals for a USAF contract scheduled to gross more than \$1 billion over a five-year period (AVIATION WEEK Nov. 20).

Manpower Supply Crisis Looms

Aircraft industry already facing critical personnel problems because of lag in firm procurement plans.

As this nation moves a step nearer "war footing," the problem of manpower, key to industrial and military expansion, reaches a near crisis.

Expansion of the aircraft industry, personnel-wise is in a critical state due to non-crystallization of USAF and Naval aircraft procurement programs. Late last week, manufacturers were being told that all previous orders for planes and expansion plans were "purely academic." Drastic revisions in procurement plans were being crystallized based upon the outcome of the decision to place the nation in "emergency status."

A few months ago, President Truman ordered a strengthening of the nation's industrial and military potential, basing his order on recommendations of the Joints Chiefs of Staff. He simultaneously called for a speed-up of plans to strengthen the defense potential of North Atlantic Treaty Organization nations militarily and industrially.

• **He ordered an increase in Army, Navy and Air Force**, doubling the strength on hand as of June 1. This means a manpower build-up of the military establishment to 2,761,000 by July 1, 1952.

• **He ordered industry to expand** on a comparable basis to supply planes, spares, equipment, tooling, technical knowhow, and facilities for this nation and for the NATO nations.

The nation's population increased 20 million between 1940 and 1950. Despite this heavy population increase, the nation's labor force has been increased only by approximately 1 million. At the same time there has been a general drop in population in aged 10-19, as a result of depression years when fewer children were born. This group includes those who normally would just be entering industry or military service.

► **Age Problem**—Further complicating the nation's manpower mobilization is the fact that in 1940 20 million persons at age 55 constituted about 1/7 of the population. Today this group is ap-

proximately 25 million, constituting 1/4 of the population. As the nation approaches "emergency" status, these persons are of limited use to industry, useless to the military.

Still another complicating factor in the manpower question is a decrease in unemployment. Ordinarily a healthy sign, insofar as it relates to the general economic wellbeing of the country, it nevertheless works a hardship on industry seeking to expand quickly. For example, the number of unemployed dropped nearly 1 million between Jan. 1 and June 30 this year. Jan. 1 unemployment in the U. S. was approximately 4 1/2 million. In September, unemployment dropped to nearly 2 million and is expected to reach an all-time low as military production shifts into high gear.

June 1, national production was set at \$270 billion annually, almost 200 percent above the prewar 1935-1939 average. By August of this year, the nation's index of industrial production was just 43 points below World War II peak. It had jumped 204 percent of prewar years.

Today the aircraft industry is being asked to turn out planes and equipment not only for the U. S. Air Forces, but for nations allied under the North Atlantic Pact.

To determine how best to meet the manpower crisis rapidly developing, Senate Preparedness Committee, headed by Sen. Lyndon Johnson, plans to launch a major investigation into manpower problems. It is being held up until Mrs. Anna Rosenberg is confirmed by the Senate as Assistant Secretary of Defense.

► **Aircraft Employment Climbs**—Employment of prime airframe contractors reached a peak in November 1943 when 1,326,345 were engaged in aircraft construction. Low point was reached in December 1946 with 202,462. In June of 1950 employment had climbed slightly higher to 239,059.

With programmed expansion of USAF and Naval aircraft procurement,

employment is expected to climb upwards of 1 million by July 1951.

Manufacturers have been urged to place orders for any additional personnel with state and private employment offices. This is to assure that local labor supplies are being utilized to the fullest.

Local employment agencies have been asked by the Labor Bureau to publicize their "wares." Industries are likewise asked to publicize their labor requirements.

► **Manpower Brass**—Manpower mobilization chief is W. Stuart Symington, head of the National Security Resources Board. Directly under him is Robert Clark, chief of the Manpower Division, NSRB. Robert Goodwin, ex-director of the Office of Defense Management for the Labor Department, coordinates employment data of the Bureau's Department with NSRB. In the Office of the Secretary of Defense, newly appointed Mrs. Rosenberg, as Assistant Secretary of Defense and Coordinator of Defense Manpower Planning, is currently working out details of an overall manpower survey which will provide the key to establishing and allocating this nation's manpower.

Maj. Gen. Lewis B. Hershey, Director of the Selective Service System, is also firming up provisions to amend the Selective Service Act, which will again tend to impair the development potential of the industrial manpower pool.

These amendment proposals would include:

- **Extension of the period of service** from 21 to 30 months.
- **State provisions for drafting** physically sub-standard personnel.
- **Inclusion of 18 year olds.**
- **Tighten deferment provisions** for students.
- **Remove exemptions** given short-term veterans.

The Defense Department, and in fact, all government agencies dealing with the manpower problem, are working desperately towards solution of manpower deficiencies.

Plans are fairly well along, though not crystallized, which would eliminate the imbalance in build-up of industry versus military requirements that were subject to so much criticism during early World War II.

AA-TWU Pact

Wage increase agreement signed by American Airlines and CIO Transport Workers Union provides four-cents-an-hour raise each year for three years for AA's approximately 4000 maintenance and stores personnel, retroactive to Dec. 1. Included is a cost-of-living escalator clause to be adjusted quarterly, granting two cents hourly for each 2.35 points increase in the Bureau of Labor Statistics index.

USAF Starts Liaison Evaluation

Order for as many as 300 planes may await winner of Wright Field tests, which begin with six craft

Air Force evaluation of liaison aircraft types at Wright-Patterson AFB got off to a fast start last week although more than half of the builders signifying intent to compete ended up as "no shows."

On hand for tests the first day (Dec. 5) was the Aero Commander, Ryan Navion, Cessna 195, Atlas H-10, de Havilland Beaver and Bellanca Skyrocket. Still not at Wright-Patterson, but indicating arrival in the next few days, are Aquafight and Helioplane Corp. entries.

The competition was originally scheduled to begin Dec. 3 and run through Dec. 26, with an order for the winner rumored to run all the way from 40 to 1000 planes. Military sources predict a contract of not less than 100 nor more than 300.

So far, all flight tests with the exception of night evaluation tests have been completed with the planes on hand. Flight tests included require that a total of 16 hours total flight time would be flown by four USAF pilots in various phases of the tests. Each pilot, flying competing planes, was scheduled to perform the following flight tests with the plane loaded at design gross weight (first figure in each case represents desired value, figure in parenthesis is minimum acceptable):

- **Takeoff** over 50' obstacle (without assist), 500 ft. (800 ft.).
- **Landing** over 50' obstacle, 500 ft. (800 ft.).
- **Rate of climb**, sealevel (first minute), 1250 ft. (1000 ft.).
- **Maximum endurance**, 6 hr. (5 hr.).
- **Speed** (lowest at which full control and constant altitude can be maintained), 35 knots (50 knots).
- **Speed** (cruise, not over 75 percent power), 130 knots (110 knots).
- **Service ceiling**, 18,000 ft. (15,000 ft.).
- **Radius of action** at cruising speed, 300 nautical mi. (220 n. mi.).

Air Force military characteristics set up for the competition stated a need for a liaison plane with a primary mission for operation from small unprepared fields, and that it must be capable of meeting liaison functions including: courier and messenger service; personnel and light cargo transport, including light supply dropping; aerial evacuation; visual reconnaissance and light photographic; column control; aerial wire laying; camouflage checking and spraying and dusting.

► **Army Not Interested**—Army has indicated that it has no special interest

in the evaluation being conducted by USAF. It has nevertheless, already ordered four de Havilland Beavers for military evaluation to meet its own requirements.

While Army undoubtedly is monitoring the evaluation, feeling is that no further commitment of Army funds to fixed-wing liaison type aircraft is foreseen in the immediate future. Approximately \$40 million in Army funds set aside for aircraft procurement has already been obligated for fixed-wing liaison aircraft. Most of these planes will go to MDAP nations.

Generally speaking, however, Army sources predict that Army is no longer interested in the light "artillery spotter" fixed-wing aircraft. Trend, they report, is towards heavier, faster, multi-place personnel transports instead. The job of forward combat Army planes is rapidly switching towards one- and two-place helicopters.

► **Design Requirements**—Air Force has specified that the liaison aircraft competing must meet the following specifications:

Payload, including pilot, 1,000 lb. (pilot, attendant and 2 litter patients



COLLIER TROPHY TO LEAR

William P. Lear, founder, research director, and board chairman of Lear, Inc., has been named recipient of this year's highly coveted Collier Trophy for his "outstanding achievement in the development and production of the Lear F-5 automatic pilot and automatic approach coupler system which makes possible the safe landing of jet aircraft regardless of extreme weather or visibility conditions." The 36-lb. F-5 device is considered largely responsible for successful progress in all-weather fighter development.

or such cargo as desired in lieu of passengers). Navigational radio equipment must be included in empty weight; good visibility characteristics to the maximum extent possible; maximum ease of maintenance, servicing, operation, and loading and unloading; dual controls. Plane may be either single- or twin-engine; and capable of operating in temperature ranges from -20 F to 120 F, and with procurement of modification kits to extend this range to -65 F.

New Group to Push Prototype Program

The lagging \$12.5-million prototype testing program will move forward with a meeting in January of the Prototype Aircraft Advisory Committee, now being organized to discuss the initial phase of the program.

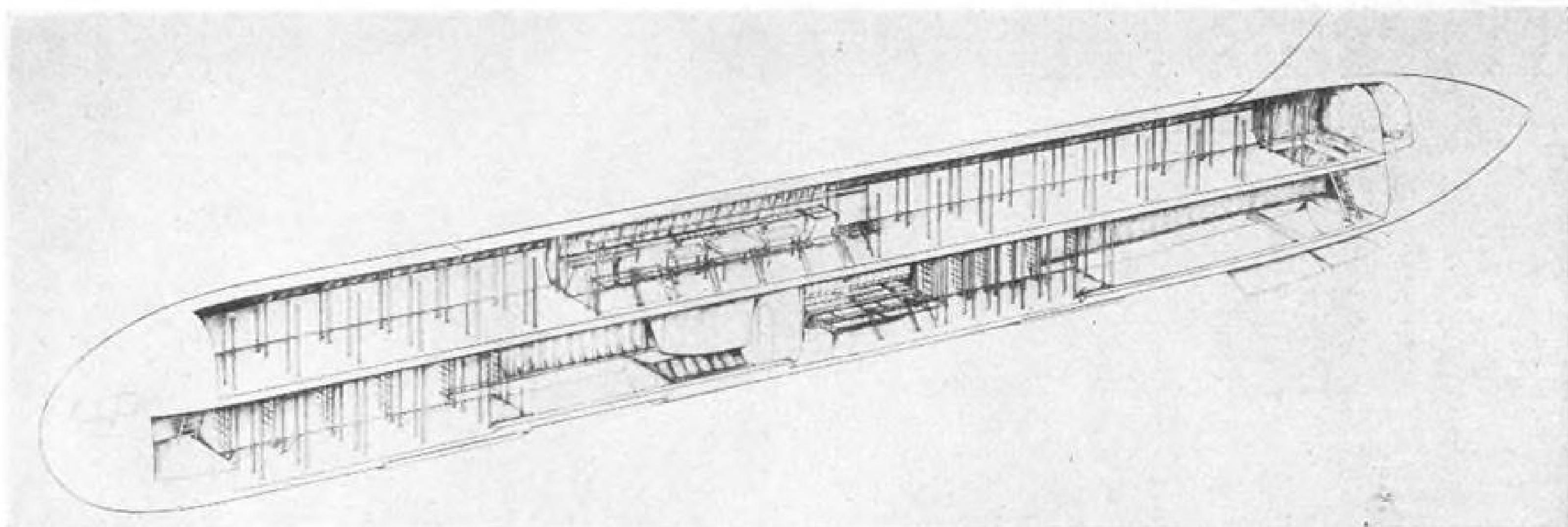
Officers of the Committee will be Donald Nyrop, CAA Administrator, chairman; F. B. Lee, deputy CAA Administrator, alternate chairman; Harold Hoekstra, of the CAA Office of Aviation Safety, Executive Secretary.

Nyrop has invited the following agencies and groups to name members to the committee: Department of Defense, Civil Aeronautics Board, National Advisory Committee for Aeronautics, Air Line Pilots Assn., Aircraft Industries Assn., Air Transport Assn., and Air Coach Transport Assn. The four certificated domestic cargo carriers and two over-ocean irregular carriers have also been asked to name one representative each.

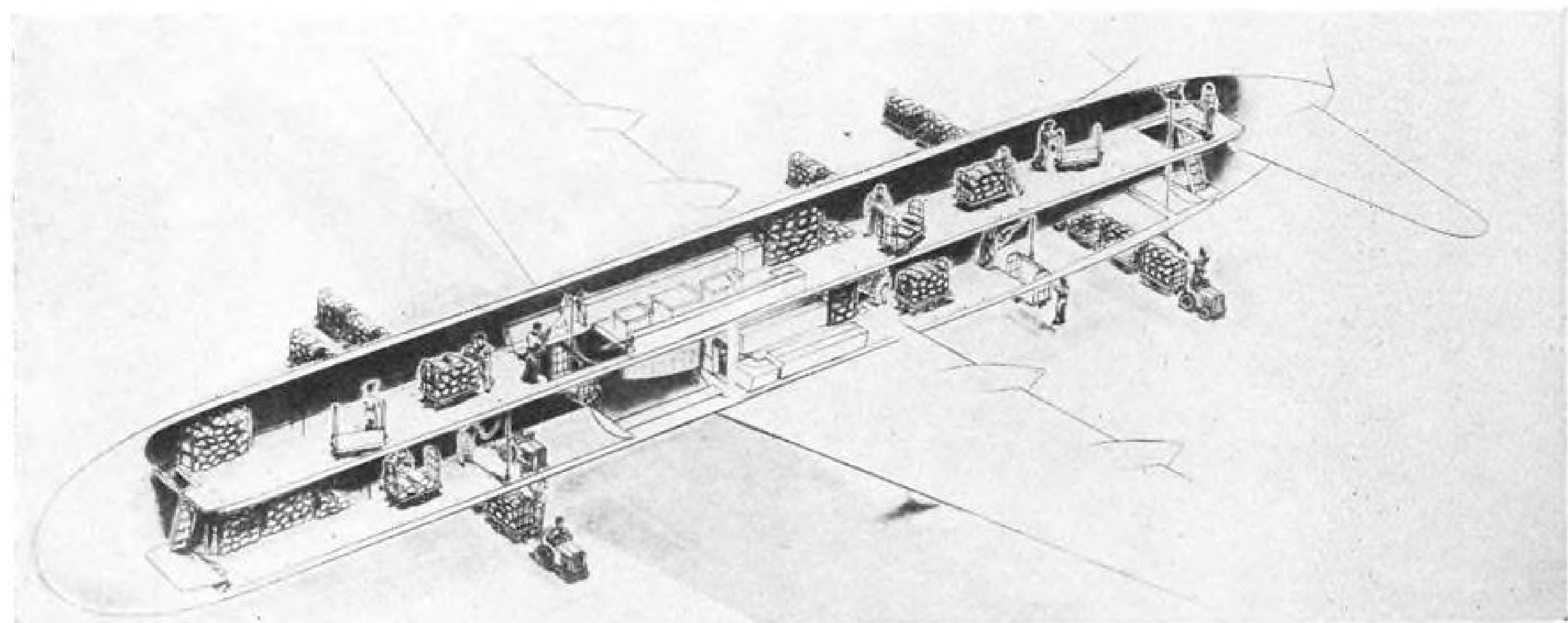
It was originally planned to have Air Coordinating Committee, including the same groups, determine planes and engines to be tested under the program. Authorizing legislation, signed by the President in September, provides for an expenditure of \$12.5 million over a five-year period. Money must still be appropriated by Congress to finance the testing. A CAA spokesman anticipated that a request for funds would be submitted to the Budget Bureau to start the program off shortly after the January meeting of the Advisory Group. Groundwork is now being laid at CAA, under Lee's direction.

P&W Signs Pact

Agreement between Pratt & Whitney Aircraft division of United Aircraft Corp. and Lodge 1746, International Assn. of Machinists provides tie-in with Bureau of Labor Statistics "Consumers' Price Index—All Items." Agreement, expiring in 1953, gives immediate 14-cent-an-hour boost, and provides annual improvement factor increases of 4 cents an hour.



XC-99'S VOLUME, about equal to four mail cars, is suitable for parcel post as well as mail. And sorting stations are easily installed.



XC-99'S LOADING system as presently installed would meet postal needs, with four hoists able to handle mail simultaneously.

PO Studies XC-99 Use As All-Mail Plane

As big craft sets weight records and railroads ask for higher pay, air transport of all mail wins more favor.

Post office officials are watching with increasing interest long-distance weight-lift tests of the Convair XC-99 as the railroads press for doubling rates in pay for hauling the nation's mail.

Faced with a railroad proposal to boost pay for mail haulage by 95 percent (AVIATION WEEK Dec. 4), the Post Office is re-examining feasibility of shifting the major portion of the U. S. mail to the airlines.

Consolidated Vultee has estimated that the XC-99, with its 16,117 cu. ft. usable capacity (equal to four standard mail cars) and ability to transport 100,000 lb., could carry the following payloads:

- Between New York and Chicago: 100,000 lb. at a direct flying cost of 4.7 cents per ton-mile.
- Between Chicago and New Orleans: 100,000 lb. at a direct flying cost of 4.6

cents per ton-mile.

- Between Chicago and Los Angeles: 95,000 lb. at a direct flying cost of approximately 4.6 cents per ton-mile.

In its first seven weeks of operation as a freight carrier, the XC-99 hauled 1,114,654 lb. of high-priority cargo. The total was accumulated in five roundtrip missions out of Kelly AFB, Tex., the plane's home base.

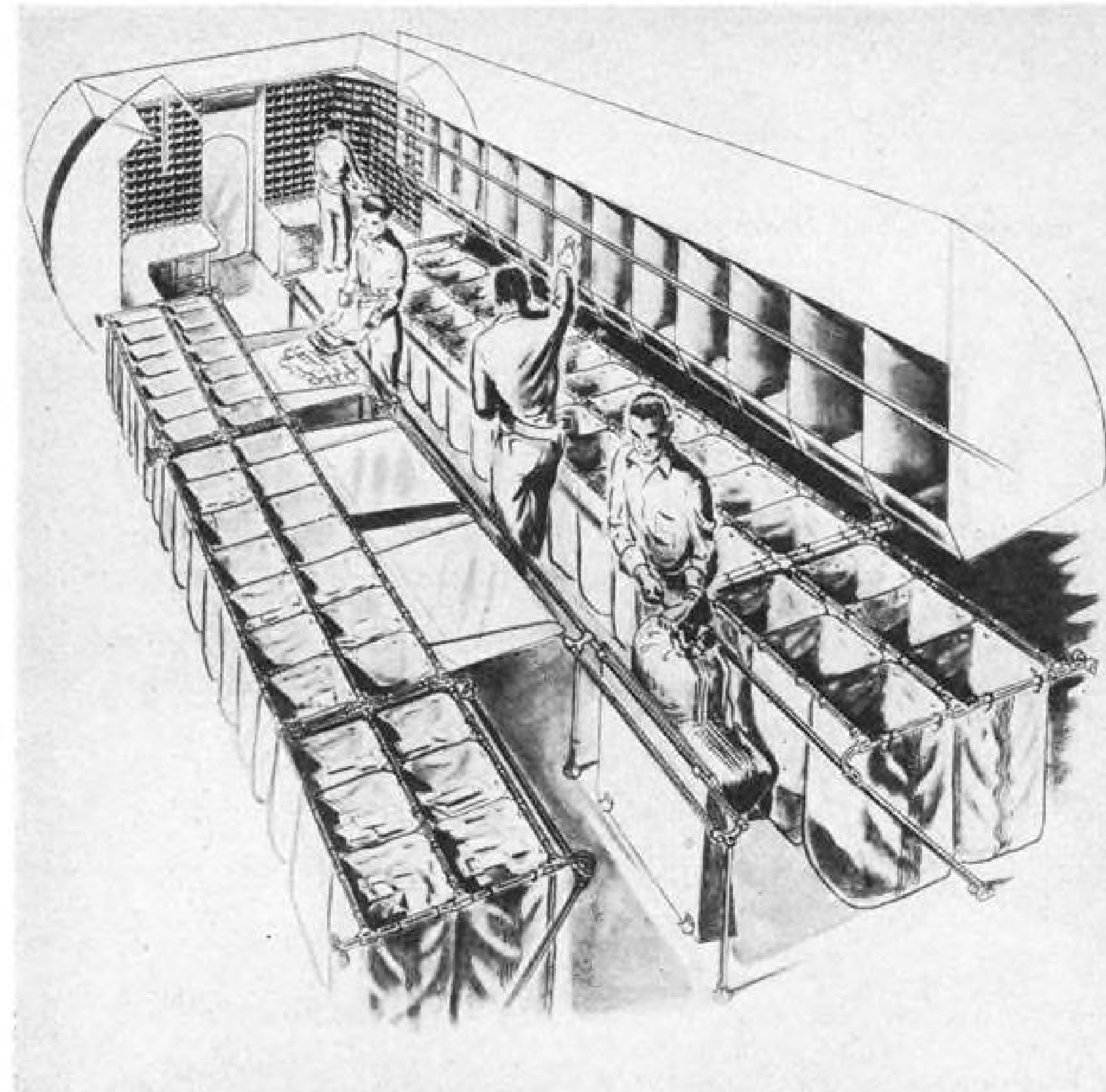
Missions included three flights to various air bases in the West, one to Macon, Ga., and a record-breaking non-stop flight across the continent with 85,000 lb. of air materiel.

In all, the XC-99 has flown 17,182 mi. on its introduction as an aerial freighter, ferrying urgently needed military supplies a total of 602,000 ton-miles. Thirteen freight cars would be needed to haul the same tonnage by rail from Chicago to New York.

Biggest single cargo lifted by the XC-99 on any of its flights was slightly more than 100,000 lb. On its transcontinental run, the XC-99 carried approximately twice as much freight as its nearest rival, the C-124, which required two hops for the 2200-mi. flight. Twenty-three international records for cargo flown various distances at different altitudes have been shattered by the XC-99, including two broken on its transcontinental trip.

► **C-99 Postal Configuration**—The C-99 transport configuration for postal service would not differ too much from the present experimental military transport version. Provisions for postal use could be readily installed and would use present cargo tie-down fittings.

As shown in accompanying sketches, the upper deck of the flying post office would be 130 ft. long with a central location for en route sorting of parcel post. This mail would be stowed adjacent to loading hatches forward and aft of the sorting station. The forward



XC-99'S SORTING STATION would be similar to that of a railway postal station.

lower deck has stowage provisions for pre-sorted parcel post.

The lower deck aft of the C-99 postal version would be equipped with complete en route sorting stations for 1st, 2d, 3d and 4th class mail. This mail would be stored immediately aft of the sorting station and immediately adjacent to the loading hatch.

► **Loading.** C-99 monorail and hoist systems would provide rapid and simultaneous loading and unloading of all classes of mail by means of individual hoists at four different points. This would give a minimum elapsed ground time.

Because of the great size of the C-99, loading of mail could be accomplished with present standard P. O. platforms. Use of preloaded lightweight pallets which could be loaded rapidly and secured for flight would result in an added time saving.

Adaptation of forward and aft clamshell doors on the C-99 would enable motorized vehicles to move directly into stowage compartments for discharge of special and emergency shipment.

► **Sorting.** A parcel post sorting station, on the central upper deck, would be equipped with sorting tables and bag racks similar to standard P. O. facilities for parcel post sorting. This would enable mail clerks to sort mail en route

between terminals for distribution at destination. Mail sacks would be accessible from both directions by means of small hand trucks on monorails extending the full length of all compartments.

A separate sorting station for 1st, 2d, 3d and 4th class mail would be located in the aft lower compartment and would be equipped with sorting tables, letter case, chutes and registered mail drawers.

► **\$300 Million Annually**—Last year, surface carriers moved 3030 million ton miles of mail for which they were paid \$253 million. The airlines carried an approximately 40 million ton miles and were paid \$54 million.

The railroads currently receive mail pay at the rate of 8½ cents per ton mile. Proposed boost would jump railroad pay to over 16 cents per ton mile.

The Big Four airlines are currently being paid 50 to 60 cents per ton mile. Last year payments to all air carriers for domestic air transport averaged \$1.32 per ton mile.

Assistant Postmaster General John Redding recently told AVIATION WEEK that the gap between air and surface mail transportation—though still wide—was closing. Initiative on the part of the airlines, he said, could bridge the gap. (Slick Airways has already offered to carry the mails at 15 cents per ton mile.)

► **Air Merchant Marine**—Second significant factor lending strength to growing conviction of the Post Office that all first class mails and parcel post should be switched to the air carriers is the nation's military need for an air merchant marine.

Air Force has lobbied "off the record" for four years for U. S. backing of an air merchant marine to augment its Military Air Transport Service in event of a national emergency.

Late in March, Maj. Gen. Laurence L. Kuter, MATS commander, presented to a closed session of the Senate Commerce Committee an estimate of airlift requirements and availability as prepared by the Joint Military Transportation Committee of the Joint Chiefs of Staff.

► **Airlines Disturbed**—Most disturbing to the airlines is continual talk of a complete takeover of all commercial aviation resources in wartime, regardless of current plans to the contrary. Department of Defense and the civil airlines reached a compromise within the Air Coordinating Committee in M-Day plans for civil-military aircraft utilization.

But despite the compromise, MATS is known to have prepared and submitted to the Secretary of Defense an "ideal" mobilization plan from MATS' point of view. The plan was not made known to civil airline executives.

Post Office officials are considering practicability of asking USAF for loan of the big Convair C-99 to test feasibility of heavy cargo mail transportation to key distribution centers such as Washington, D. C., New York, Chicago, Los Angeles, San Francisco and New Orleans.

Utilization of the XC-99 to test its air mail capabilities, Air Force and Post Office officials state, would not impair its present long-range heavy weight-lift tests. Security of the information in connection with the big plane is not a factor, Air Force sources say, since the big plane is not on the classified list.

ARS Honors Night

Awards for rocket work were made at the American Rocket Society dinner on Nov. 30.

Among those honored were:

- Lovell Lawrence, Jr., recipient of Goddard Memorial Lecture Award for outstanding work with liquid rocket motors.
- Col. Leslie A. Skinner, USAF, recipient of C. N. Hickman award for work in liquid and solid rockets.
- Clair N. Beighley and Eldon L. Knuth, recipients of ARS Student Award for best report by a student member. Their joint paper was on film cooling of rocket motors.

PRODUCTION

Aviation Newcomer Buys Kollsman

Standard Coil, growing manufacturer of television parts, takes over instrument firm to get into defense business.

By Erwin J. Bulban

Standard Coil Products Co., Inc., a comparative newcomer in the skyrocketing television industry, has reached out from the midwest to pick up one of the best buys in the aviation industry, Kollsman Instrument division of Square D Co., Elmhurst, L. I. The exact price in the transaction is not being given, but is understood to be "very close to \$5 million," and does not include cash or accounts receivable due the Kollsman division.

An interesting facet of the deal is the fact that this is the second time Kollsman has changed hands during a world crisis—the first was late in 1939, when owner Paul Kollsman sold his company to Square D. And both times the buyers have been for the most part civilian-goods suppliers.

Why did Square D sell such a promising property at this time, and why did a company already having its hands full taking care of a growing consumer industry buy Kollsman?

• **Square D's principal business** is making electrical equipment; switches, panel boards, fuse cabinets, compensators, automatic starters, temperature controls and similar products. The company has five plants scattered over the United States and plans to add two more in addition to expanding one of its existing facilities. These plans will require full attention of its management as well substantial funds for enlarging the electrical field of operations. It felt that the Kollsman division was alien to its main business and might interfere in its expansion.

• **Standard Coil, on the other hand,** has been watching with some apprehension the continuing emphasis on military production and forecasts of consumer goods restrictions. Buying into one of the industries that would play a major part in the expanded defense program would be a wise hedge against the time when civilian manufacture and sales would plummet.

Thus the time was ripe for Square D to sell and Standard Coil to buy—and Kollsman was the target. The new owner is setting its purchase up as a separate division and making Kollsman's long-time general manager Victor E. Carbonara its president.

Standard Coil has apparently chosen

well in its new venture. Kollsman has come a long way since it was started by brothers Paul and Otto in 1929. The first plant of any size was the one-time hosiery mill it occupied in Elmhurst, N. Y., which has since undergone a three-fold expansion in floor area, including a more-than-double expansion since last year. Backlog is a healthy \$10 million plus.

► **Who is Standard Coil?**—From its formation in Chicago in 1935 through 1940, Standard Coil was a minor manufacturer of small coils having a net worth at the end of this period of only about \$16,000. President Glen E. Swanson, secretary-treasurer James O. Burke and vice president Robert E. Peterson owned all its 1,470,000 shares of common. A public offering has since reduced their holdings to 75 percent of the stock outstanding.

During World War II the company went into radio, radar and other electronic work, but renegotiation and taxes kept it from showing any substantial financial progress. The turning point came when it went into the television field and developed a highly successful TV tuner.

The tuner was introduced around the middle of 1948 and the following years saw the company really soar. From 1948's gross sales of about \$3,348,000, Standard Coil in 1949 went to gross sales of about \$16,594,000; in the first six months of this year the figure was approximately \$16,038,000. Assets have jumped to \$9,190,504, approximately 2.2 times its liabilities.

Sales of television tuners became approximately 84 percent of Standard Coil's sales, with other TV components making up the remainder. There are now six plants, three in Chicago, two in Los Angeles and one in Bangor, Mich. Employees number over 3000.

Negotiated Contracts

A contract for \$602,539 to Harris-Seybold Co., Cleveland, for printing presses, led AF negotiated awards for the week ended Dec. 1. Total awards in this period were \$2,890,163.

Bendix Products div., Bendix Aviation, South Bend, Ind., wheel and brake assemblies, Cl. 03B, \$265,625.

Eicor, Inc., Chicago, inverters, Cl. 03C, \$31,321.

General Textile Mills, Inc., New York, helmets, Cl. 13, \$312,600.

Goodyear Tire & Rubber Co., Akron, airplane casings & tubes, Cl. 04, \$367,220.

Harris-Seybold Co., Cleveland, printing presses, Cl. 43, \$602,539.

Jack & Heintz Precision Industries, Inc., Cleveland, generators, Cl. 19A, \$240,000.

Kingsley Stamping Machine Co., Hollywood, Calif., automatic wire marking machines, Cl. 17A, \$43,460.

Lear, Inc., Grand Rapids, Mich., actuator assemblies and screw-jacks, Cl. 03C, \$280,738.

Lockheed Aircraft Corp., Burbank, Calif., mobile training units, Cl. 01L, \$50,000; spare parts for aircraft, Cl. 01L, \$123,542.

Marlin-Rockwell Corp., Jamestown, N. Y., ball bearings, Cl. 04D, \$66,444.

Revere Corp. of America, Wallingford, Conn., fuel flow transmitters, Cl. 05D, \$192,800.

United States Rubber Co., Detroit, airplane casings & tubes, Cl. 04, \$220,332.

Vectron, Inc., Waltham, Mass., negative duplicating printers, Cl. 10B, \$44,636.

Wynn Mfg. Co., Inc., Philadelphia, hand-operated wire-marking machine, Cl. 17A, \$48,906.

AF Invitations

Bid openings are 20-30 days after approximate issue dates shown in the following bid proposals. Bid sets containing specifications for items to be procured will be sent to qualified applicants who state bid invitation number.

One bid set will be available for examination without obligation by prospective bidders, after bid publication date, at each of the seven AMC procurement field offices. This will enable firms to see specifications before writing or telegraphing for their own bid sets.

Procurement field office locations: Boston Army Base, Boston 10, Mass.; Government Aircraft Plant No. 4, Ft. Worth 1, Tex.; 39 S. LaSalle St., Chicago 3; Wright-Patterson AFB, Dayton, Ohio; West Warren and Longo Aves., Detroit 32; 155 W. Washington Blvd., Los Angeles; 67 Broad St., N. Y. 4.

INVITATIONS

Nails, 1-53 items, bid invitation No. 51-1102, issue date 13 Nov., delivery 50% within 60 days, complete within 120 days.

Cloth, wire brass, 1-11 items, bid invitation No. 51-1103, issue date 13 Nov., delivery 50% in 60 days, complete within 120 days.

Bolt, 1-51 items, bid invitation No. 51-1104, issue date 13 Nov., delivery 30% within 65 days, complete in 120 days.

Radio receiver, 1-11 items, bid invitation No. 51-1105, issue date 13 Nov., delivery complete within 250 days after date of award.

Fitting-synthetic rubber, 2000 each, bid invitation No. 51-1106, issue date 13 Nov., delivery to start in 30 days, complete in 120 days.

Tester assembly, 33 each, bid invitation No. 51-1107, issue date 13 Nov., delivery complete within 90 days after date of award.

Hose, 1-8 items, bid invitation No. 51-1112, issue date 13 Nov., delivery to start in 30 days, complete in 90 days.

Handle, brush & mop, 210,260 each, bid invitation No. 51-1113, issue date 13 Nov., delivery 50% in 60 days, complete in 120 days.

Cushion-aircraft, 350 each, bid invitation No. 51-1126, issue date 16 Nov., delivery to start in 30 days, complete in 60 days.

Bolt, 1-101 items, bid invitation No. 51-1127, issue date 16 Nov., delivery to start in 30 days, complete within 90 days.

Recorder unit, 1-5 items, bid invitation No. 51-1135, issue date 16 Nov., delivery of first articles within 90 days, production items to be delivered starting within 60 days after approval.

Set screw disc safety, 1-32 items, bid invitation No. 51-1136, issue date 16 Nov., delivery to start in 30 days, complete in 90 days.

Chemicals, class 24, 1-11 items, bid invitation No. 51-1138, issue date 16 Nov., delivery within 30 days after date of award.

Latest USAF Bid Awards

Air Materiel Command Procurement Division makes available to AVIATION WEEK the latest bid awards, shown on this page. Requests for further information should be addressed to Contracting Officer, AMC, Wright-Patterson AFB, Dayton, Ohio, attention: MCPPSX72.

ABSTRACTS (Advertised procurements over \$2500)

For flashers (51-340):
Chris J. Van Eyk dba Seaboard Electric Co., New York, on a bid of \$213,409.75.

For books, periodicals, subscriptions (51-352):
W. E. Falk—Books, Cincinnati, on a bid of \$250,000.

For 275,080 gal. compound (51-397):
Companies sharing: Magnus Chemical Co., Inc., Garwood, N. J., on a bid of \$300,527, and Tureco Products, Inc., Los Angeles, on a bid of \$52,470.

For outdoor type substation (51-152):
Railway & Industrial Engineering Co., Greensburg, Pa., on a bid of \$19,035.75.

For copper tubing (51-330):
Wolverine Tube div., Calumet & Hecla Consolidated Copper Co., Inc., Detroit, on a bid of \$62,558.80.

For 8000 bracket assemblies (51-331):
Stretcher Die & Tool Co., Ypsilanti, Mich., on a bid of \$3605.44.

For 4500 elbow assemblies (51-406):
Westinghouse Electric Supply Co., Dayton, O., on a bid of \$13,185.

For 200 portable rectifiers (51-451):
McColpin-Christie Corp., Ltd., Los Angeles, on a bid of \$103,300.

For 124,800 ft. braid (51-538):
U. S. Radio & Television Supplies, Inc., Chicago, on a bid of \$3425.60.

For stand assemblies (51-562):
Denison Engineering Co., Columbus, O., on a bid of \$126,400.

For fireproof power cables (51-615):
Wagner Smith Co., Dayton, on a bid of \$9723.

For 18,000 thermocouples (51-601):
Companies sharing: Lewis Engineering Co., Naugatuck, Conn., on a bid of \$10,725, and Revere Corp. of America, Wallingford, Conn., on a bid of \$5130.

For knobs (51-650):
Companies sharing: U. S. Radio & Television Supplies, Inc., Chicago, on a bid of \$1134.80, and Herbach & Rademan, Inc., Philadelphia, on a bid of \$1737.55.

For aircraft electric testers (51-197):
Moulle Specialties Co., Bloomington, Ill., on a bid of \$5175.

For 661 flexible shafts (51-285):
Balmar Corp., N. A. Strand div., Chicago, on a bid of \$2915.01.

For jack boxes (51-374):
Molded Insulation Co., Philadelphia, on a bid of \$35,566.70.

For 20 fixture assemblies (51-398):
U. S. Pipe Mfg. Co., San Francisco, on a bid of \$7645.50.

For stand assemblies (51-571):
United Mfg. Co., div. of United Advertising Corp., New Haven, on a bid of \$20,236.

Packaging Program

Spreading packaging know-how among some 350 Midwest USAF contractors is a current prime task of Chicago's AF Procurement Field Office. The field office is overseeing the program through seven offices across the 14-state area.

Three goals of the educational mission are:

- **Setting up** standard packaging methods and development of new techniques.
- **Eliminating waste** caused by "over" or "under" packing;
- **Speeding research results** from AF laboratories to contractors and monitoring of deviations.

New contractors are given guidance in setting up Air Force-approved packaging systems by specialists attached to the area offices—for special problems a specialist is called in from the field office. The field office sends out men occasionally to do on-the-spot inspections of the manufacturer's procedures.

Goodyear to Build Piasecki Components

Goodyear Aircraft Corp. will build complete fuselage shells and "omni-phibious" landing gears of the USAF Piasecki H-21, rescue helicopter.

Prime contract for manufacture of the H-21 was awarded to Piasecki by Air Force following a competition among rotary-wing builders based on a military requirement for an Arcos helicopter (AVIATION WEEK Feb. 13). The H-21 is an advanced version of Navy's Piasecki HRP-2 "Flying Banana," and has Piasecki designation PD-22.

► **Emphasis on Helicopters**—Award of the subcontract to the Goodyear Corp. is indicative of the heavy emphasis being placed upon the helicopter phase of this nation's air potential. During World War II, Goodyear produced 4008 F4U Chance Vought Corsairs for Navy and is well equipped for mass production engineering.

Real significance of production subcontracting by Piasecki to Goodyear is it indicates Piasecki is to stay in the field of design research and engineering, rather than enter heavy production on this machine.

The fuselages to be built by Goodyear measure 54 ft. from nose to tail. As a troop transport, the H-21 has provision for 20 and emergency accommodation for 27. Omni-phibious landing gear which enables the copter to land on snow, ice, water, tundra, marsh and land combines regular landing wheels, floats and skis into one unit.

Tread of the tricycle gear between the two rear units is 13 ft. 4 in. Flotation gear is constructed of rubberized fabric with a tensile strength of 600 psi.

It has abrasion-resistant sides and bottom, and is inflated to 4 psi.

► **Powerplant**—Twin-rotored, the H-21 is powered by a single Pratt & Whitney R-1820-76A engine developing 1090 hp. The same engine powers the twin-engine Grumman SA-16 amphibian. It develops 1090 hp. at 2600 rpm. at 12,000 ft. maximum altitude. Fuel tank capacity is 277 gal.

Twin metal rotors measure 44 ft. in diameter, are three-bladed and have a —7 deg. twist. Upper controls of the rotors are the same as those of the Navy HRP-2, but are somewhat increased in dimensions to accommodate a larger transmission and rotor.

Cruising speed is 104 mph. at 5000 ft., maximum speed 130 at 5000 ft. Service ceiling is 16,000 ft. and hovering ceiling is 13,000 ft. Range is 610 mi., endurance 7.7 hr.

T. A. Knowles, who disclosed receipt of the subcontract, said that production will run well into 1952. Subcontract includes all detail design and production engineering for fuselages and landing gears.

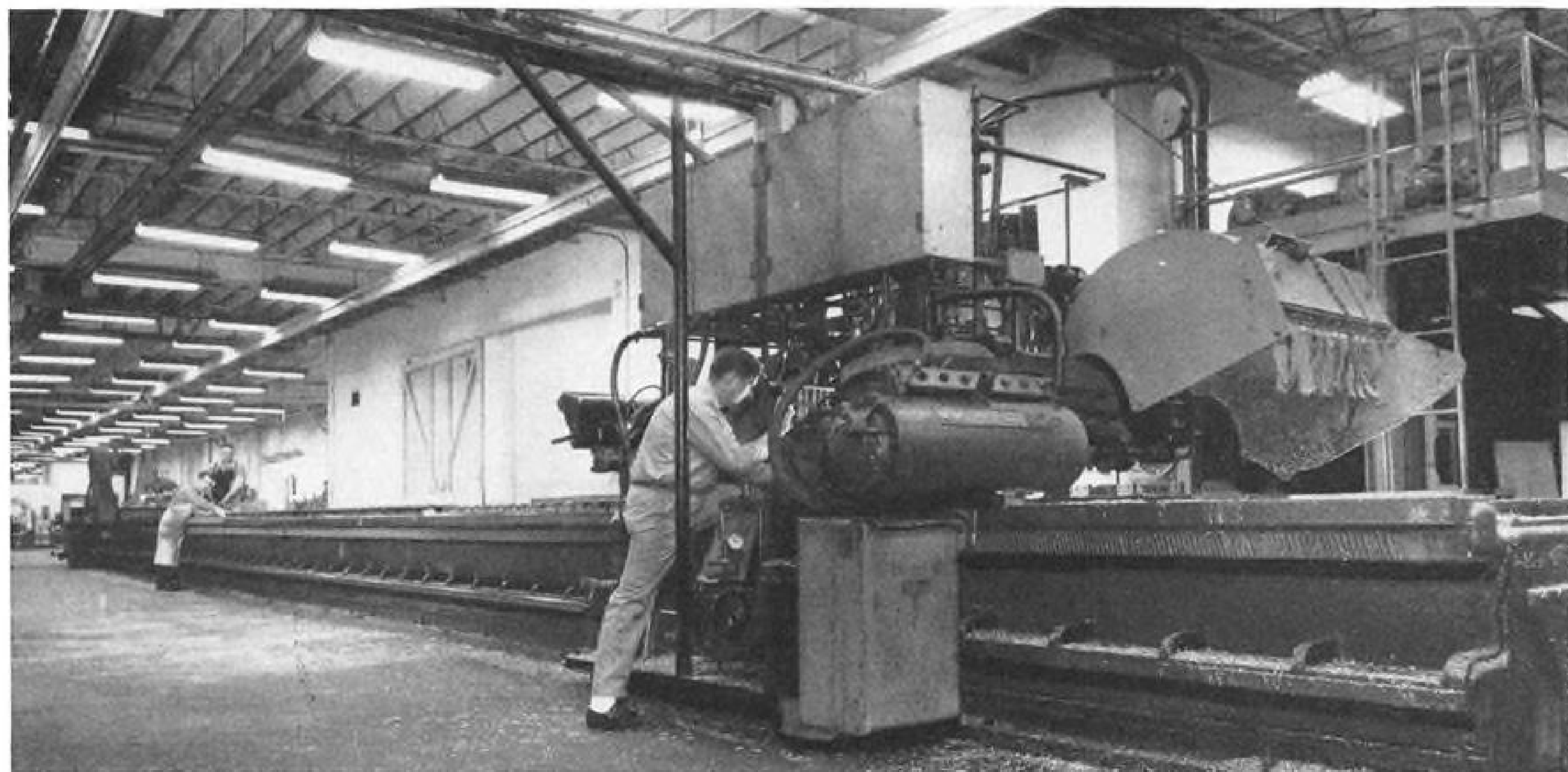
PRODUCTION BRIEFING

► **Cessna Aircraft Corp.,** Wichita, received a 50 percent increase in subcontract work from Boeing for B-47 components.

► **Fluid Power, Inc.,** Cleveland, makers of aviation oxygen equipment, has named John B. Rudy Co., 1113 Airway Drive, Glendale, Calif., as exclusive representatives for the firm in the states of Washington, Oregon, California, Arizona, Texas and Kansas.

► **Boeing** has upped wages at Seattle and Wichita. Aeronautical Mechanics Union personnel at the former plant have gotten an average increase of 9.64 cents per hour, with wages there now ranging from \$1.24 to \$2.07 per hour. All non-bargaining hourly paid employees at the Wichita plants got slightly more than 10 cents an hour increases, with salaried employees hikes averaging six percent.

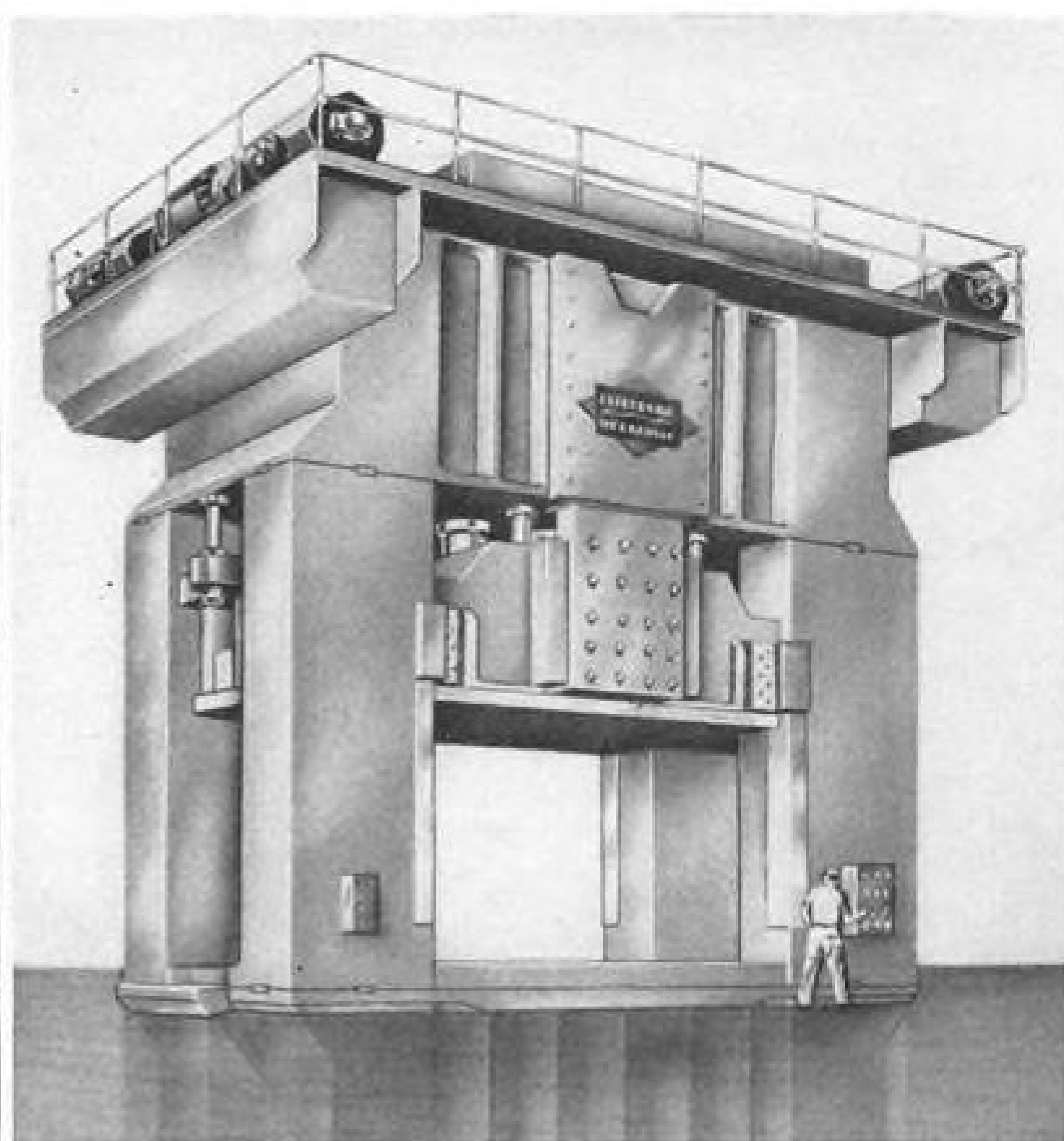
► **Sperry Gyroscope Co.** is taking over the major portion of Lockheed Aircraft Service's facilities at MacArthur Field, L. I., N. Y., to set up a comprehensive modification center for its military production aviation and ordnance equipment. Sperry took over the LAS leasehold covering 430,000 sq. ft., with LAS retaining a portion of shop area for about a year to handle supercharger overhaul. LAS will concentrate maintenance work at New York International Airport, Idlewild. Sperry also will use the acquisition to house an expanded flight research activity.



\$70,000 was invested by North American Aviation in this lengthy Onsrud milling machine to cut wing spars for jet fighters. This is typical of the capital being put into face-lifting production lines.



\$410,000 was spent by Sikorsky for this 5000-ton Bliss hydraulic press. Considered a giant even then, this machine is dwarfed by this new . . .

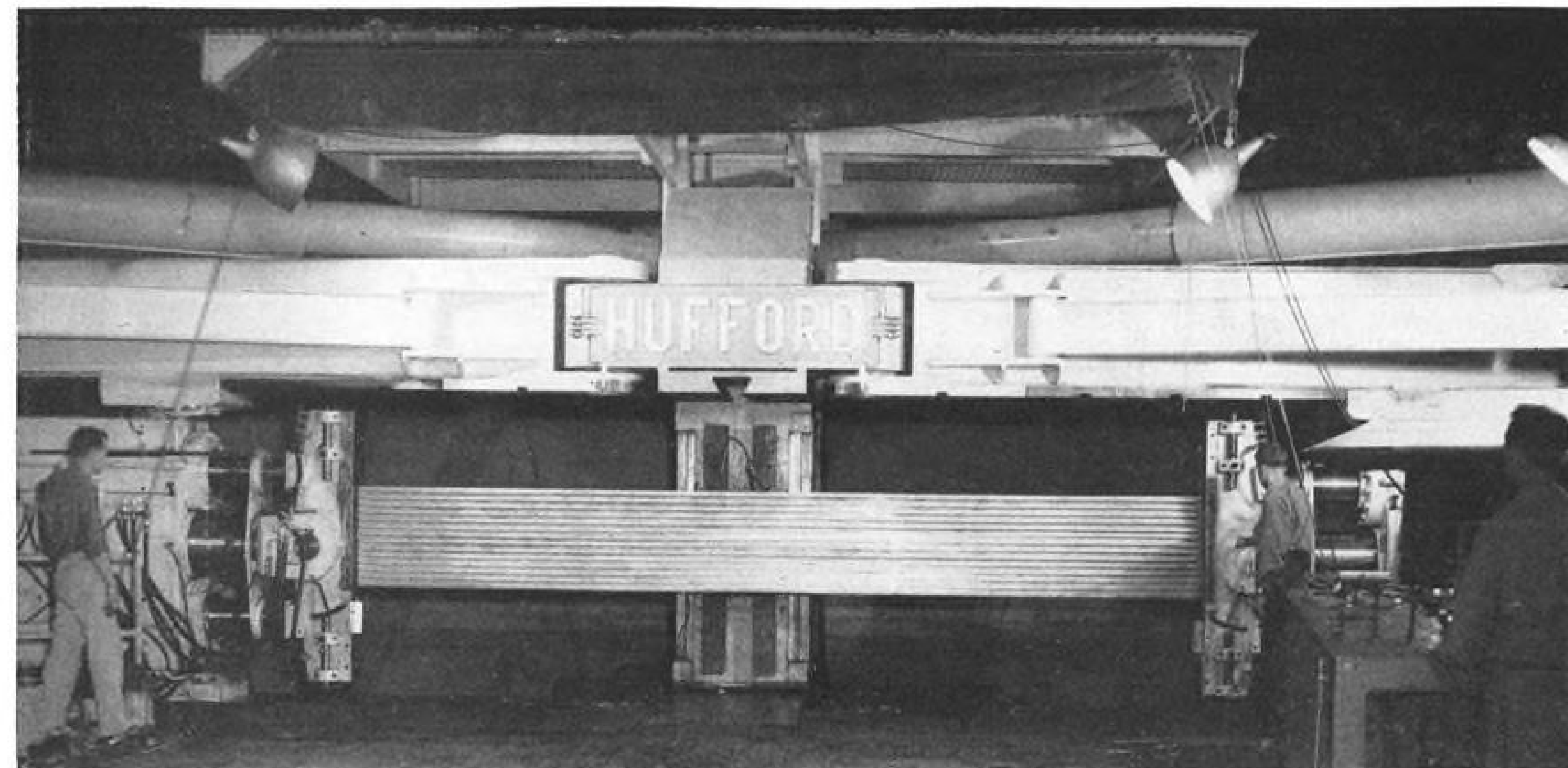


\$750,000 Birdsboro 8000-ton hydraulic press, seen in artist's conception, which was ordered this year by Lockheed. Note small size of scale figure.

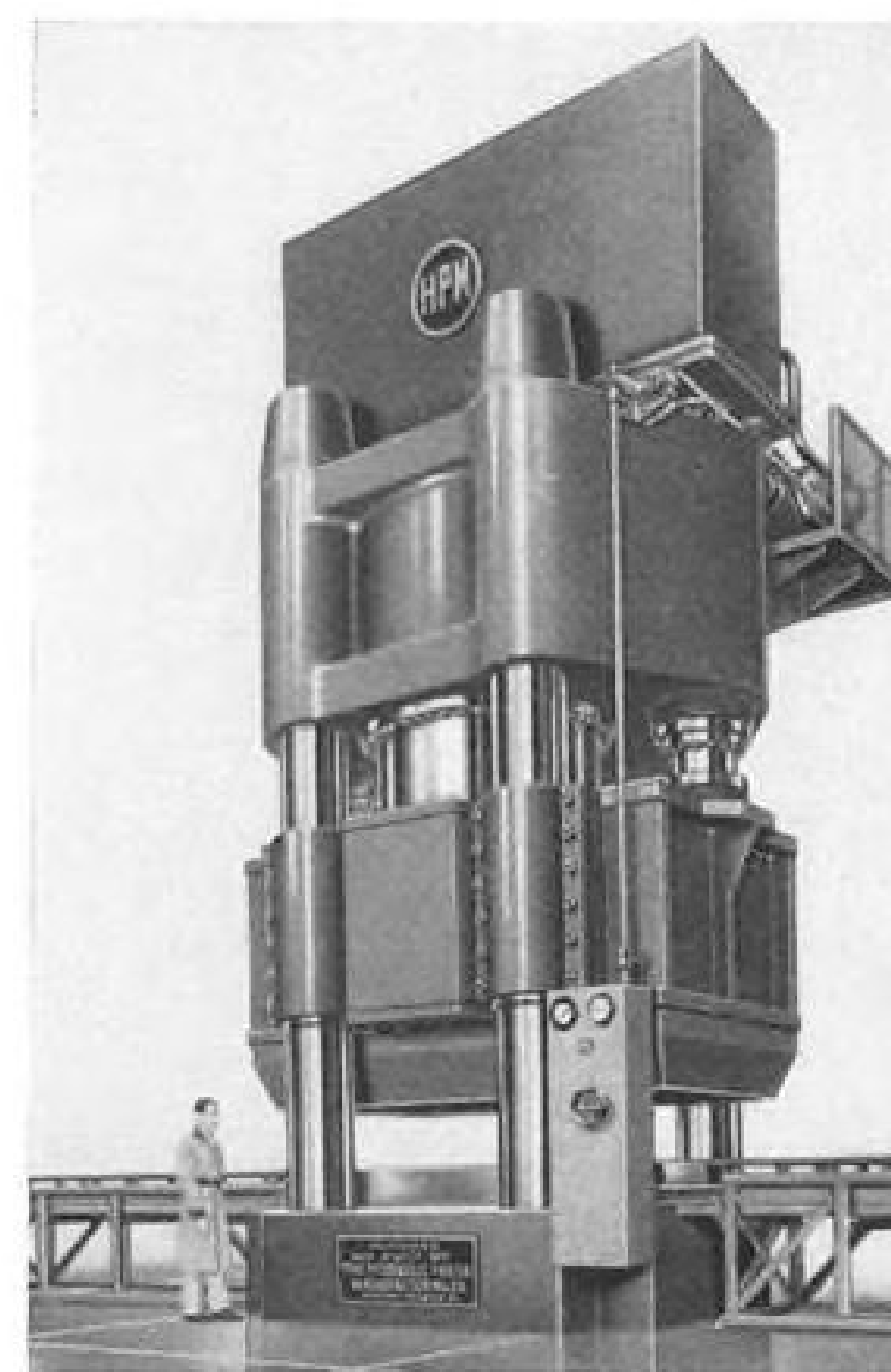
Massive Tooling Marks Industry's Defense Program

U.S. aircraft production lines are undergoing a tremendous and costly reorganization to meet the huge rearmament program set rolling by the world's worsening political situation.

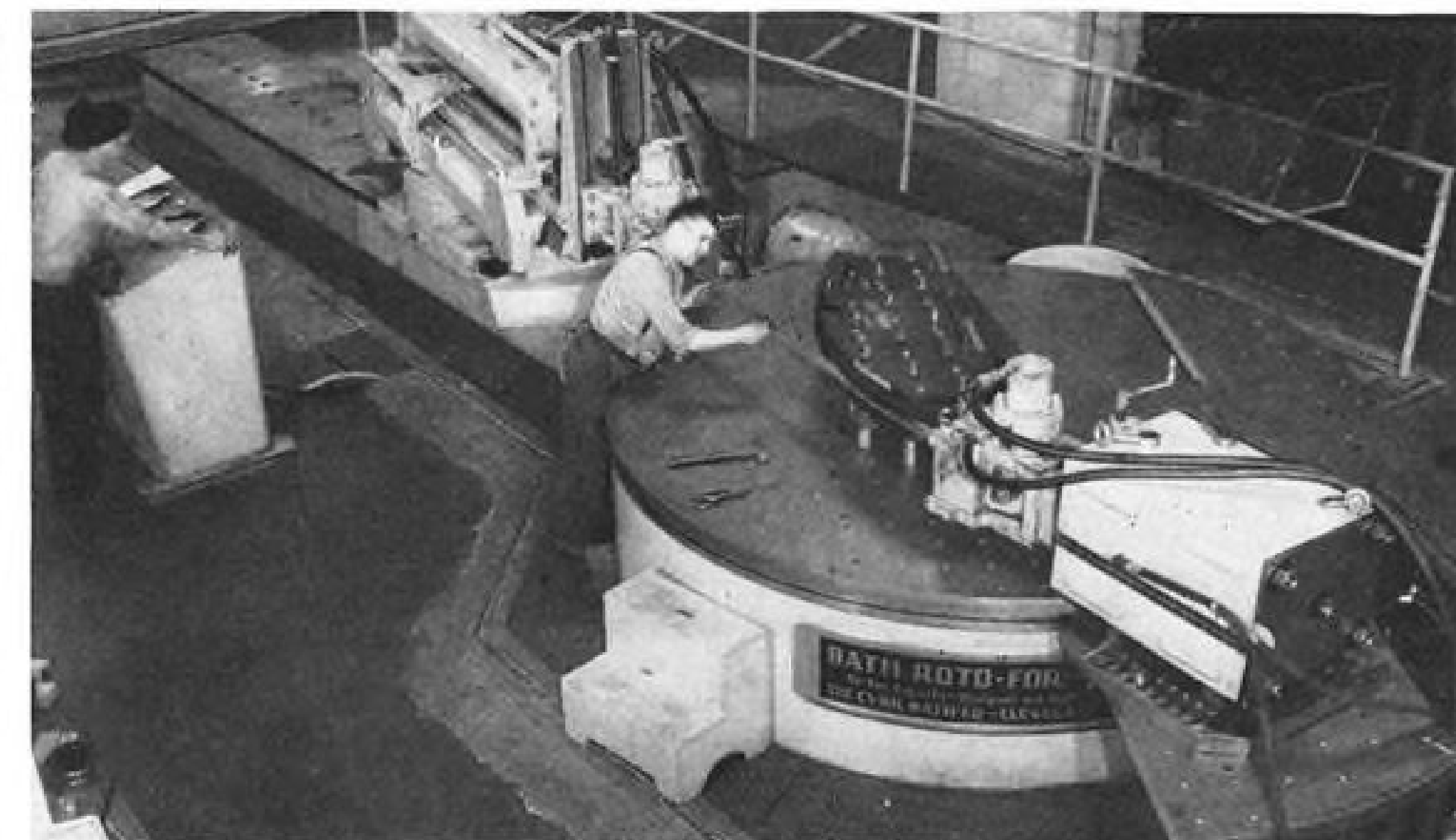
The manufacturing picture is further complicated by the need for far more intricate processing machinery necessary to handle tougher materials, the new shapes and curves and smoothness inherent in modern and complex high-speed military aircraft.



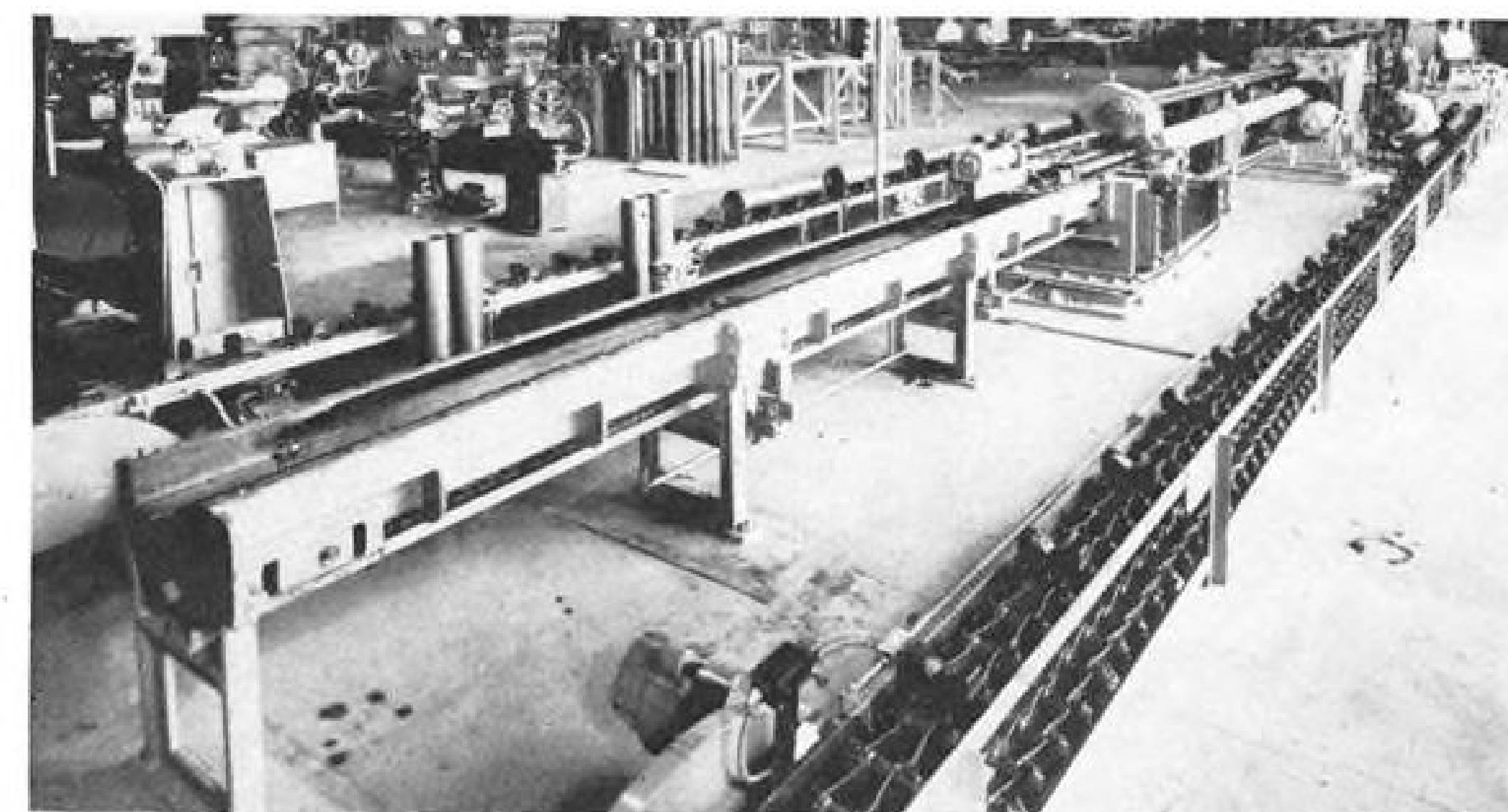
\$318,000 Hufford stretch press is used by Lockheed to flatten an integrally stiffened aluminum alloy extrusion. This machine can also be utilized in forming wing skins, stringers, and longerons.



\$250,000 was bill for this 7000-ton Hydraulic Press rubber pad forming tool for Boeing-Seattle.



\$80,000 Cyril Bath Roto-Former has been put in use by Boeing-Seattle to bend aluminum or magnesium parts in semi-circular or circular shapes.



\$155,000 was the total bill for this 90-ft. Wallington tube reducing machine used by Hamilton Standard on hollow steel blade production.

The more than \$5 million program for new plant and equipment of North American Aviation and the \$13 million outlay being handled by Lockheed are typical of the sums the industry is spending to update its technology to handle the increased expansion.

Shown on these pages are some of the giant machines on order and in use by the industry, and their price tags. They typify what AIA President Adm. D. C. Ramsey recently called, "a new cycle of progress in manufacturing methods."

AERONAUTICAL ENGINEERING

Machining Studies Aid Aero Production

High-temperature alloy problems emphasized in metal-cutting research.

The U.S. Air Force is attacking the problem of high costs and slow production of critical jet engine parts scientifically in the machine shop.

Close tolerances and almost precision-alloying of metals bring metal-cutting from an art to a science. Although much effort had gone into improvement of machines, cutting tools and handling techniques, relatively little had been done to apply knowledge of metallurgy to the betterment of machining conditions.

► **Air Force Acts**—In 1948, the Air

The increased tempo of industrial expansion has underlined the urgent need for high-volume, low-cost production.

To help the aircraft industry attain this goal, the USAF sponsored research on machining processes as a vital factor in output potential.

AVIATION WEEK here reviews salient features of the Air Force study.

	BRINELL HARDNESS	MEYER EXPONENT	COEFFICIENT OF FRICTION, AVG.	CUTTING SPEED	UNIT POWER, HP/CU. IN./MIN.	SHEAR STRENGTH IN CUTTING, PSI x 1000	70°F.	1000°F.	1500°F.
S-816									
Annealed, 1950°F.	297	2.23	0.68	100	1.21	132	.....	.....	.....
Solution treated, 2250°F.	250	2.28	0.65	100	1.16	130	.....	.....	.....
Solution treated, 2150°F.	269	2.34	0.62	100	1.22	138	.....	.....	.....
Solution treated, aged, 2150, 1400°F.	268	2.34	0.69	100	1.20	135	160	122	78
INCONEL "X"									
Solution treated, 2100°F.	279	2.37	0.68	100	1.30	135	.....	.....	.....
S. T. and aged, 2100, 1550, 1300°F.	313	2.25	0.66	100	1.26	145	162	140	50
Equalized, 1625°F.	265	2.21	0.72	100	1.27	135	.....	.....	.....
Equalized, aged, 1625, 1300°F.	332	2.37	0.68	100	1.38	147	.....	.....	.....
TIMKEN 16-25-6									
Work hardened.	318	2.09	0.61	200	1.18	130	148	95	45
Stress relieved, 1300°F.	274	2.24	0.60	200	1.02	127	.....	.....	.....
Solution treated, 2150°F.	187	2.17	0.62	200	1.05	115	109	85	43
AISI 347									
Annealed.	262	2.08	0.60	200	0.87	109	90	61.5	24
AISI 4340									
300 Brinell.	300	2.20	0.68	200	0.94	111	150	.....	.....
AISI 410									
200 Brinell.	204	2.22	0.69	200	0.82	97	89	44.5	9
300 Brinell.	305	2.11	0.65	200	0.92	109	.....	.....	.....
SAE 8640									
300 Brinell.	302	2.15	0.67	200	0.93	109	150	.....	.....

Force through the Resources Planning Section, Industrial Planning Division, Air Materiel Command, requested an industry committee to study maximum production at minimum cost as a vital objective of mobilization planning.

The committee formulated a machinability program and allocated specific phases of the work to Curtiss-Wright Corp., Ford Motor Co., Metcut Research Associates and the Massachusetts Institute of Technology.

The report of their findings was published recently in a 162-page book, "Increased Production, Reduced Costs," prepared for the AF by Curtiss-Wright.

Pressing problems attendant to machining high-temperature alloys for aircraft gas turbines provided a major impetus for research. It was discovered along the way that the underlying principles were equally helpful in improving the machinability of industry's "work horse" metals—cast iron and steel.

It was discovered, for instance, that slight variations in the microstructure (interior makeup) of a piece of stock can be responsible for as much as a five-fold change in tool life at a given cutting speed.

► **Control Needed**—Optimum machinability requires control of all aspects of

the process. It is measured in three ways:

- **Tool life**
- **Surface quality** of the finished product.
- **Power required.**

In this analysis three other factors must be controlled carefully to get best production at least cost. They are:

- **Behavior of the work material** in cutting.
- **Operating characteristics** of the machine tool.
- **Performance of the cutting tool.**

Cutting-tool life looms as a major factor because it affects machine downtime and cutter preparation costs. Life of the tool and its ability to retain a cutting edge influence the production rate. A dulling tool slows production and increases the incidence of sub-standard work.

► **Surface Finish**—It is imperative that jet engine blades, buckets, nozzle guide vanes and companion parts have an excellent surface finish. Hence it was fortunate that carbide cutting tools were available to take the terrific burden of shaping newer alloys tougher than previous high-speed steel.

Not only does carbide tooling permit

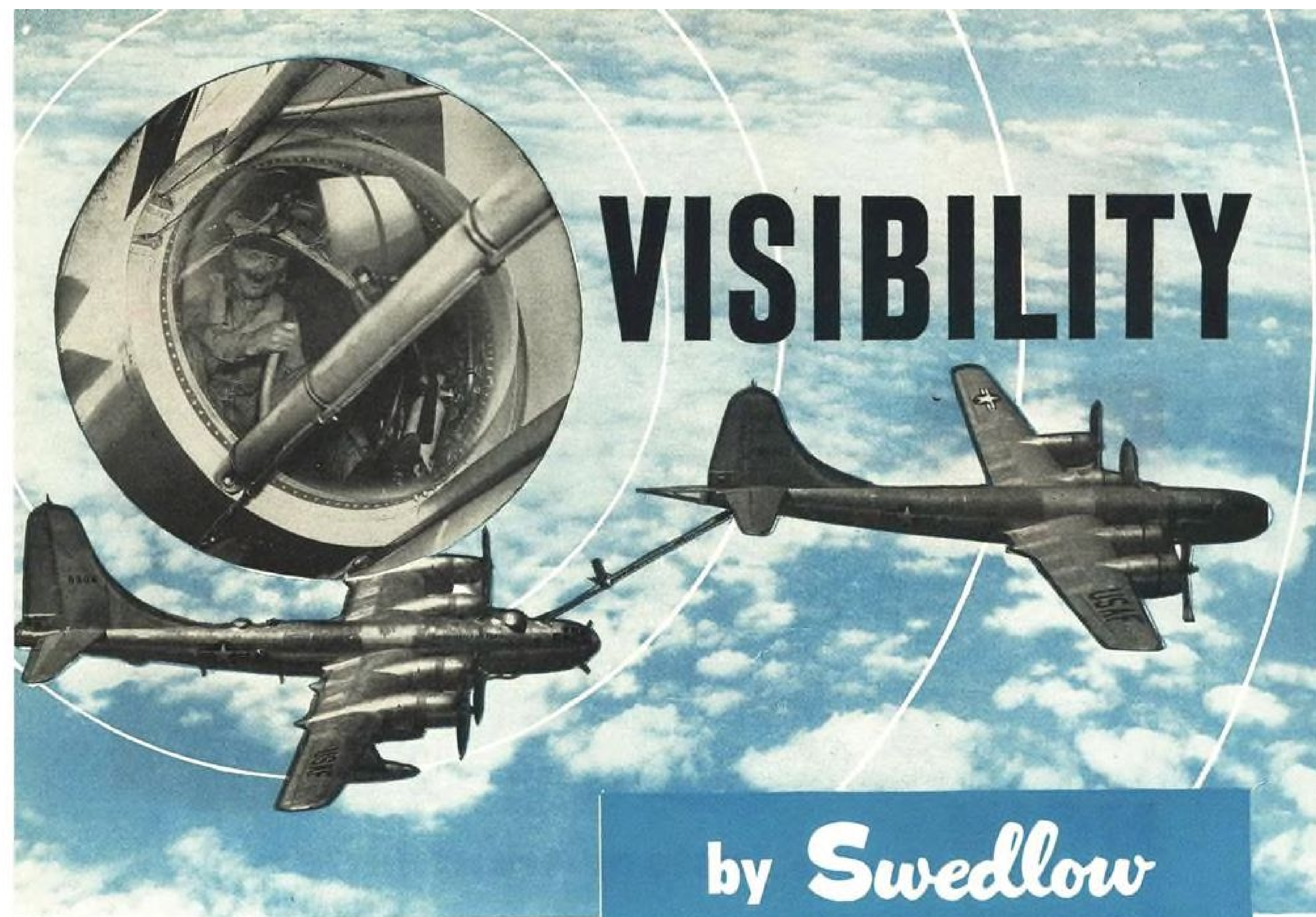
higher production rates and longer tool life, but it brings a dividend in superior surface finishes—minimizing the number of operations to produce a given part.

The report bespeaks a need for more power in machine tools to handle heavier loads and faster cutting speeds for greater production. Experience has shown that one or two machines—amply powered, properly tooled and handled—will replace as many as ten under-powered units, maintaining the same production rate at a large net saving in power. Also, there should be a sizeable reduction in fixed costs.

► **Tool Life**—The common denominator applied throughout all the testing was tool life. Tool life can be measured in several ways. Time alone is not necessarily a true measure of the life of a cutting tool. Cuts can be light or heavy, fast or slow and life can be taken as the time between grinds (total life: time between grinds multiplied by number of grinds).

For test work, the measure of service was expressed in terms of cu. in. of metal removed.

Metallurgy enters the picture because relationships between hardness, strength



by **Swedlow**
on the "Flying Boom" of the
BOEING B-29 TANKER

Among other notable new developments in which **SWEDLOW** skill in acrylics had a share are the latest achievements of...

- Consolidated Vultee Aircraft Corp.
- Hiller Helicopters, Inc.
- Lockheed Aircraft Corp.
- McDonnell Aircraft Corp.
- North American Aviation, Inc.
- Northrop Aircraft, Inc.



• This sensational new "Flying Boom," developed by the Boeing Airplane Co. for the U. S. Air Force, makes it possible to transfer fuel in the air at higher speeds, higher altitudes and at greater rates of flow than have been attainable with any previous systems.

The boom control operator, who "flies" the boom down into a socket on the receiver plane, must have perfect visibility for fast "coupling-up" and quick disconnecting. **Swedlow** skill and 15 years' experience in acrylic fabrication assures this perfection in the boom control enclosure.

No matter how novel or unprecedented your problem in acrylics, the **Swedlow** engineering staff is at your service to help you solve it. Communicate **TODAY** with **Swedlow**.



NOW . . . custom transmitters from prefabricated assemblies

You can now get the benefit of production line economies in a new Collins series 430 one or two kilowatt communications transmitter tailored for your specific requirements.

Completely constructed RF, power supply, and modulator components of new design are available for integrating in different combinations, forming finished transmitters to fulfill all requirements of ground-to-plane, shore-to-ship and point-to-point systems. The frequency range of these transmitters is 2 to 30 megacycles.

RF units can be supplied with or without Autotune* control. Manual tuned RF units may be worked in multiple to provide a multiplicity of fixed tuned instantly selectable channels or simultaneous transmissions on two or more frequencies.

Among the combinations available are the Type

431D one kilowatt, ten channel CW-FSK and phone autotuned transmitter illustrated here. It is made by combining a 507A-1A RF unit, a 506A-1 power unit, a 508A-1 power unit, a 509A-1 modulator unit, a 2-bay cabinet and a 1 KW blower.

Another combination, not illustrated, is the Type 434B-1 one KW, two simultaneous-channel CW-FSK only, manual tuned transmitter, which is made by combining two 507A-1 RF units, two 506A-1 power units, a 508A-1 power unit, a 2-bay cabinet, and a 1 KW blower. Several other combinations are available, one of which is certain to satisfy your exact needs.

Final assembly, and testing, may be accomplished at the Collins plant or at the installation site. We will be glad to give you details about the 430 series transmitter to fulfill your own requirements.

*Reg. U.S. Pat. Off.

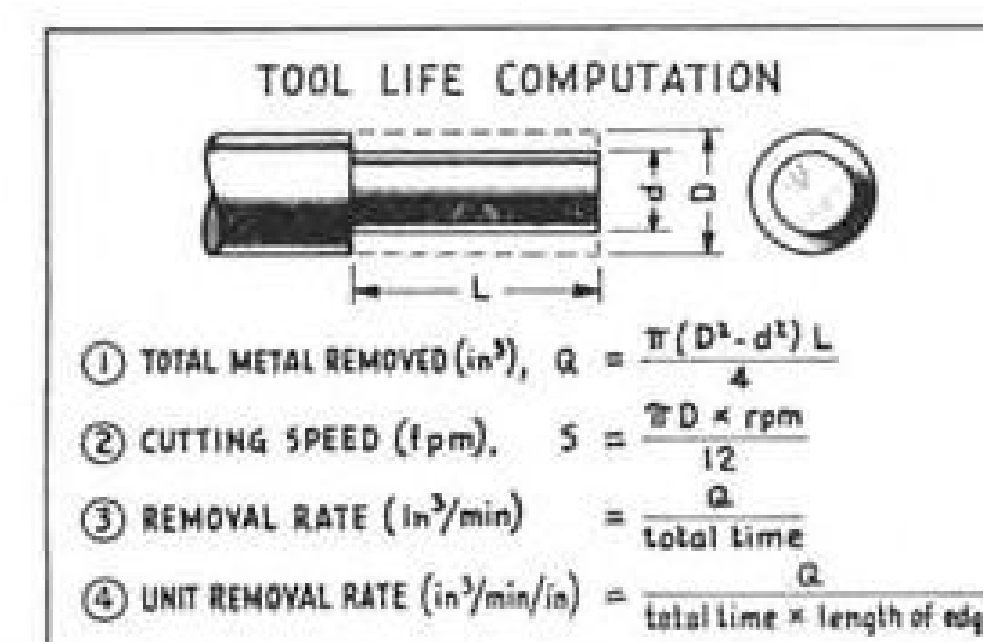
IN RADIO COMMUNICATIONS, IT'S . . .



COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 West 42nd Street, NEW YORK 18

2700 West Olive Avenue, MINNEAPOLIS



TOOL LIFE is usually expressed in terms of volume of metal removed in cubic inches per inch cutting-edge length for a specified degree of tool wear. Data is recorded as explained on page 35, and formulas like the above are used for the actual calculations.

and machinability are close. And a mere hardness test may be far from providing all the information required to set up accurately a metal-cutting operation where the work piece is one of the tougher alloys.

The well-known macrohardness Brinell and Rockwell tests cover rather large areas compared to grain structures in metals and may not present a true picture of local hardness due to minute constituents within. These local "hard spots" may upset machining calculations on high-temperature alloys.

Microhardness tests are coming into wide use. These provide readings at microscopic points to determine the hardness of specific micro-constituents. Tukon testers used have integral microscopes to examine etched and polished specimens which locate the exact spots where hardness readings are desired.

Indentations range in length from 5 to 1000 microns (one micron = .001 mm.) and loads applied can be varied from 10 to 50,000 grams.

► **Structure Examined**—A chapter entitled, "Metals Under the Microscope," discusses effectively the microstructure of wrought steel, cast iron and, more importantly, high-temperature alloys. The common constituents of the well-known alloys are given and grain make-up illustrated in a refresher treatment for those who are not constantly engaged in metallurgy.

High-temperature, corrosion-resistant alloys receive special treatment since their carbide constituents behave differently. These alloys harden differently from steels and cast irons and usually are subject to solution treatment, and later age (precipitation) hardening and work hardening. Aging increases precipitation of the carbides. This, in turn, affects machinability and tool life.

Testing of machine tools was a major part of the research program. High speed, high power and automatic operation are important advantages of new production machinery. But these characteristics demand a high degree of machine perfection to absorb heavier loads—both rotating and reciprocating.

Machine tool vibrations were analyzed and traced to their sources. Stress analysis received some attention, although only in the case of failures. No basic design studies were made.

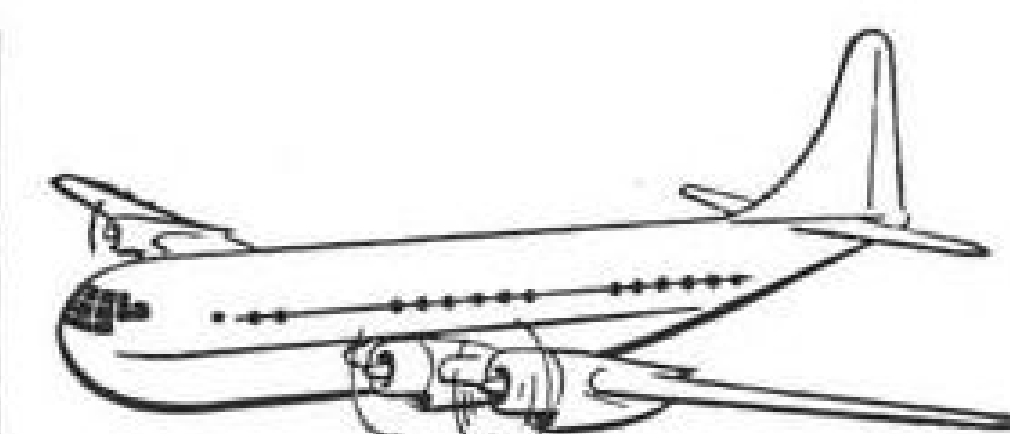
► **Carbide Tools**—Sintered-carbide tools have brought about a revolution in production. Their extreme hardness and high strength, even at high temperatures, permit production increases on the order of 300 percent.

It would seem that such performance indicates a sudden and complete switch to carbide cutting tools throughout industry. But it must be remembered that machine tools must be redesigned to incorporate higher speeds, greater strength and much more power to make the new techniques effective.

Furthermore, the carbides demand a new technology in application. They themselves have been improved steadily over the past 15 years.

The choice of carbides is difficult because composition may vary, even where equivalent grades are specified. Produced by powder metallurgy, carbide composition may vary for numerous technical reasons—producing many combinations of physical properties.

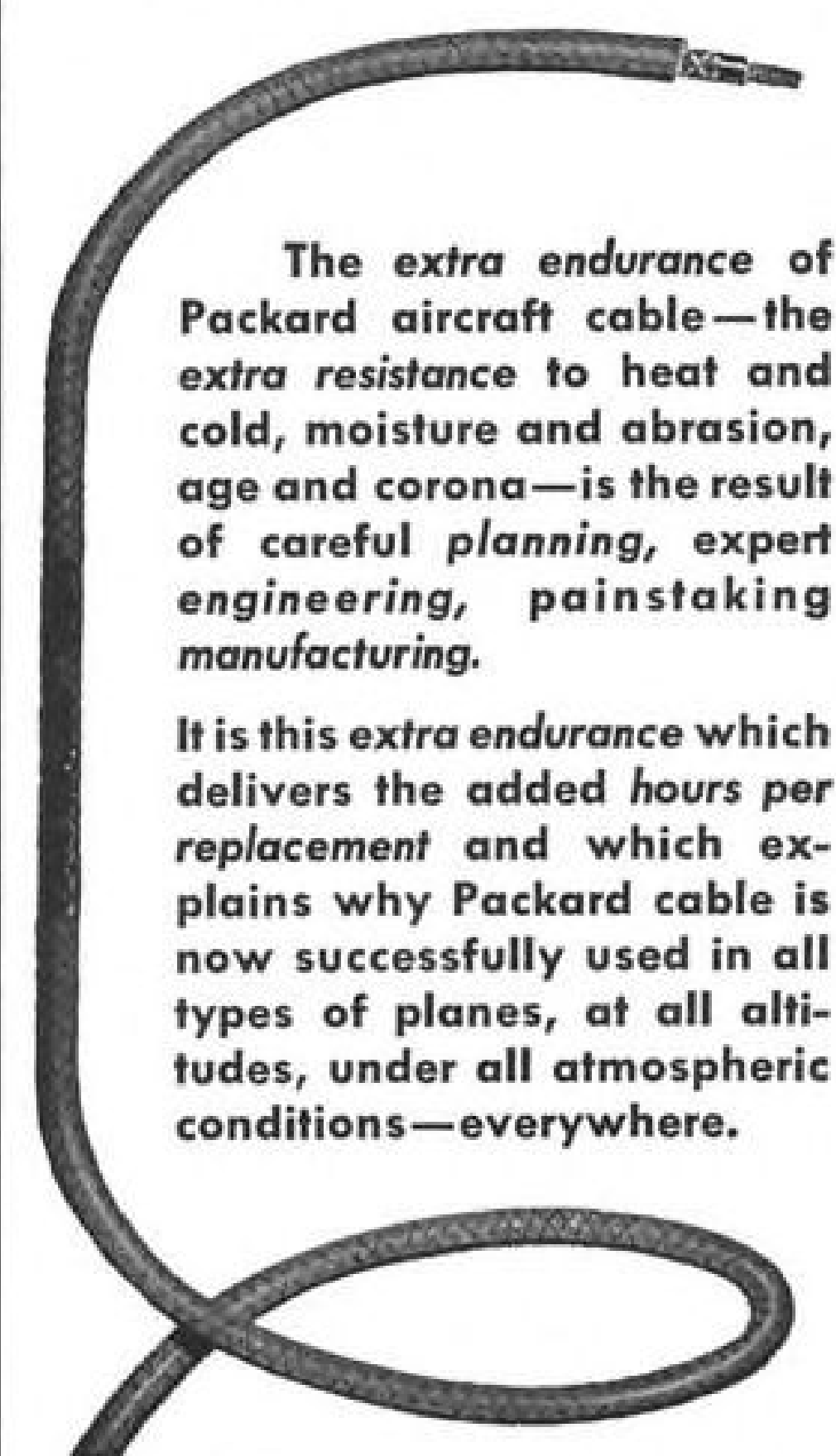
► **Carbide Properties**—Thermal expansion of carbide is one-third that of steel. Thermal conductivity is double that of steel. It has a low tensile



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ENGINEERED
TO GIVE MORE

H·P·R
(HOURS PER REPLACEMENT)

PACKARD
high-altitude
aircraft
IGNITION CABLE



The extra endurance of Packard aircraft cable—the extra resistance to heat and cold, moisture and abrasion, age and corona—is the result of careful planning, expert engineering, painstaking manufacturing.

It is this extra endurance which delivers the added hours per replacement and which explains why Packard cable is now successfully used in all types of planes, at all altitudes, under all atmospheric conditions—everywhere.

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Aircraft Engineers Specify

THE PROPELLER THAT'S
Right on the Nose

More power—more pull—more performance have made Sensenich the largest manufacturer of wood propellers for personal planes. Designers specify them because pilots prefer them!

METAL . . . Fixed Pitch
CAA approved up to 125 hp.

SKYBLADE . . . Controllable
CAA approved up to 165 hp.

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TEST CLUBS
up to 5000 hp.

Write for bulletins and price list
SENSENIC CORP., LANCASTER, PA.

Prompt repair service on all makes of wood propellers from Sensenich's PROP-SHOP.



BETTMANN ARCHIVE

Weighing the Air...in Inches

Taking the measure of atmospheric pressure dates back to Torricelli's mercury column in 1643.

Subsequently, the aneroid—or fluidless—barometer was developed. But while it offered a much higher degree of portability, there was also a corresponding sacrifice of accuracy.

In fact, not until the advent of the first sensitive altimeter—engineered by Kollsman—was the aneroid diaphragm recognized to be an extremely reliable gauge of pressure differential.

The pointer of the Kollsman 80,000-foot Sensitive Altimeter accurately indicates a change of fifty feet while the positive diaphragm movement is only one ten-thousandth of an inch.

This outstanding example of precision engineering and careful manufacturing technique typifies Kollsman leadership in the fields of aircraft instrumentation, optics and electro-mechanical controls.

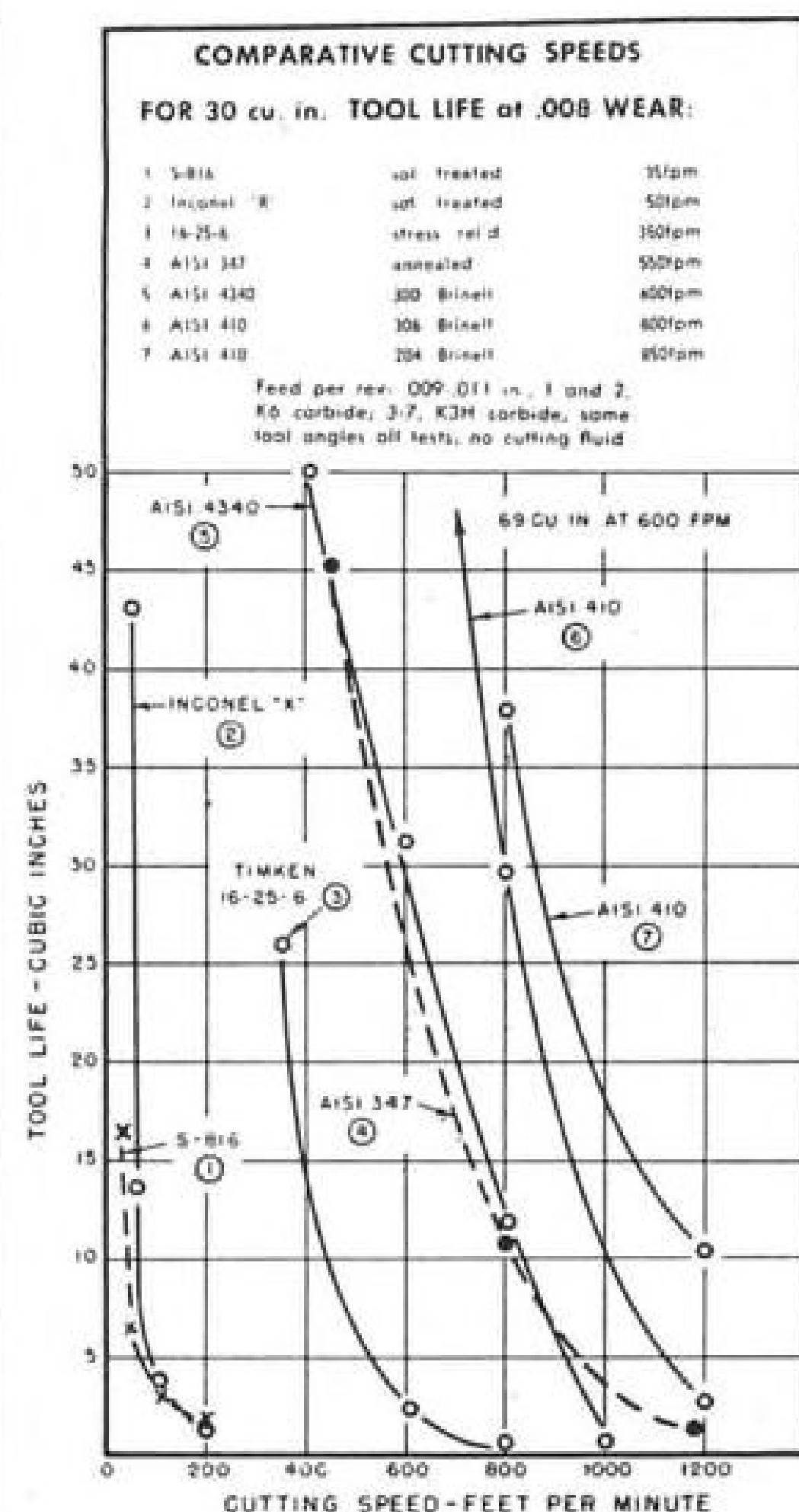
KOLLSMAN AIRCRAFT INSTRUMENTS

PRODUCT OF

SQUARE D COMPANY

ELMHURST, NEW YORK

GLENDALE, CALIFORNIA



strength and fractures under shock loads. Though extremely hard, carbides may erode or gall under high-pressure, high-speed contact of a frictional type. Comparison of strength is difficult. Breakage frequently is caused by improper tool design. In carbides the softest is the toughest and the hardest most brittle.

In the search for the best high temperature alloy cutting, the carbide favored least proved to be best.

► **Cast Iron Grade Best**—Cast iron-cutting grades prove superior to steel-cutting grades which had been recommended earlier but which afforded comparatively short tool life.

As expected, most variables in machining are found critical in alloys for aircraft gas turbines.

Turbine-bucket alloys proved to be the greatest machining problem. Cobalt-alloy nozzle blades are tougher but are precision-cast. The turbine rim is midway in machining difficulty between bucket materials and conventional stainless steels. Shroud rings and combustor parts are of stainless steel.

These alloys present a high shear strength to cutting tools and have a tendency toward rapid work hardening during cutting operations. Their structure becomes highly abrasive to conventional sintered-carbide tools.

Turbine-bucket alloys are so unlike other engineering materials that none of the present carbide cutting tools are entirely suitable. The bucket alloys have a tendency toward galling, seizure



NEW

BROMOCHLOROMETHANE LIQUID (C B) TYPE A-20 PRESSURIZED FIRE EXTINGUISHER

Type A-20 Fire Extinguishers are especially made for AIR FORCE use.

We take pride in being prepared to offer suppliers of AIR FORCE units this newest pressurized 1 quart fire extinguisher for the protection of military aircraft.

Fully illustrated literature is available to qualified purchasers upon request.




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SOLVES MANY REMOTE CONTROL PROBLEMS

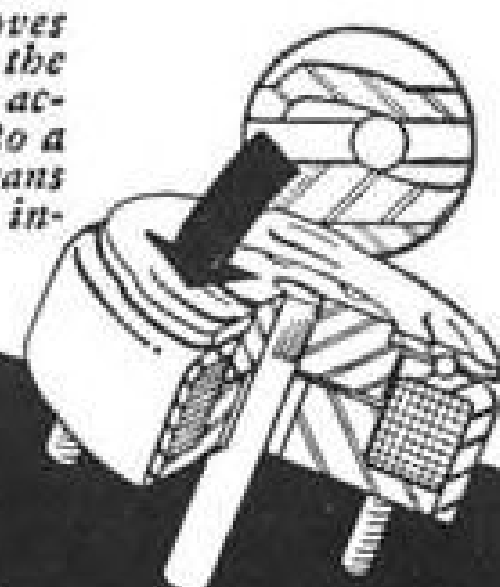
The many production applications of Ledex Rotary Solenoids vary from the dependable, snap-action tripping of airborne bomb releases to the actuation of rugged, hydraulic valves in heavy duty materials handling equipment.

Five Ledex Rotary Solenoid models are manufactured. Diameters range from 1 1/8 to 3 3/8 inches. Predetermined rotation up to 95° can be engineered to suit your product's requirements. Starting torques for 45° stroke range from 1/4 pound-inches to 50 pound-inches.

We supply to quantity users and solicit the opportunity to be of assistance in engineering a Ledex Rotary Solenoid to meet your product's requirements.

MODEL NO.	2	5	6	7	8
Diameter	1 1/8"	1 7/8"	2 1/4"	2 3/4"	3 3/8"
Torque lb./inches	1/4	5	10	25	50
Weight lbs.	1/8	1/2	1	2 1/4	4 1/4

Magnetic action moves the armature along the solenoid axis. This action is converted into a rotary motion by means of ball bearings on inclined races.



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and cratering of the tool. It is felt that a new, more balanced sintered-carbide tool should be developed for these special requirements.

► **Heat Treatment Helps**—An improved sequence of manufacturing operations should make it possible to do all the major machining on the work while it is in the solution heat-treated form—with a minimum of stock left for finish grinding.

The important turbine-bucket alloys, Inconel X and S-816, are machined best by utilizing solution heat treatment and the cast-iron grade of cutting tool. Feed per revolution should be between .008 and .014 in. Best cutting speed

for highest tool life is approximately 50 fpm. This is low for carbide machining on standard engineering, but much better than has been possible on these high-temperature alloys.

Tests were run on materials at elevated temperatures (up to 1600 deg. F.) but weakening of the carbides offset any possible gains.

► **Drill Studies**—The research program also included drilling studies on Tinken alloy 16-25-6, used on turbine discs. Information was obtained on drill life and the various factors which could be introduced to improve production. Drill metals and design are discussed.

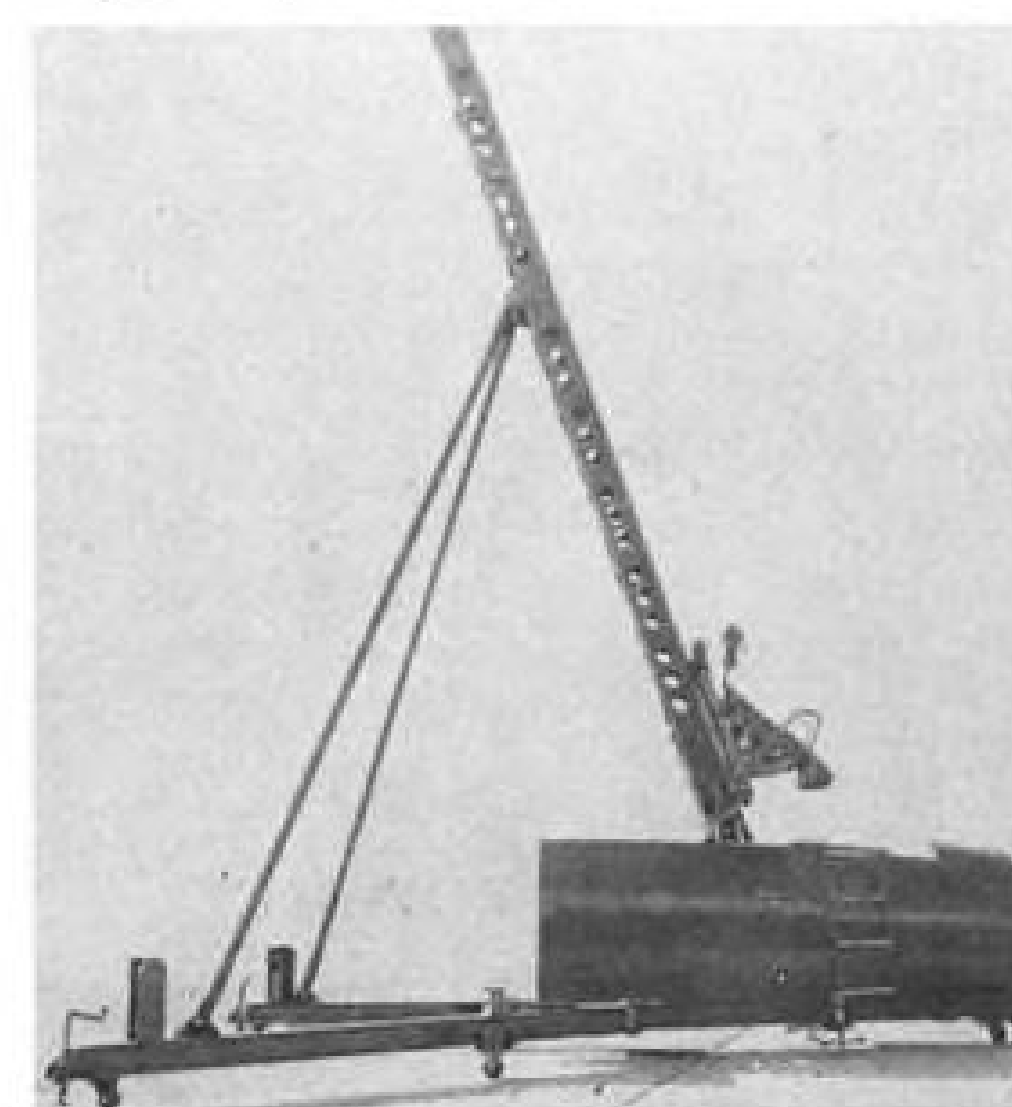
The book concludes with two chap-

ters on the microstructure and machinability of steel and cast iron.

Machinability research has gone a long way to put metal working on a truly scientific basis. It also points up the need for several specific carbides and improved machine tools in general.

These suggestions involve increased capital outlay in most cases but hold forth the bait of sharply increased production, lower unit costs and elimination of a serious bottleneck in the nation's defense schedule.

The full report is available from Curtiss-Wright Corp., Wood-Ridge, N. J., for \$2.40.



Navy Device Teaches Ejection Bailout

Keeping pace with the increasing need for training apparatus, the Navy Special Devices Center at Sands Point, New York, has developed equipment to familiarize the pilot with ejection-seat bailout procedure.

This ejection seat trainer now is being evaluated at the Naval Air Material Center at Philadelphia, Pa. It employs a catapult arrangement powered by a 37mm. cartridge and shoots the pilot-trainee and ejection seat 20 ft. up a tower at approximately 60-mph.

The setup is built around a reproduction of a Grumman F9F Panther cockpit and uses a Navy pilot seat.

► **Operation**—First action of the trainee is to pull a face curtain, forcing him to sit erect with his head in direct line with his spine. Pulling the curtain cocks the gun mechanism attached to the back of his seat.

The trainee's safety belt is provided with an electrical connector in a safety circuit. In series with the connector is the instructor's pushbutton. First push on the button disengages the safety device on the belt. Second push fires the mechanism and catapults the seat upward with a force of about 15G.

This top force lasts for only 1/100 sec., so that there is no danger of the pilot blacking out. For the rest of the



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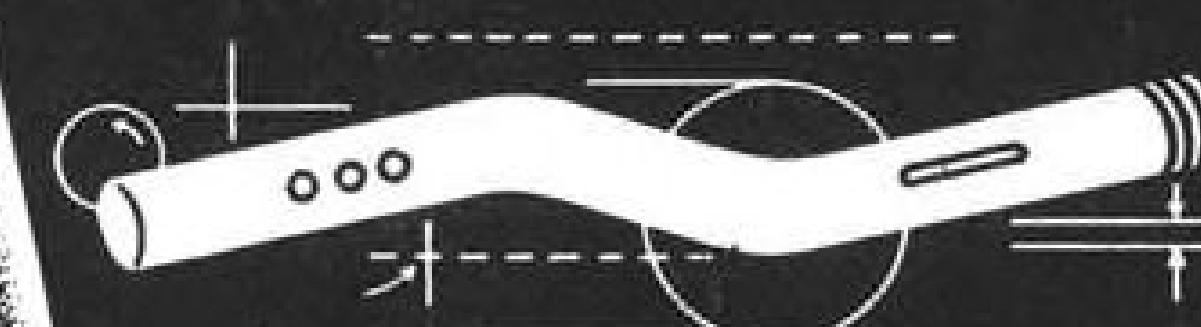
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trip he is slowed down gradually by gravity, air resistance and friction.

► **Controls**—The seat has a 2-ft. safety displacement under control of a spring-loaded friction brake. Two independent brakes slow the seat and stoppage is by hydraulic-pneumatic buffers.

The training rig also includes a panel of red lights tied in with procedure, each light going off automatically with the successive phases of the operation, allowing the instructor to be stationed about 20 ft. from the trainer and control check-out before releasing the seat. Another feature is use of soft rubber pads that actuate a bell if the trainee contacts them with improper body attitude.

Electric circuits fed by built-in automatically charged battery allow use of the rig outdoors as well as in a hangar.

The trainer was devised as a result of experiments with a 105-ft. steel tower originally developed at the Martin-Baker plant in England, but unlike this rig, can be folded quickly and transported on casters.

Optical Torquemeter

The measurement of jet engine compressor-turbine shaft torque calls for accuracies of ± 0.5 percent at shaft speeds as high as 17,000 rpm.

Researcher John J. Rebeske, Jr., at

NACA's Lewis Flight Propulsion Laboratory, Cleveland, has designed an optical torquemeter for gas turbine shafts. It has an indicating system which requires no physical connection to the shaft under test.

Dynamic tests of the torquemeter were made over a range of shaft speeds from 6,000 to 17,000 rpm. and torque loads from 200 to 5500 in. lb.

► **Accuracy Shown**—The tests showed that the optical type can be used at high rotative speeds with acceptable accuracy. Operational principles are simple and the collimator used is available commercially. Installation and static calibration are relatively simple.

But difficulty has been experienced in fabrication of mirrors to close tolerances, in addition to some minor mechanical problems. Also, it is difficult to take remote readings of the instrument. A 6-ft. periscope has been employed, but it was still necessary for personnel to get close to the rotating shaft under test—a proximity undesirable for safety reasons.

Effect of Ice on Prop Performance

There has been considerable disagreement concerning the percentage of performance loss attributable directly to icing of propeller blades. Generally the propeller has been blamed for a greater loss than it actually causes.

Long-term investigations by NACA's Ames Aeronautical Laboratory show that efficiency losses usually can be expected to be less than 10 percent. Maximum losses—encountered rarely—may be as high as 15 or 20 percent.

Losses frequently have been reported greater than 15 or 20 percent, as a result of reduction in airplane performance. But NACA feels that most of these have been the result of ice build-up on other portions of the aircraft.

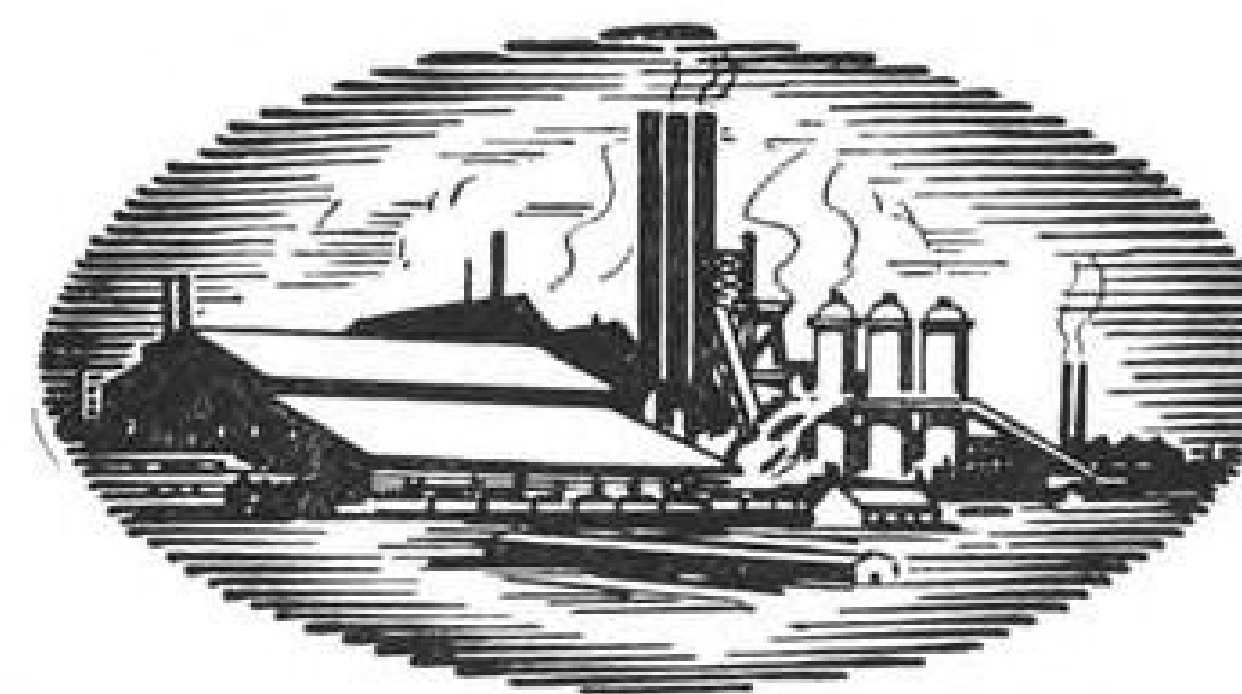
These investigations were carried out during the winters of 1946-47 and 1947-48. Data recorded were obtained by flights over most of the U. S.

The aircraft employed was a Curtiss C-46 type. Thermal anti-icing equipment was provided for wing and tail surfaces and the windshield. Electrically heated blades were used on the propeller of the left engine.

The right engine and propeller were used for purposes of icing research.

Carr B. Neel, Jr., and Loren G. Bright of NACA, in Tech. Note 2212, present the results obtained and also include an analysis to establish the magnitude of efficiency losses to be expected under natural icing conditions.

The tests also showed that the amount of blade efficiency loss can be influenced by the pilot in adjusting engine and propeller controls.



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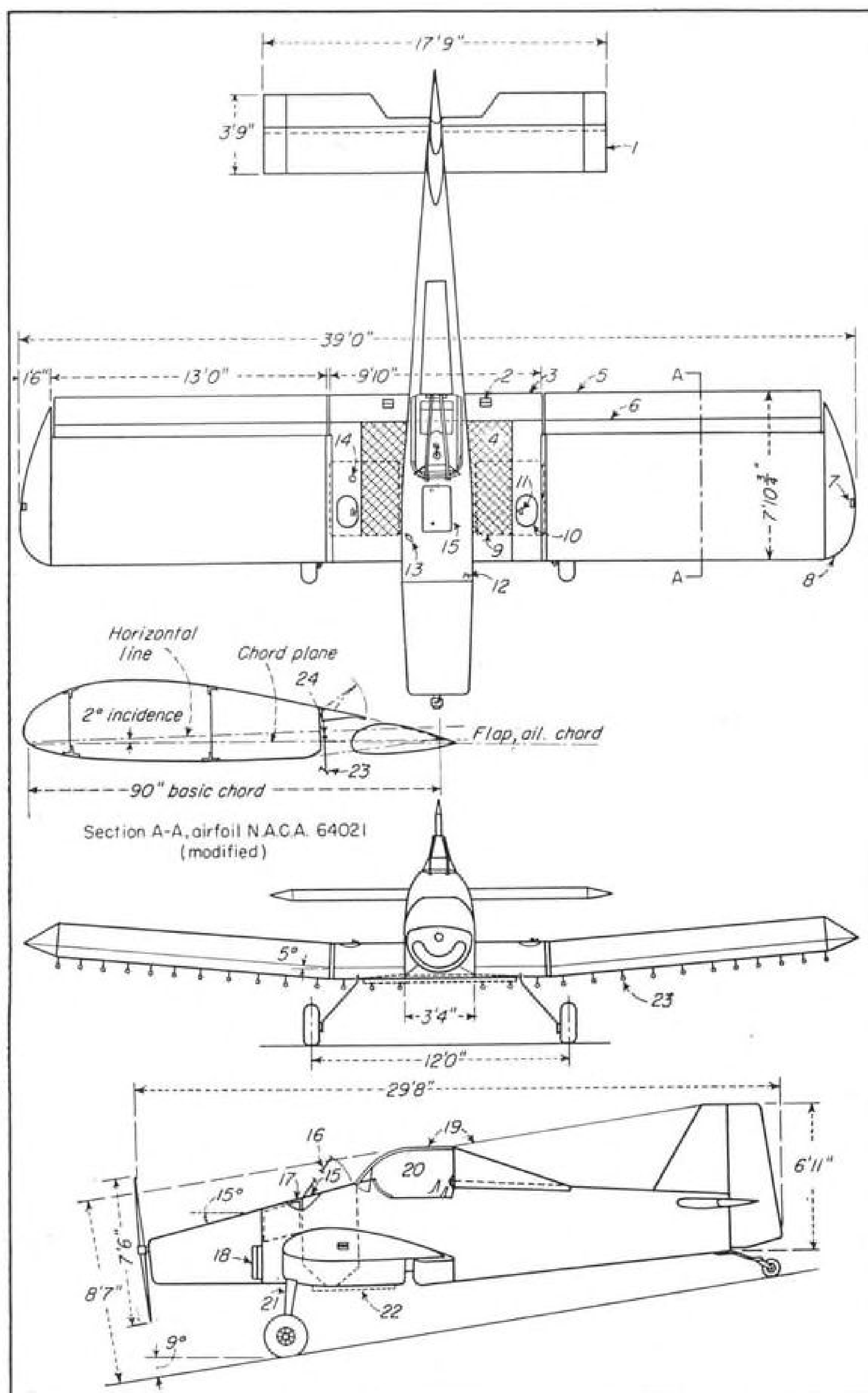
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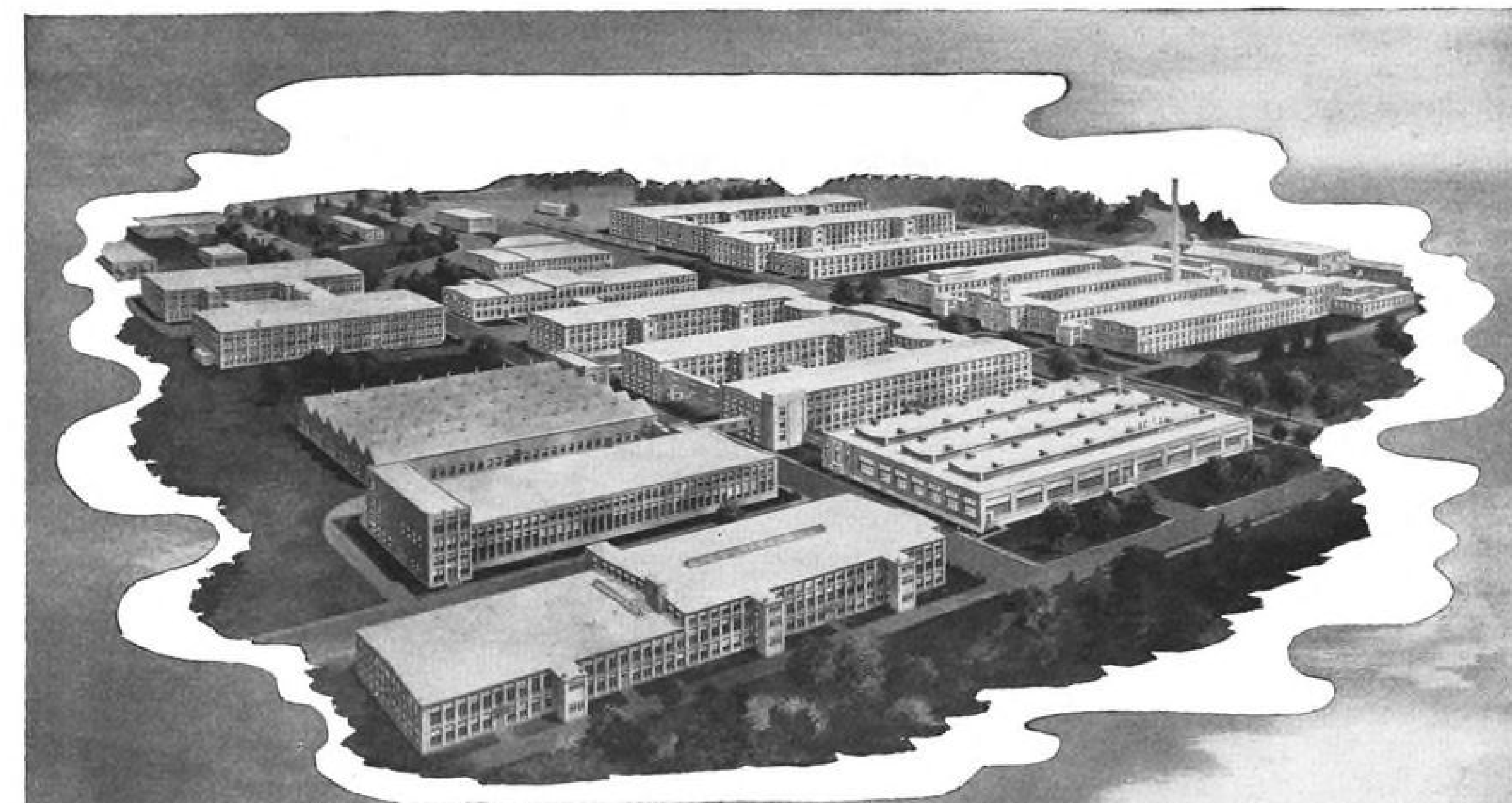
The first flight, on Dec. 1, of the experimental agricultural plane Ag-1, marked the successful debut of this designed-for-the-job sprayer, duster, fertilizer and seeder—developed and constructed in the fast time of one year at the Personal Aircraft Research Center of the Agricultural and Mechanical College of Texas.

A comprehensive analysis of the plane appeared in the Oct. 9 issue of AVIATION WEEK.

C. W. Von Rosenberg was at the controls on the plane's first flight, taking off in a 30-mph. wind. Two takeoffs were made, each described as being very short, and made without flaps. According to observers, "handling in the air was satisfactory, but no extremes were used."

The accompanying photo, taken soon after the prototype was rolled out of the hangar, shows the external stiffening extending from the firewall to the rear of the cockpit, the excellent visibility down the 15-deg. nose, substantial overturn structure, thick wing to provide spray tank storage and high lift, simple tip fairing, and wide tread.

Latest details of the aircraft, along with conventional items, are specified on the three-view: 1, Removable stabilizer tips; 2, step; 3, flap; 4, walkway; 5, aileron; 6, slot lip; 7, hand-hold and mooring point; 8, removable wing tips; 9, bladder cell spray tanks; 10, filler and access door; 11, air vent; 12, fuel gage; 13, gasoline filler cap; 14, spray tank gage; 15, dust hopper; 16, hopper door (open); 17, fuel tank; 18, cooling air outlet; 19, wire deflectors; 20, open cockpit; 21, sharp edge landing gear; 22, dust spreader (proposed); 23, spray nozzle; and 24, spray manifold.



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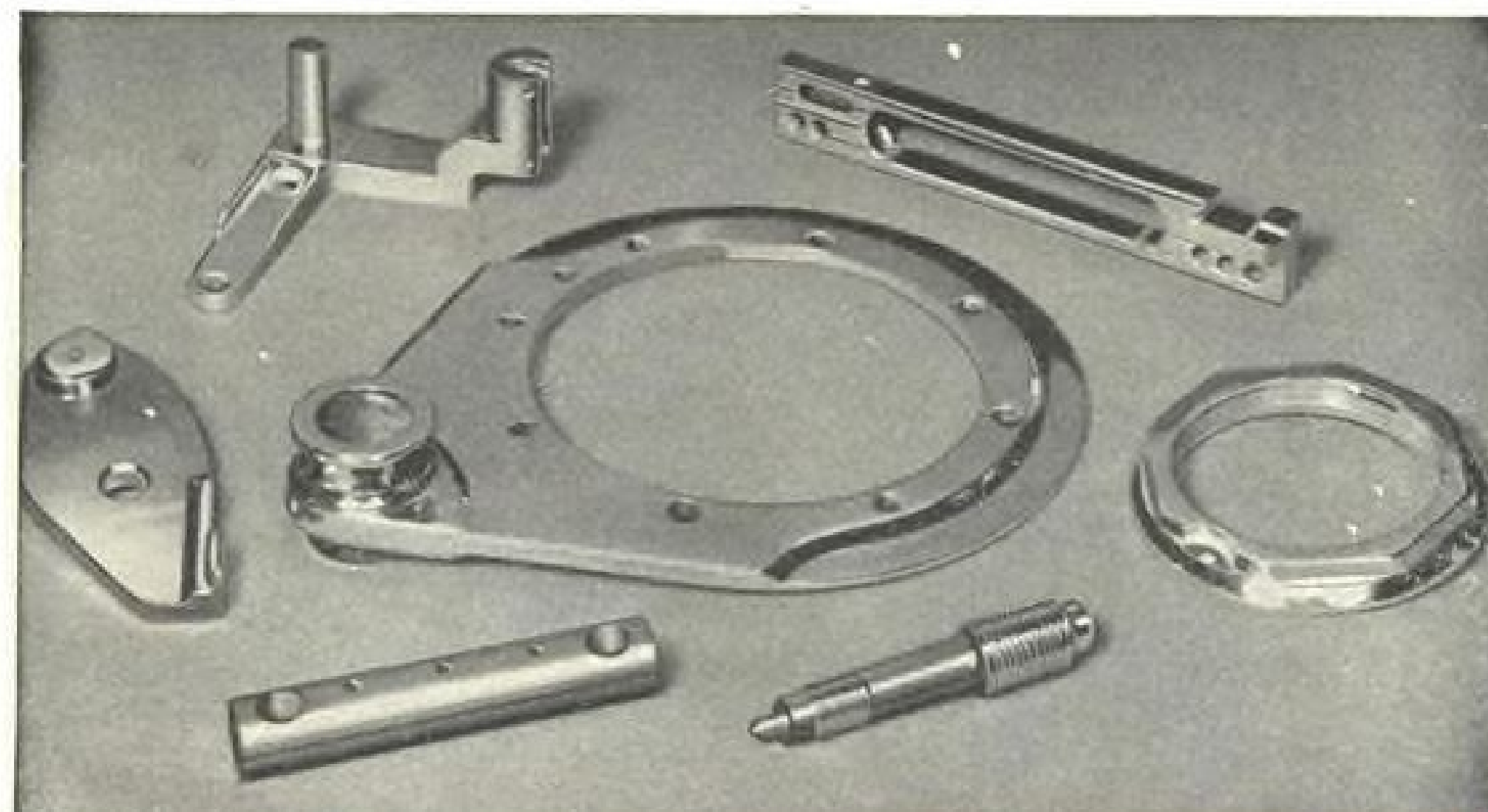
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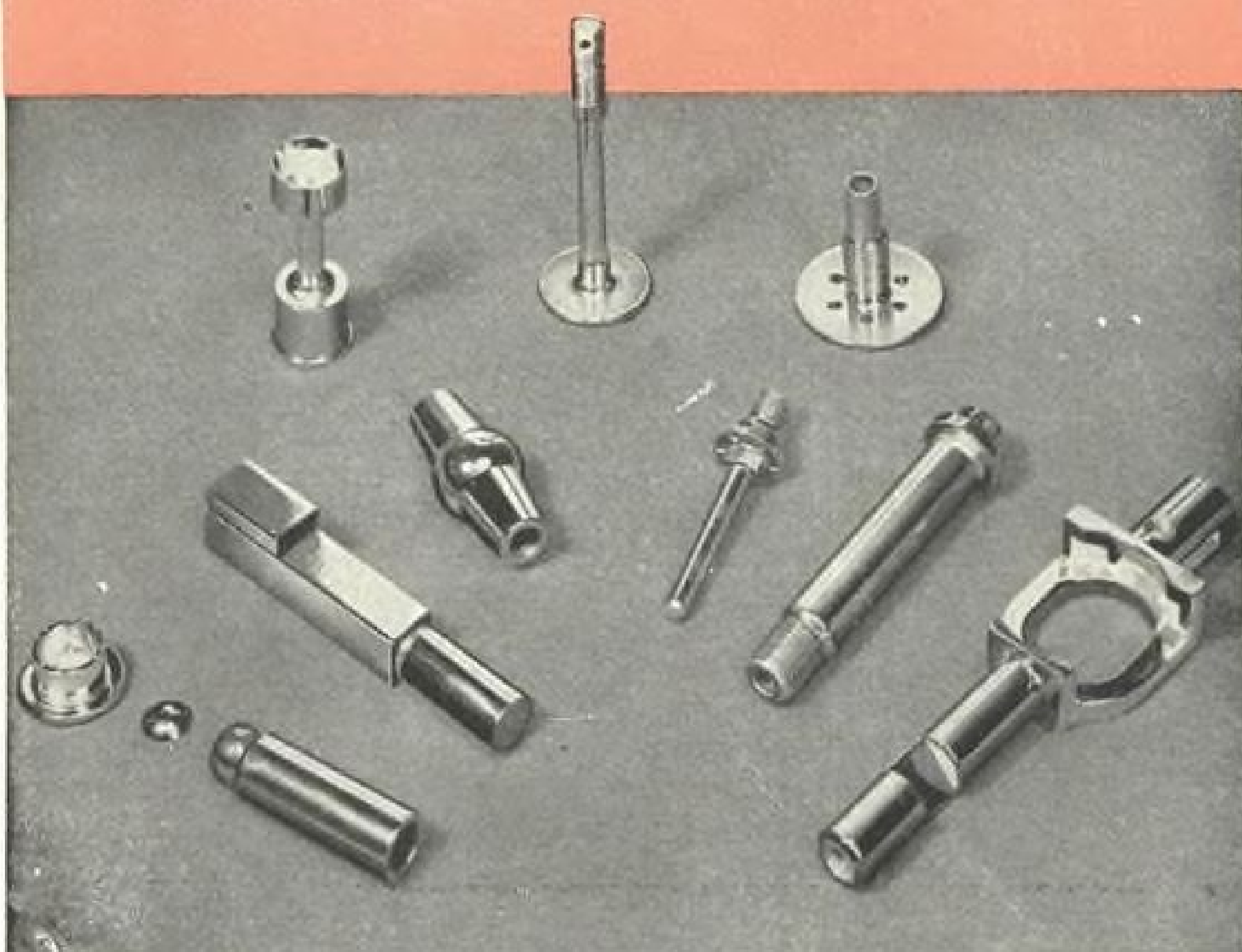




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Rocket Air Tests

Results of engine test experience with X-1 reviewed for ASME.

Since December, 1946, the United States Air Force X-1 aircraft have made many rocket-powered flights while using the same engine on all successive flights.

The basic elements of flight-testing the X-1 rocket engines have been summarized in a paper by Richard F. Gompertz, Power Plant Branch, Edwards AFB.

Entitled, "Rocket Engine Flight Testing," the paper was presented to the operations session of the American Rocket Society's fifth annual convention, held in conjunction with the recent annual meeting of the American Society of Mechanical Engineers.

► **Orphan Child**—Rocket engine evaluation has had to take a back seat in the X-1 flight test program because of the interest centering around the aerodynamic performance of the airplane. This orphaned status has meant that actual in-flight data pertaining directly and only to the engine have been very hard to come by.

Because of this, general practice is to accept the figures for thrust, fuel consumption and other parameters as the manufacturer specified them.

But some useful information does occasionally get past the aerodynamicists and to the power plant people. Photopanel records, telemetering and the pilot's comments aid in piecing together the bits of data.

It follows, then, that because of the inability of the rocket engineer to get what he considers adequate flight data, the engine performance must be guaranteed by much careful testing and checking.

► **Preflight Procedure**—Actual preflight checks vary somewhat, depending on the results of the previous flight. But in all cases, a complete pressure check is made by filling the propellant tanks with nitrogen and operating all valves and pressure switches from the cockpit. It takes a lot of experience to conduct this phase, because observation of the engine components in the airplane is difficult due to small number and sizes of access doors. All leaks are traced carefully to their origin.

Igniter firing tests come next in the preflight. Special test devices have been developed to inject a small amount of propellants into the engine during ignition test. Actual ignition is observed visually and aurally from fifty feet or so away; the shape, color and sound of the flame are checked.

Electrical systems are checked by the flight crew. The multitude of flight instrumentation means that this phase of the preflight is carried on almost until the plane is cleared for flight.

Visual inspection of lines and components continues during other checks and right up through propellant servicing.

► **Loading Order**—Nitrogen is pumped in first. The X-1 uses the gas to pressurize the propellant tanks and to operate all pressure-controlled valves. In addition, the nitrogen provides a constant bleed through the propellant valves and combustion chambers to avoid or neutralize any internal leaks which may develop.

The nitrogen is stored at the flight test base in liquid form, and for loading is passed through a converter and transformed into high pressure gas. The gas is then expanded into the high pressure storage system of the plane.

Soon after pressure is available in the nitrogen system, the water-alcohol fuel is pumped into the tanks, using conventional methods. Having pressure up expedites this tanking, because various valves and safety features are operable only when pressurized.

Liquid oxygen tanking comes last, scheduled to be completed just before takeoff time to minimize evaporation losses.

Throughout propellant servicing, the nitrogen supply line is left connected to the source to replace continuously the nitrogen which is lost through the bleed system.

Lastly, the airplane crew checks the filler caps and the operation of the liquid oxygen tank vent valve.

► **Pre-Drop Procedure**—After all tanks are loaded, the mother aircraft and attached X-1 are ready for takeoff.

An auxiliary source of nitrogen in the mother ship is connected to the X-1 storage system and continually "tops" the ground-loaded nitrogen tanks. Just before reaching drop altitude, the service crew aboard the mother plane disconnects this line.

At drop altitude, the pilot pressurizes the propellants, fuel tank first, then oxidizer.

The propellant system is bled of all trapped gases and vapors so that liquid—rather than gaseous—oxygen will flow into the combustion chamber. This operation is completed 30 to 60 seconds prior to drop.

Once the rocket plane is on its own, the engines generally require some pressure regulator changes to increase tank pressure while the propellants are being expelled. The pilot monitors the tank pressure gages, holding the fuel tank level from 10 to 15 psig. above the pressure in the oxygen tank.

This results in a slightly fuel-rich mixture at the engine, but such a mixture

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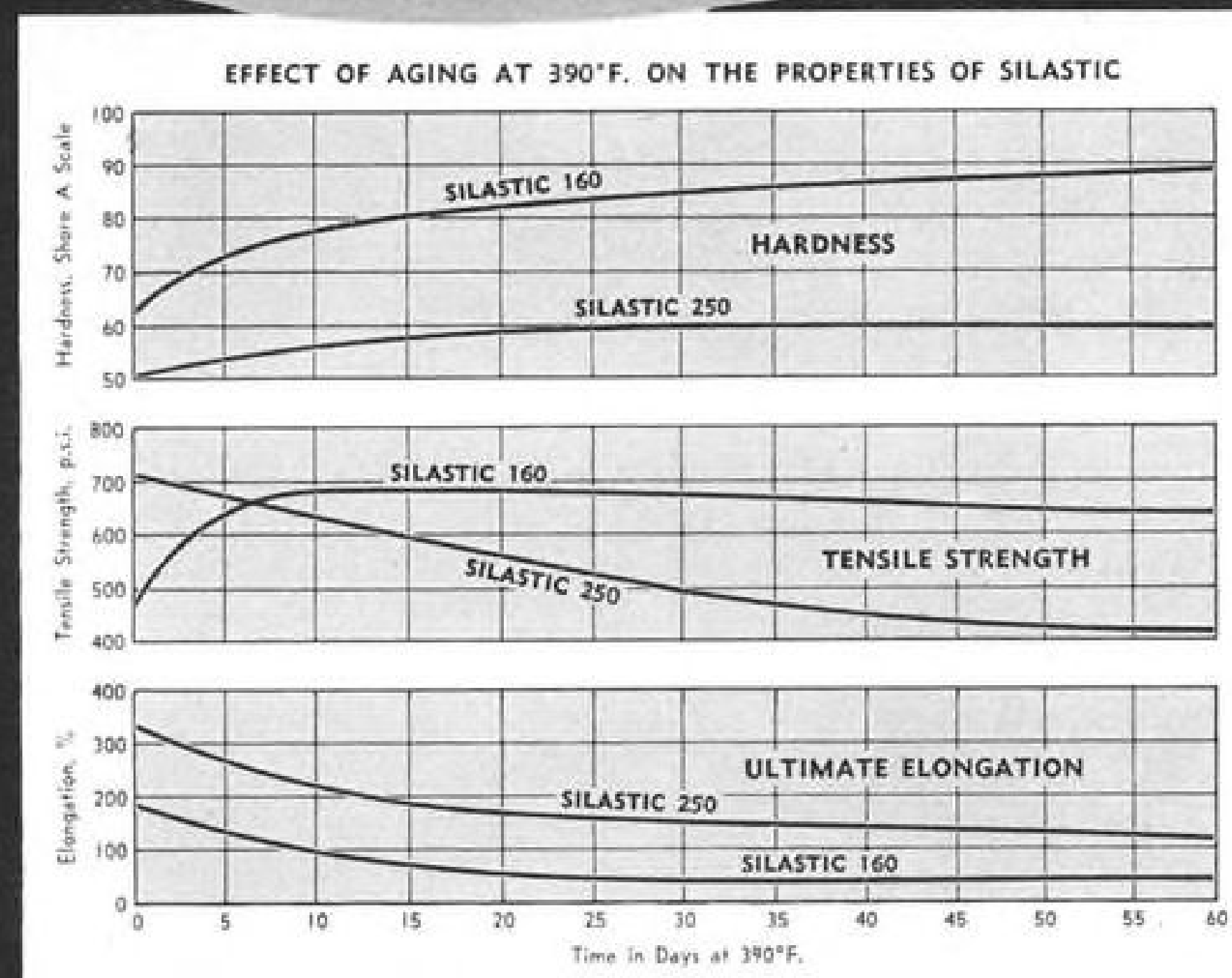
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ratio increases combustion chamber life and avoids hard starts and hard shutdowns at only a slight decrease in specific impulse (reciprocal of specific fuel consumption).

► **Shutdown**—If the shutdown of the engine is intentional or activated by the emergency shutdown system, an air restart can be accomplished by the pilot. Only one cylinder is started or shut down at a time to keep hydraulic surge and hammer to a minimum.

Generally, the engine is shut down before propellant exhaustion. After cutoff, the pilot jettisons the remainder of the propellants, one at a time to decrease the chance of external ignition. Both tanks are then vented, but no purging is attempted at this time because the purging agent—nitrogen—is expelled through the vent valves.

At the end of powered flight, the X-1 glides to its landing and waits for a specially equipped jeep to come and get it. It is towed back to the servicing area to complete the last phase of the purging operation.

After the tank and line purging, the engines are thoroughly dried and cleaned internally. All the water-alcohol mix is removed from the system to reduce corrosive action. All visible parts are inspected and the cylinders are checked for bulges or burnouts. Where pressure operated accessories have been reported to malfunction in flight, a pressure check similar to the one for preflight is conducted.

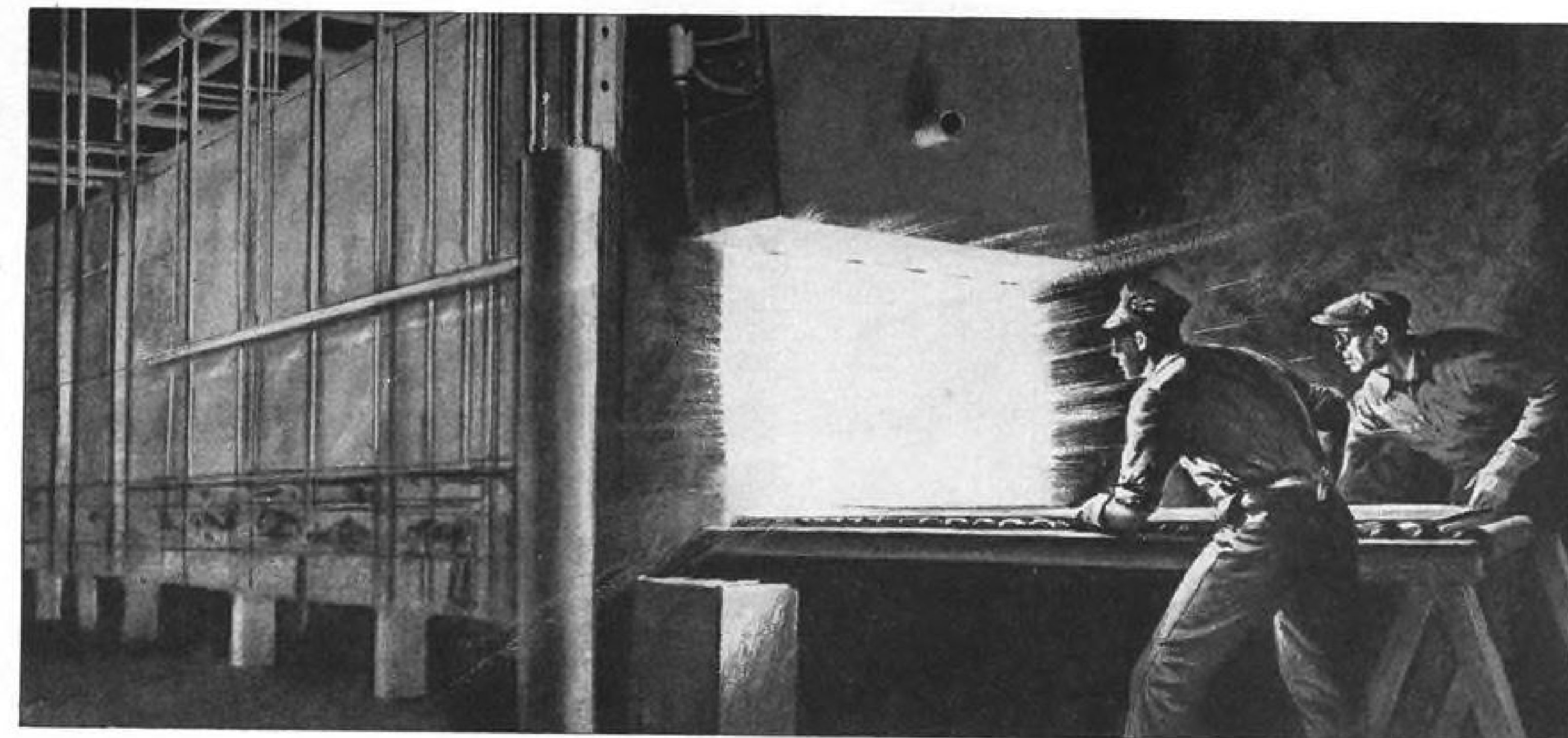
► **No Accidents**—This month is the fourth anniversary of the first rocket-powered flight in the Bell X-1 (AVIATION WEEK, Dec. 22, 1947). The intervening years have seen an intensive flight test program carried out on the airplane and engine.

It is high tribute to the pilots, maintenance personnel, Reaction Motors, Inc., and Bell Aircraft Co. that in these four years there have been no serious accidents. And this is with a fuel system with an explosive potential about equal to that of its own weight in TNT.

Plastic Takes Shocks

Outstanding shock resistance is accredited to a new plastic developed by the Chemicals division of General Electric's Chemical department at Pittsfield, Mass. Special impact tests, utilizing the repeated drop-ball method, were employed to get an accurate indication of the resilience of the new rubber-phenolic compounds.

Wyman Goss, engineer of phenolic products for the Chemicals division, stated that when subjected to these drop tests the GE rubber-phenolic compounds showed shock resistance five to ten times that of conventional phenolic molding powders.



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GROUP III—Low Nickel—High Chromium—Large ton-nages of low nickel—high chromium alloys are used in

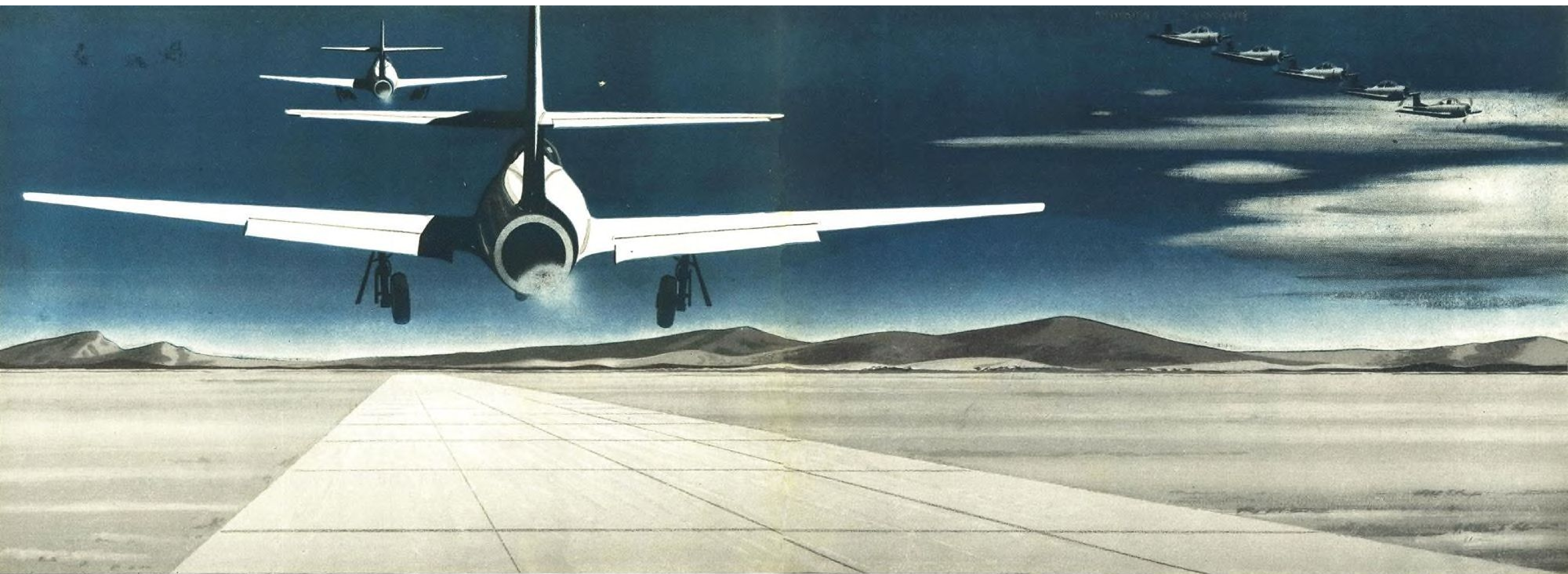
the heat treating and furnace field. These castings are lower in cost than those of the first two groups. They provide somewhat less resistance to carburization and nitriding than do the higher nickel types.

GROUP IV—Very Low Nickel—High Chromium—Very low nickel—high chromium irons find their chief applications in high sulfur atmospheres and for elevated temperature service when high creep strength is not an important factor.



Because of unusually heavy industrial and defense demand, rationing of nickel has been in force since July 1st. However, we believe that dissemination of technical data and service experience can help to promote the intelligent utilization of critical materials, so essential in these times. We shall, therefore, continue to issue information on new developments and user experience with nickel-containing materials.

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► **More Power for Fighter, Bomber, Carrier, Airliner —** From this international relationship . . . which not only covers

specific engines but pools research, engineering and manufacturing teams . . . will come higher-performance power plants for every type of aircraft from supersonic interceptor planes to vibration-free luxury airliners . . . aircraft whose records will inspire many of the future's great headlines.

► There is nothing speculative about these new engines. All have passed their 150-hour type tests . . . flown successfully . . . helped raise performance ceilings for current aircraft.

Wright Aeronautical, in short, is now fully prepared to maintain and enhance its 30-year leadership in air power progress.

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Aeronautical Corporation, Wood-Ridge, N. J.

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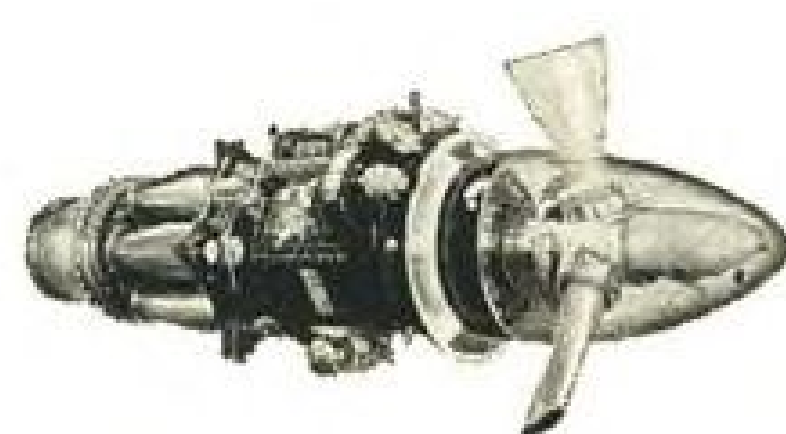
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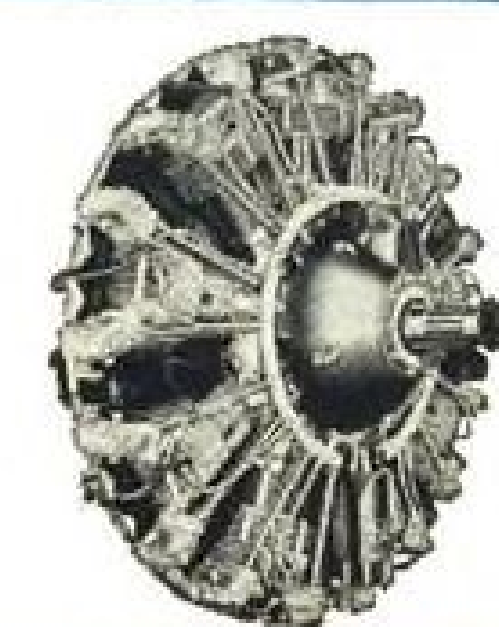
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New electronic computer can solve problems of entire defense system.

By David A. Anderton

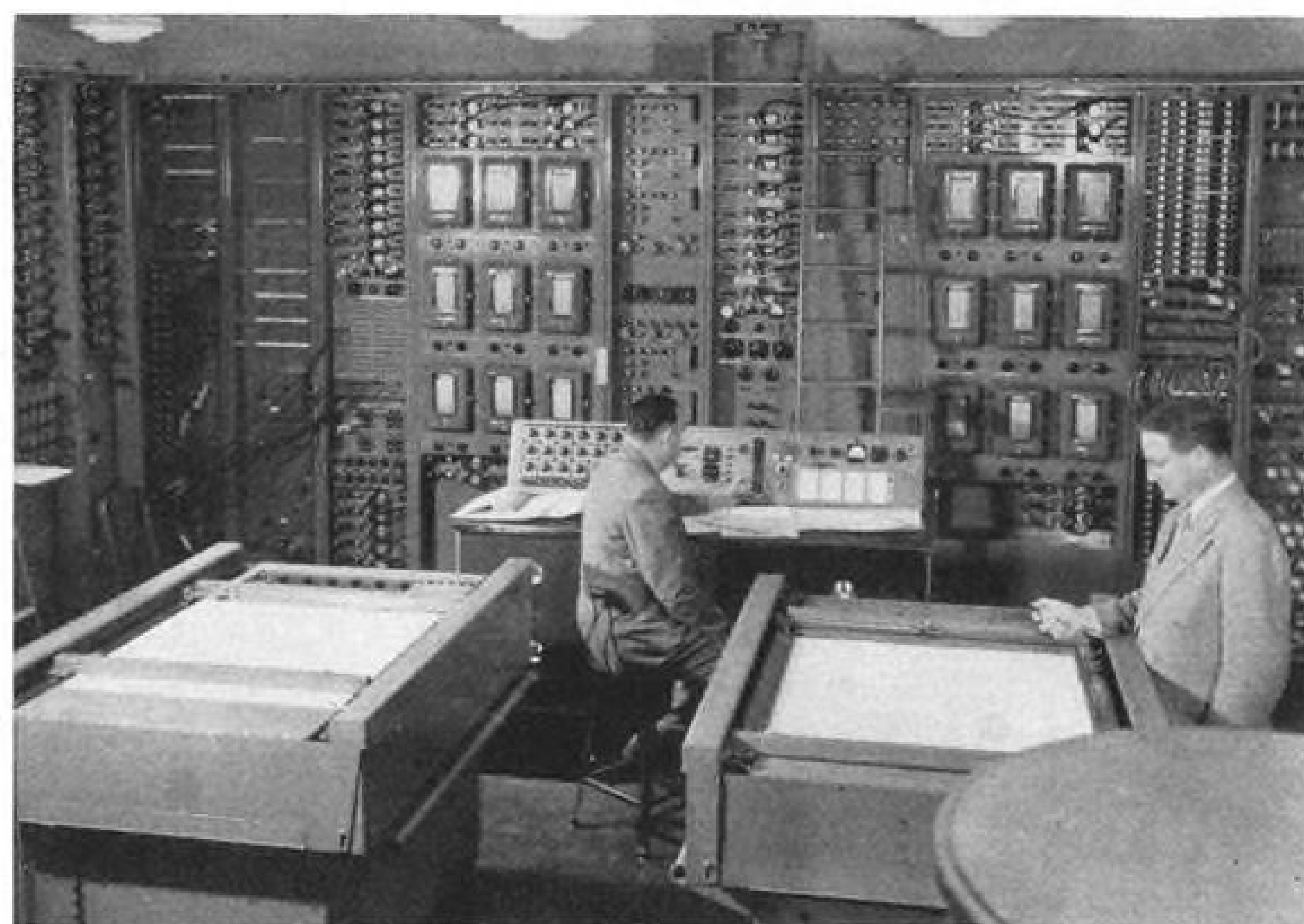
Princeton, N. J.—You walk into a room about 20 ft. square, dimly lit and noisy with the operation of air conditioners. Straight ahead, a gaily painted missile model under a spotlighted plastic dome catches your eye. Beyond the model are two large plotting boards, their glassy surfaces lit from below, and further still, a control desk. Then you notice the banks on banks of electronic circuitry closing you in on three sides, towering over your head. And only last do you see a glass enclosed cube of space containing two phosphorescent spheres.

This is Project Typhoon, an electronic computer, demonstrated here publicly for the first time on Nov. 21.

► **Joint Program**—Typhoon—result of a joint program between the Special Devices Center of the Office of Naval Research and the Radio Corporation of America—is a design aid. It is intended, as are other computers, to replace thousands of man-hours of tedious calculations. It is not an electronic brain, because brain implies original thought. It does not design missiles, but helps their designers. It does not test small models of missiles, either. If you want a homely analogy, it's a very expensive slide rule.

But it can do things no slide rule ever could, and at thousands of times the rate of the fastest slipstick operator. ► **Versatility**—Typhoon's capabilities are almost unlimited; in its current form, it can compute the motions of any projectile through any medium—and that means rockets in the ionosphere or submarines through water.

A simple demonstration problem was solved by the computer: the interception of a high-speed bomber flying straight in toward a target and at an altitude of 25,000 ft. by a supersonic anti-aircraft missile. It was the simplest of interceptions—the missile was fired from well ahead of the aircraft and climbed toward it. Guidance of missile toward target was by beam-riding, which meant that the missile was always heading toward the target. Resultant course was a curve in the vertical plane which had a decreasing radius of turn as the



TYPHOON plotting boards, control desk and recording section of computer banks.

missile approached the target aircraft.

Presentation of the courses of missile and target was made on the two-dimensional plotting boards, one handling the course projection on a vertical plane in space, the other handling the horizontal projection. Path traces were made by colored styluses, red for the bomber and green for the missile.

During the plotting, the missile model simulated the attitude of its life-sized counterpart, changing its control surface deflections and heading as the computer elements calculated them.

► **Space Plotter**—But most spectacular and stimulating was the three-dimensional plotter, the glass-enclosed space cube.



MODEL missile simulates flight attitudes.

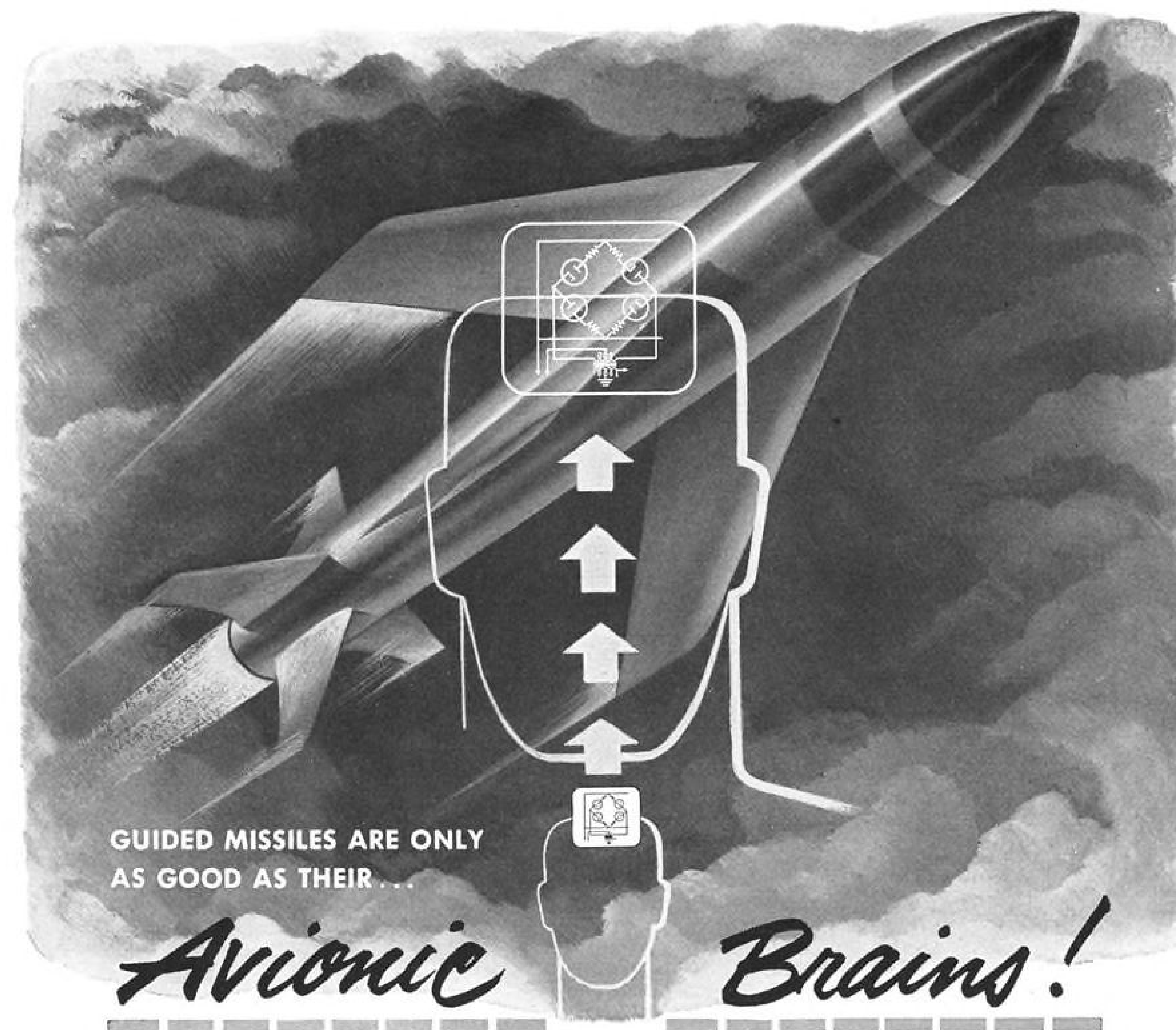
This device, the first known use of a three-dimensional plotting technique, resembles an oversized telephone booth. It's about 4 ft. square and perhaps a little short of 8 ft. high. In the sides at eye level are square sheets of glass for observation. The interior is painted flat black, and illuminated by ultra-violet lights.

Two tiny spheres, coated with some fluorescent paint, represent the missile and the bomber. And as the more prosaic plotting boards trace the paths of target and missile in two dimensions, the spheres move through space to their ultimate collision.

Such a demonstration adds nothing to the computer. It is not relevant to the final solution of the problem. But it presents the lay spectator with a bird's-eye view of the conflict in an unforgettable and impressive way. And it is good stage management.

The demonstration problem was repeated, and then altered slightly. The oncoming bomber was permitted to take gentle evasive action—a diving turn—and the missile altered its course to take into account this new variable.

► **Solution Satisfactory**—What did this prove? Well, it proved that the design of the hypothetical missile was suitable for the beam-riding type of guidance and that it had enough power and a low enough wing loading to be able to turn at an ever-increasing G. If, for instance, the designer had chosen his



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the missile's body—are Fairchild designed and Fairchild manufactured.

To prove the ruggedness and reliability each missile is subjected to G loads never before asked of electronic equipment, while test apparatus shows how the "bird" stays locked on the target. Flight tests confirm this amazing accuracy and ruggedness.

Here is another example of Fairchild research and development, at work for the Armed Services.

Far ahead in the field, Fairchild Guided Missiles are an example of the achievement possible when top-flight aerodynamicists and ingenious electronic engineers tackle closely interrelated problems as a single, united team.

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wing loading too high, the missile would never have intercepted the target—and the place to find that out is on a plotting board and not over a city.

This problem is among the simplest any computer could be asked to do, and has been handled in the past by human calculators using a step-by-step integration, well larded with assumptions.

But the computer solved the problem in one minute, and humans would require upwards of 1900 man-hours.

And when the problem gets even more complex, and additional variables in the form of active guidance systems, varying aerodynamic coefficients and deteriorating motor performance are cranked into the input data the computer really becomes worth its high keep.

► **Time and Money**—Three years and about \$1.4 million were spent from initiation of the project to its current status. Those figures include all research and development engineering and actual construction.

Typhoon's heart is a hybrid electronic multiplier which combines analog and digital computing techniques into a more complex form. This way, Typhoon has accuracy and flexibility unobtainable by either type of computer alone.

Basic purposes behind the Navy-RCA program were:

- Development of a rapid, precise, automatic computer for simulating missile flight for studying and evaluating missile performance, present and future.
- Development of simple, fast, precise computing elements for application to missile simulators, guidance and control systems.

Typhoon is the latest computer in a decade of development in that field by RCA, starting with a fire control director and progressing through a guided missile system computer of a simpler type.

RCA expects Typhoon to save millions of dollars in guided missile design and in problems connected with the air defense of our cities, and says that Typhoon can handle simulated problems of a complete guided missile system which other computers are either too small or too inaccurate to handle.

ENGINEERING FORUM

Seaplane Records

In connection with your article on high-speed seaplanes, it is interesting to note that Lt. Agello's speed of 440 mph. was about 44 percent higher than the existing landplane speed record, and that it was more than four years later before the landplane speed record topped 440 mph.

If your writer had gone back a little farther in your files of AVIATION he would have found that other seaplanes had broken the 400-mph. mark. On Sept. 29, 1931, Flt. Lt. G. H. Stainforth went 408.8 mph. in a Supermarine S-6B, and on Apr. 10, 1933, Warrant Officer Agello hit 423.7. More recently, wasn't the Saunders-Roe SR/A1 jet fighter flying boat supposed to be in the 500-mph. class?

Probably the greatest previous impetus to high-speed seaplanes, and the major reason that world record seaplane speeds were higher than landplane speeds from 1927 to 1939, was the Schneider Trophy—an international contest for high-speed seaplanes. According to R. J. Mitchell, the British Schneider Trophy entries were direct predecessors of the Supermarine Spitfire, without which the world might well have been of a different hue today.

DOUGLAS A. KING
Aeronautical Research Scientist
Hydrodynamics Division
Langley Aeronautical Lab
NACA
606 Chapel St.
Hampton, Va.

Slant on Turboprops For Large Planes

It seemed in order to check in and to write of the enthusiasm that your good magazine engenders in this facet of the aviation industry. Everyone here seems to wait for the new issues with the same impatience that I feel. Mine is a little worse because I haven't yet advised the circulation department of my change of address . . .

I would like very much to put in a good word for the very lucid analyses of Selig Altschul. It seems to me that his is a field that is all too often neglected by aviation publications and it is consequently misunderstood by most of the community. More power to him!

The issues seem to be growing in stature each week and it is a constant source of wonder how you manage to get out such an absorbing journal and still meet the inexorable deadline.

In an issue a few weeks back—the one where the P&W turboprop power-plant was unveiled—and more recently in discussing the Wright acquisition of British design rights, it seemed that the technical boys overlooked a rather intriguing aspect of the turboprop picture. Namely the argument of twin versus single installations in a certain horsepower range. They seemed overimpressed by the simplicity and lightness of the Pratt and Whitney configuration—as opposed to the twin Allison layout, and underimpressed by the commercial possibilities of the Twin Mamba.

Fundamentally, the problem with turbine powerplants is still fuel consumption. Admittedly, the P&W-published figure of under .70 specific is cheering. Certainly the R-4360 is over .88 at high powers and suffers in comparison. What everyone carefully avoids, including your people, is any mention of the fact that while turboprops do

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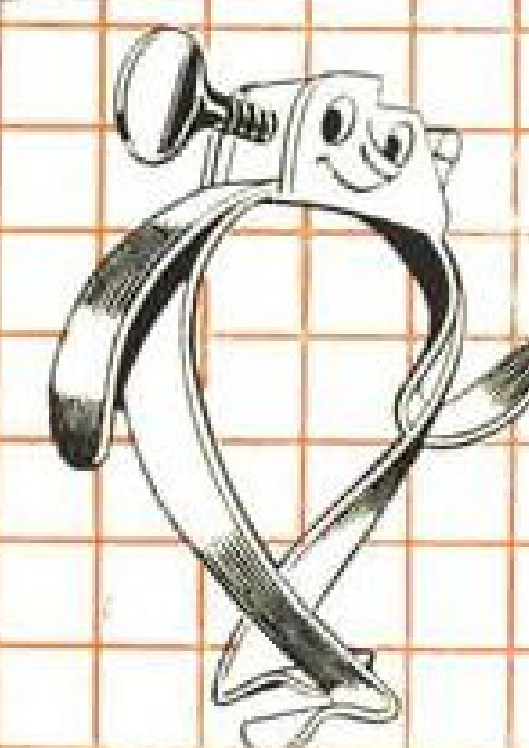
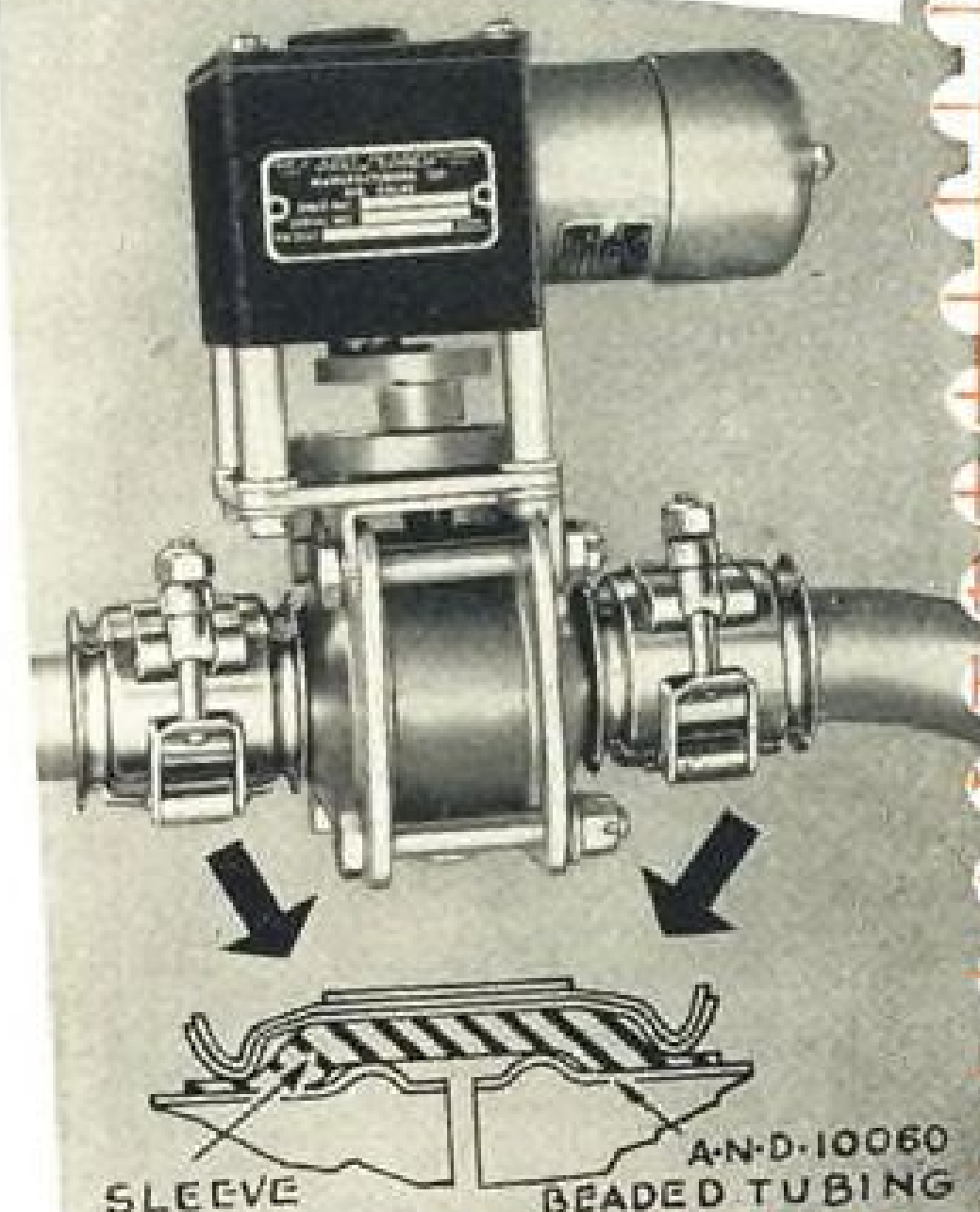
Photo courtesy Airesearch.

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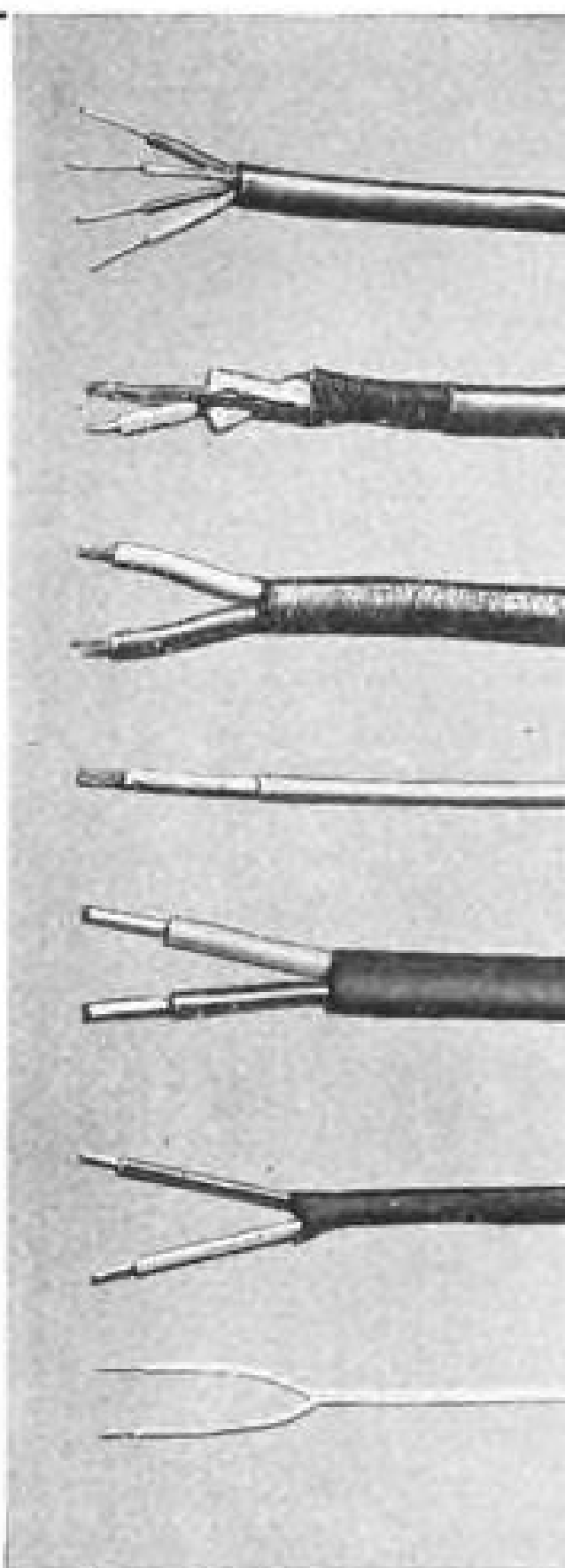
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achieve very fine specifics at or near maximum power they still do not lend themselves to throttling as do piston engines. The compound R-4360 probably achieves .36 at 60 percent of rated power, but if you reduce power substantially on a turbo-prop your specific starts climbing very rapidly—to the extent that holdings at a terminal or low power cruise—such as search and anti-sub missions—are very difficult to plan.

Actually, the P&W powerplant would seem most useful in a four-engine layout of a type similar to the C-124. In such a ship the pilot in command could undoubtedly be trained to feather one powerplant in order to increase his time in the air. This, together with some throttling of the remaining three engines, would be a substantial improvement. I actually think, though that the throttled engines would chase their specifics up so fast that the reduced horsepower would still result in almost the same consumption. Three-engine operation is not too difficult to sell—actually the early Connies would, under some very low power conditions, do better on three engines but I never knew a captain to embrace the theory. Admittedly, the Pacusan Dreamboat was deliberately flown on three engines but the selling problem is much different in such instances.

The chief charm of twin configurations is not their twin-engine reliability aspects, but the possibilities they offer in fuel savings at reduced powers. Where one unit is shut down and the other half run at efficient powers. The nacelle is kept warm and the propeller mechanism is operating and warm also, a not inconsiderable item in high altitude operation or cold weather. Accessories are not subject to such extremes of temperature as would be the case in the complete shutdown of a nacelle.

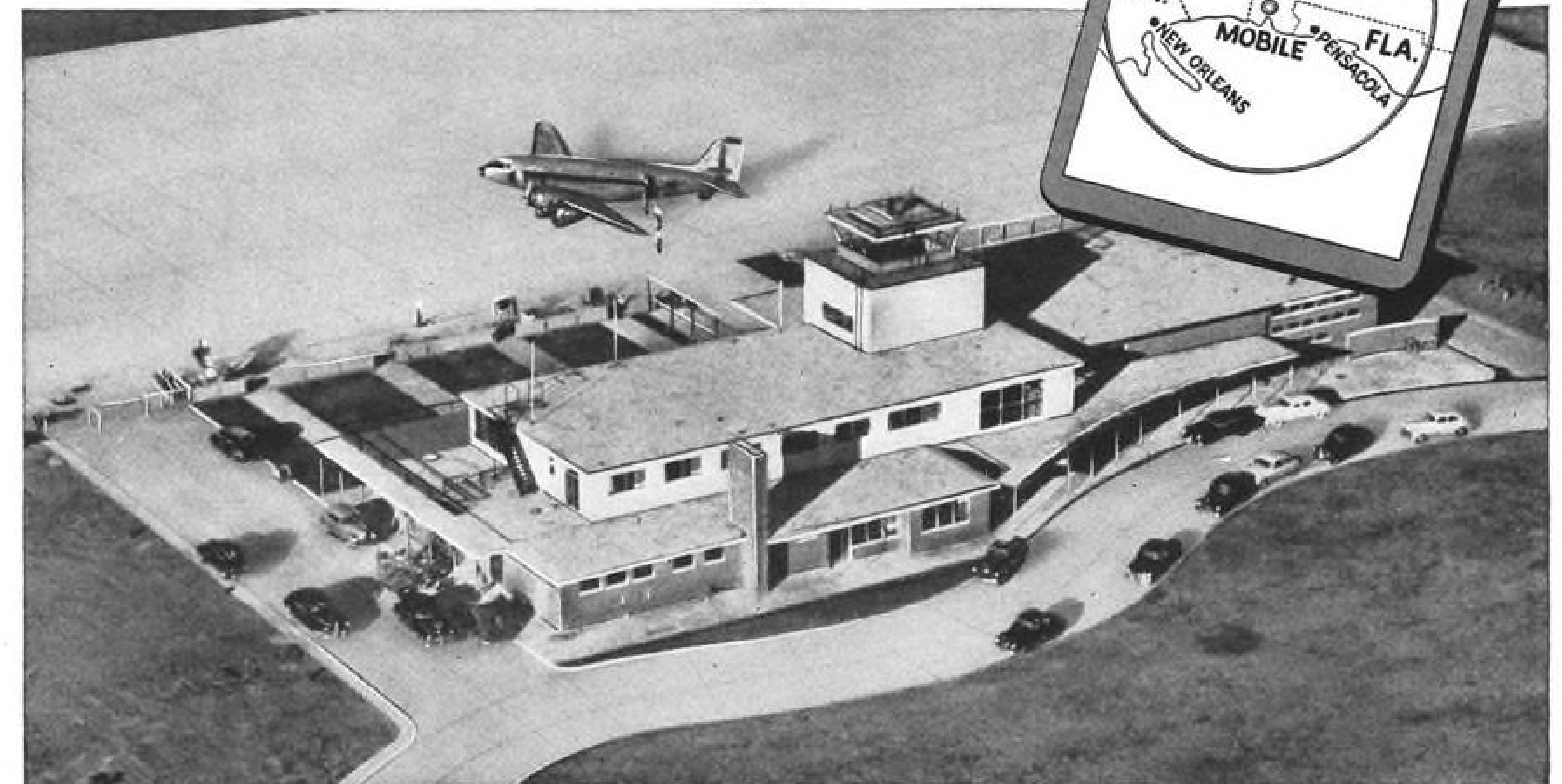
On this basis, and I believe a little conversational research will support my thesis, the twin units fit our near future outlook quite well. If the Twin Mamba is efficient and reliable, with or without increased horsepower development, it should fit the Convair 240 or Martin 4-0-4 picture quite nicely. To say nothing of the Connies and DC-6s. I mention smaller ships first because the problems in selling single engine operation—on a deliberate basis—appear insurmountable to me.

On this same basis the twin Allison looks more desirable for ships up to and including the C-124 size, since I believe it would be easier to sell the philosophy of operation to crews and the buying authorities. The P&W, a remarkably fine engine, I am sure, appears to suit very large multi-engine units—some time away yet—or single engine long-range high-speed units such as escort fighters. In any instance of contemplated slow-speed or low-power operation, such as the Douglas XA3D, the Navy has chosen the twin Allison unit. Since the P&W unit development was also a Navy project, surely they would have had a choice if they so desired. The XP5Y series is another case in point.

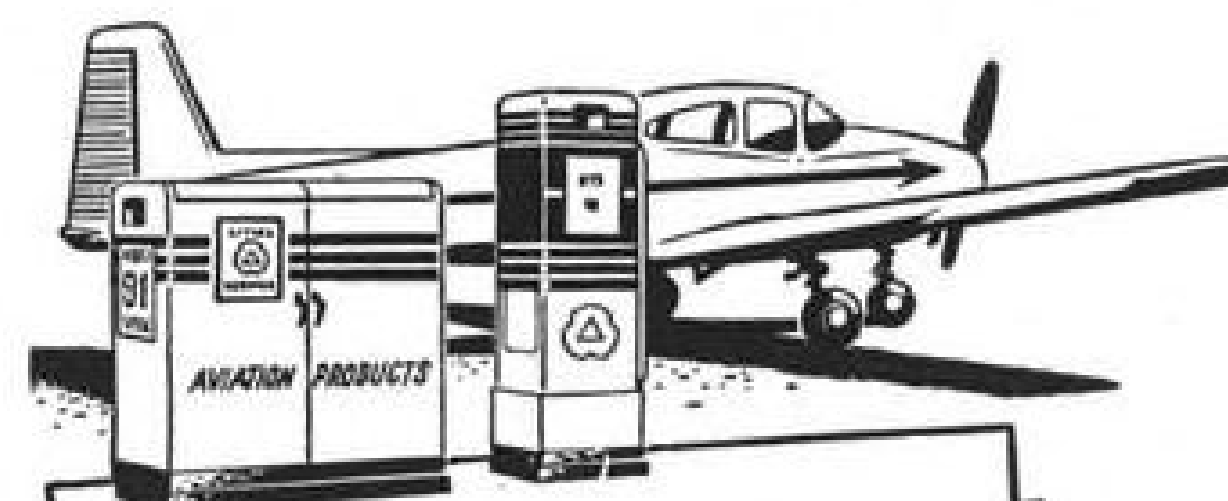
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EQUIPMENT



THREE BUTTON automatic approach coupler control box is visible just above the pilot's right hand. Directly to the right is the F-5 autopilot controller. Units are in Lear's Beech 18.

New Bantam Automatic Coupler

Undisclosed number of Lear units being built for USAF; compactness permits fighter installation.

By George L. Christian

Grand Rapids, Mich.—Aerial operations over Korea have pointed up the need for equipment to allow planes to fly and land under the most adverse weather conditions.

Small or light aircraft have been handicapped because space or weight considerations precluded carrying a full complement of flying aids to overcome the weather obstacle.

Lear, Inc., is now producing for the USAF a new, neatly compact automatic approach coupler, suited for installation in fighter, liaison or observation aircraft. These categories will be able to operate in weather which hitherto would have been impossible, Lear says.

The manufacturer claims that the unit is the smallest, lightest automatic coupler available. Dimensions are $2\frac{1}{2} \times 7\frac{1}{4} \times 13$ in., and weight complete is 7 lb.

Purpose of the device is to couple, through the autopilot, the three flight controls of an airplane first to the localizer, then to the glide path, of an ILS landing system.

With an automatic approach coupler, a plane may be flown in the lowest minimums completely automatically.

Correct heading and glide angle will be maintained throughout the approach, the pilot having only to control the airspeed with the throttles, lower gear and flaps and take over to effect a manual landing when he becomes contact. The unit was developed



COMPACT APPROACH COUPLER is at the left—note thinness. Pilot's control box at right.

by William P. Lear, director of research and development and board chairman.

L. C. Leith, Lear project engineer, said that normally the localizer is intersected at 45 to 90 deg. angle about 10 miles from the intended landing field. On the Lear approach coupler, the pilot pushes a button labeled "Localizer," and the plane will make a coordinated turn, approaching the localizer beam asymptotically.

► **Crosswind Factor**—A useful attribute of the coupler is its ability to cope with cross winds, according to Leith. The autopilot is compelled to seek the null position on the localizer beam and crabs the plane the correct number of degrees to compensate for cross-wind conditions.

As the plane approaches the middle marker, the horizontal bar of the ILS cross pointer indicator on the instrument panel gradually assumes a horizontal position. When exactly level, the "Glide Path" push button is operated and the aircraft automatically assumes the $2\frac{1}{2}$ deg. angle of descent set into most glide path installations. The glide path circuit is also responsive to rate-of-approach to the glide path signal, resulting in an asymptotic approach to that beam as well.

The ILS cross pointer meter serves as a monitor to assure the pilot that the plane is flying the desired heading and descending on the glide path.

► **Trim Control Automatic**—The Lear approach coupler also incorporates an automatic pitch trim control. An output signal, other than the one which commands a nose down attitude, is utilized to trim the plane on the pitch axis. The signal is derived from the difference between the attitude required by the glide path signal and the actual aircraft attitude at any given moment.

Importance of the automatic trim control is this: when the pilot disengages the automatic coupler (before touch down, for instance), if the ship were carrying an appreciable amount of nose up or nose down trim, it would instantly respond to the trim tab's command—a highly undesirable maneuver, especially at low altitude. With the trim tab automatically preset to a position exactly compensating for existing attitude and speed, the pilot may safely disconnect the coupler at will, irrespective of altitude or attitude.

Although no provision has been made for automatic airspeed control, the unit is designed to accommodate an aneroid automatic altitude control, currently under development at Lear.

An interlocking mechanism between



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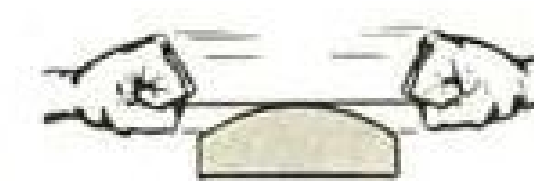
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Chosen by TWA and Eastern to modernize their twin-engine fleets, Martin 4-0-4 Airliners will go into service next year. From nose to tail, they are a product of Martin *Systems Engineering*. For whatever the product, Martin's staff integrates its work on *all* phases of a design problem... airframe and power plant, electronic flight and navigational controls, and military armament or passenger facilities.

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the glide path control and automatic altitude unit will cut out the latter when the glide path button is pushed. Moreover, when the glide path circuit is operating, it will not be possible for the pilot to switch on the automatic altitude control.

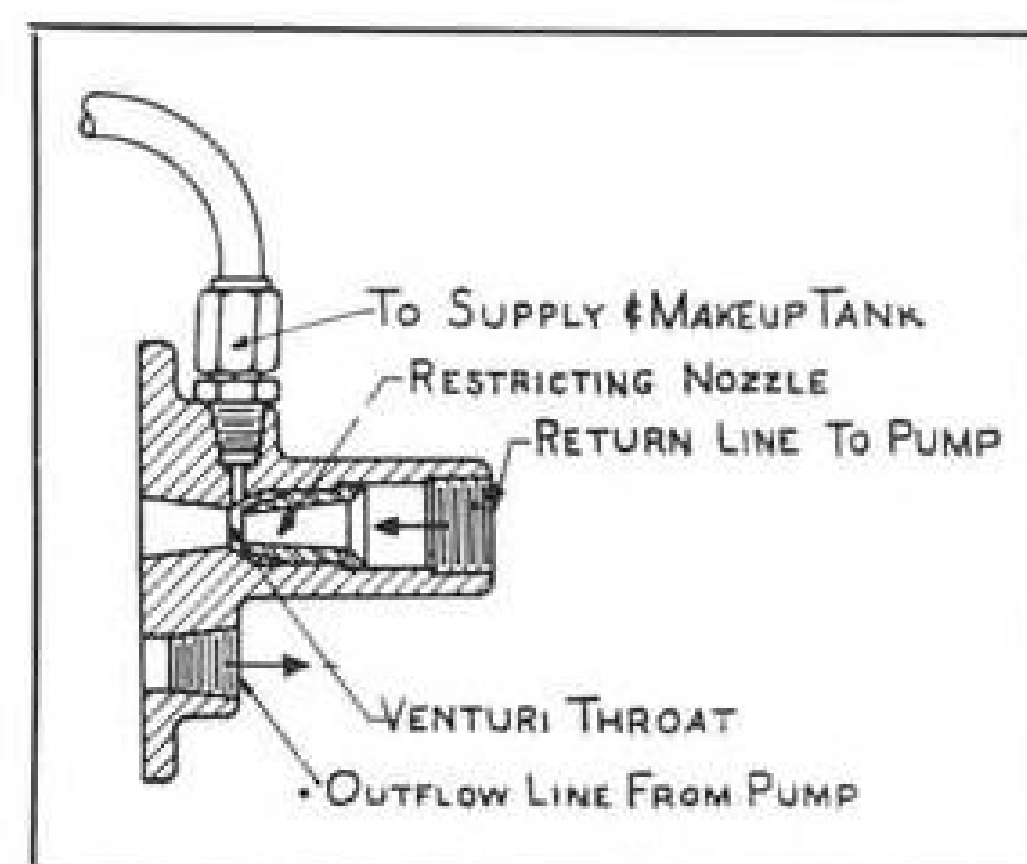
Leith said that this coupler (slightly modified) may also be used to maneuver executive type aircraft mounting the recently announced Lear L-2 personal plane automatic pilot since neither space nor weight requirements are prohibitive.

► **Compactness Emphasized**—Other approach couplers are on the market—Sperry's Automatic Approach Control

(AVIATION WEEK, June 12) and Bendix' Flight Path Control (AVIATION WEEK, July 17)—but despite the competition in the field, Lear is confident that its unit has a bright future.

Leith pointed out that the coupler could be installed almost anywhere in an airplane due to its small size. It is connected at a convenient point between the ILS receiving equipment and the cross pointer indicator.

Although security restrictions would not permit Lear to reveal how many automatic approach couplers it had contracts for, the manufacturer admitted that the USAF order was "substantial."



New Venturi Booster

A small accessory without any moving parts which, attached to the inlet of a variable speed pump reportedly prevents cavitation, has been put on the market.

Called an "input booster," it is designed to accelerate flow and raise pressure of fluid supplied to main pumps, such as those used in aircraft hydraulic systems, and in guided missiles.

Here are some advantages that might be realized under various applications:

- Weighs less than booster pump.
- Permits use of smaller pump.
- Permits effective operation of a given pump at higher speeds.

The booster is designed to ease the problem where a pump, operating at widely varying speeds, must be geared so high at low speed to supply desired pressure that it exceeds the capacity of the intake at high rpm.

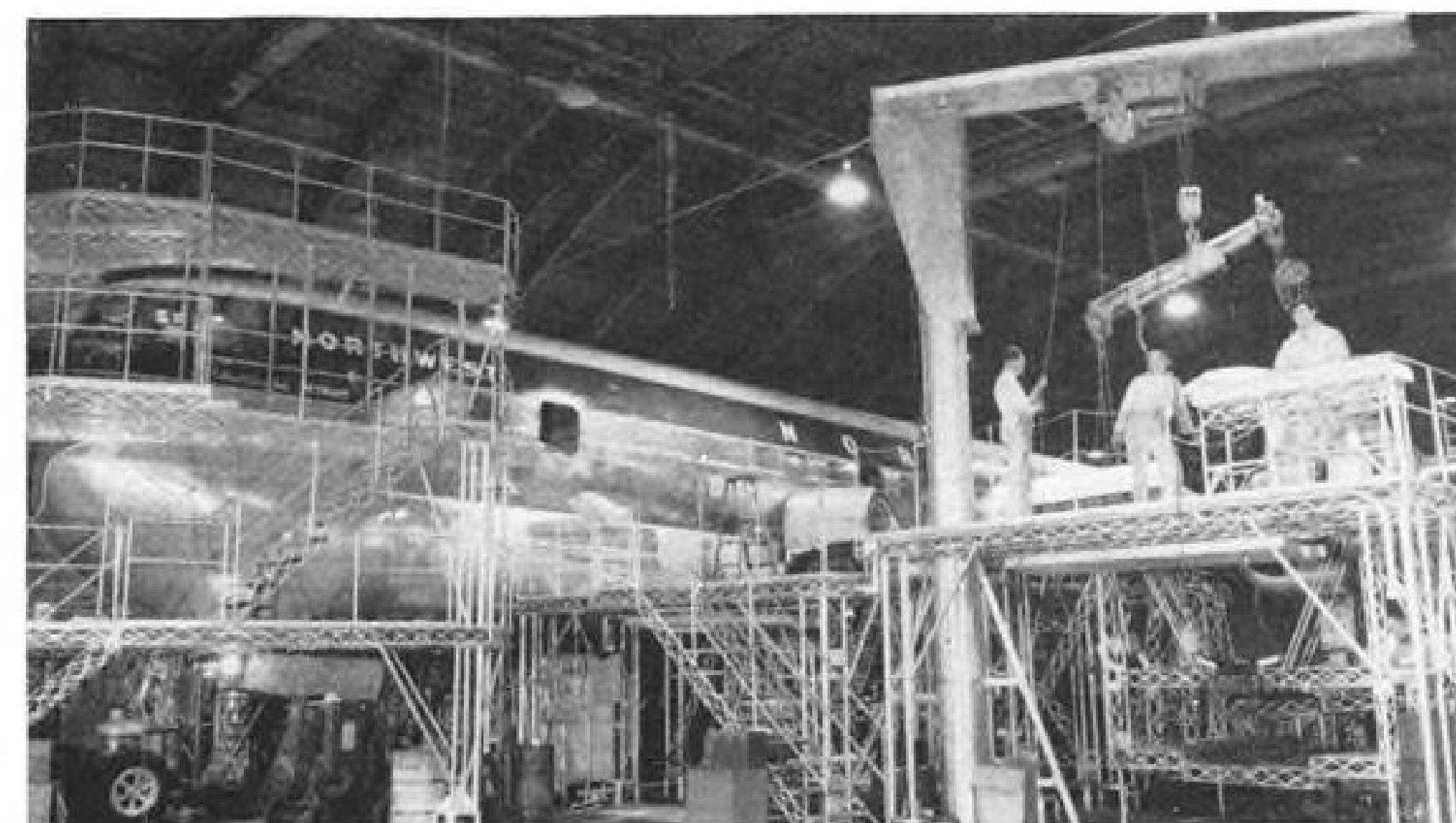
This condition causes cavitation—formation of partial vacuums or air pockets—and can result in reduced pressure at high speeds, surging, noise, and excessive wear of parts in the pump.

► **How It Works**—To overcome this, the booster creates a velocity head directly at the pump inlet. This velocity head is raised approximately to atmospheric pressure by special means.

The device essentially is a venturi (carrying main fluid supply) incorporating a special passage (carrying supplemental fluid) which is perpendicular to and opens into the venturi throat.

Operation of the unit depends on the difference in pressure between a static head (created on the throat by fluid in the special passage) and the velocity head (main fluid supply through venturi). The velocity head normally would be below atmospheric pressure, but is raised by the static head which is above atmospheric. The static head is created by the weight of fluid in the passage from a supply and makeup tank located above the booster and vented to the atmosphere.

Complete details and design data are available from F. W. Davis, consulting engineer, 124 Lexington St., Waltham 54, Mass.



Stratocruiser Overhaul Dock

Northwest Airlines spent \$35,000 on this triple-deck, steel overhaul dock recently completed to speed maintenance on its Stratocruisers.

The structure, located at the airline's main overhaul base in St. Paul, was designed by the company's engineers specifically to enable large numbers of mechanics to work on the aircraft with a minimum of effort and without getting in each other's way. The stands have accommodated as many as 60 men

simultaneously without interference.

The dock is designed to give access where it is needed most. The 20-ft.-high top deck enables workmen easily to reach radio antennas; the middle deck, almost 14 ft. high, serves to reach controls and cabin windows, while the 9-ft.-high lower deck puts the wing and engines within easy reach.

Pieces of auxiliary equipment used with the dock are:

- Rolling towers which may readily be

placed where needed most;

- Jib cranes, used to swing engines;
- "Crow's nest," resembling a fireman's extension ladder, which can hoist a man more than 40 ft. in the air and is used to work on fin and rudder.

Moisture-Free Cabin

Moisture in pressurized cabins is efficiently removed by a special wick recently developed by Avro Canada, Ltd., the company states. It also controls the patent rights.

Disposal of moisture in pressurized aircraft poses a problem since it is obvious that open drain holes of sufficient diameter cannot be used. The moisture, by condensing when cooled, can blot out windshields, cabin windows.

The wick, made of felt or similar material which will resist the passage of air, but will transmit moisture by capillary action, is attached to an absorption pad at one end and an evaporating pad at the other. Fuselage moisture is collected by the absorption pad, the wick, fitted snugly in a drain hole, allows the moisture to move outside the aircraft, where it is dissipated by the evaporation pad.

Avro emphasizes that the lightness and simplicity of the wick make it a desirable and maintenance-free installation.

Controls

FOR COCKPIT TEMPERATURE

Shown here is the application of a Barber-Colman Control Valve Actuator on the outlet of a

STRATOS

Cooling Package. Thermostatic elements in the supply duct and cockpit govern the Actuator.

For pilot comfort and efficiency, Barber-Colman automatic temperature controls accurately regulate and maintain desired cockpit temperatures, regardless of flight conditions.

Control of this cooling package is a typical application. Barber-Colman controls are designed to sense cockpit temperatures and automatically position valves to supply air of suitable temperature all the way from full heating to full cooling.

Barber-Colman controls are available for most other aircraft temperature control applications as well. Our engineers welcome the opportunity to assist you in any such problem. **Call your nearest Barber-Colman Representative.**

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NEW AVIATION PRODUCTS



Tests Plane 'Omni'

Portability and quick checkout of omnirange and ILS equipment in aircraft by one man figured importantly in the design of a new flight-line tester developed by Collins Radio Co., Cedar Rapids, Iowa.

A number of these Model 479U-1 signal generators already have been sold to several major airlines, including American, United, Trans World, Northwest and Colonial, Collins says. Some also have been delivered to fixed-base operators servicing corporation and other executive aircraft. The tester is priced at \$675, with an optional ac. or dc. power system included.

The unit can be carried to the cockpit and hooked to the craft's dc. power supply for a limited checkout of airborne omni and ILS equipment. In this case, output signals from the test set are delivered at low level directly to the receiver by means of a coaxial cable. For an overall check, from navigation antenna to indicating instruments, signals can be radiated by means of a collapsible antenna provided with the tester.

► **Not for Calibration**—This lightweight, carry-around model with hinged cover and handle is intended primarily as a single-plane checker. It serves as a quick and simple means of indicating whether or not the equipment is working within practical limits, not as a standard for calibrating or adjusting receivers. Its accuracy in the VOR positions is ± 3 deg.

Audio frequency signals of 30, 90, 150 and 9960 cps. are produced by r.c. phase shift oscillators. Radio frequency signals are generated by a crystal oscillator which uses mode type crystals. The set can be tuned to these frequencies: 109.9 or 110.3 mc. for localizer,

depending on crystals used; 112.1mc. for omnirange; 333.8 or 335mc. for glide path, depending on crystals used.

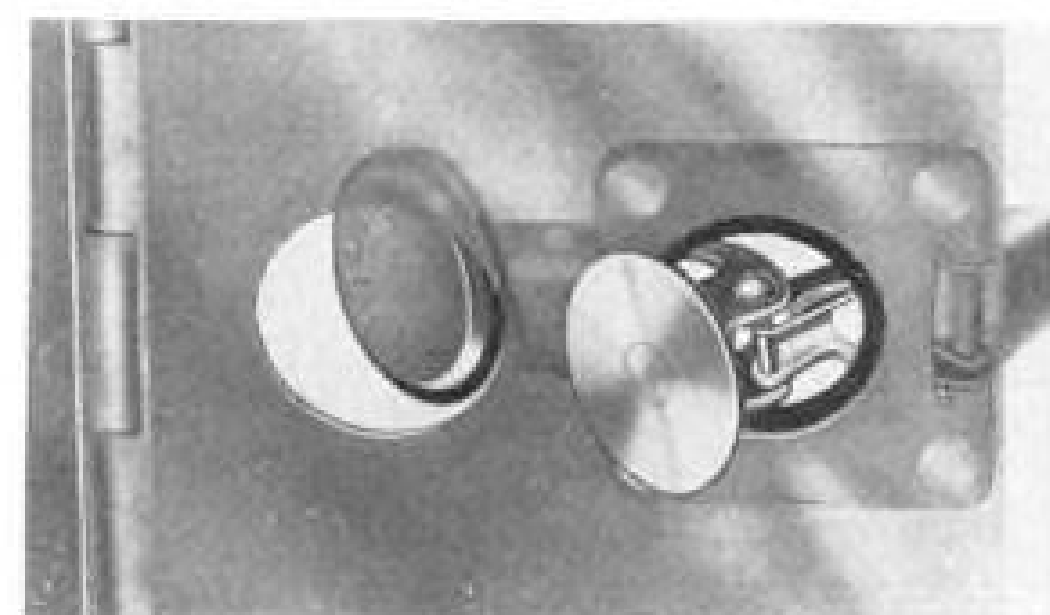
The tester will:

- Generate a "hash" or noise signal spectrum useful in determining that receiver being checked is operable on all channels.
- Check alignment of airborne omni on three tracks, 0, 150, and 315 deg. and check proper operation of to-from meter.
- Check phase localizer, indicated by "left-right" operation of cross-pointer needle. Give "left-right" check of 90/150 cps. tone localizer.
- Check operation of glide slope receiver with "down-up" deflection of needle.
- Check operation of warning flags.

The tester has a nominal 25 microvolt output for supply directly into a 52-ohm receiver or an output of 10,000 to 15,000 microvolts into the antenna. A visual check of the output level is provided by an r.f. carrier level meter mounted on the face of the set. Associated with this, is a calibrated control for adjusting r.f. output level.

The equipment contains a built-in dynamotor power supply which can be operated directly off the aircraft's dc. voltage. Current drain is approximately 1.8 amp. The dynamotor, mounted on a separate sub-chassis, can be replaced by a 60/400 cps. rectifier type power supply.

The unit is supplied with necessary coaxial connectors for direct r.f. output to the receiver under test or to the test set's antenna, power supply cords and r.f. cables. It measures $13\frac{1}{2} \times 13 \times 7\frac{1}{2}$ in.



Latch for Aircraft

A new type of quick-opening, flush latch for access doors, cowling and similar applications in high-speed aircraft has been developed by the Aircraft Hardware division of the Modern Metal Spinning & Mfg. Co.

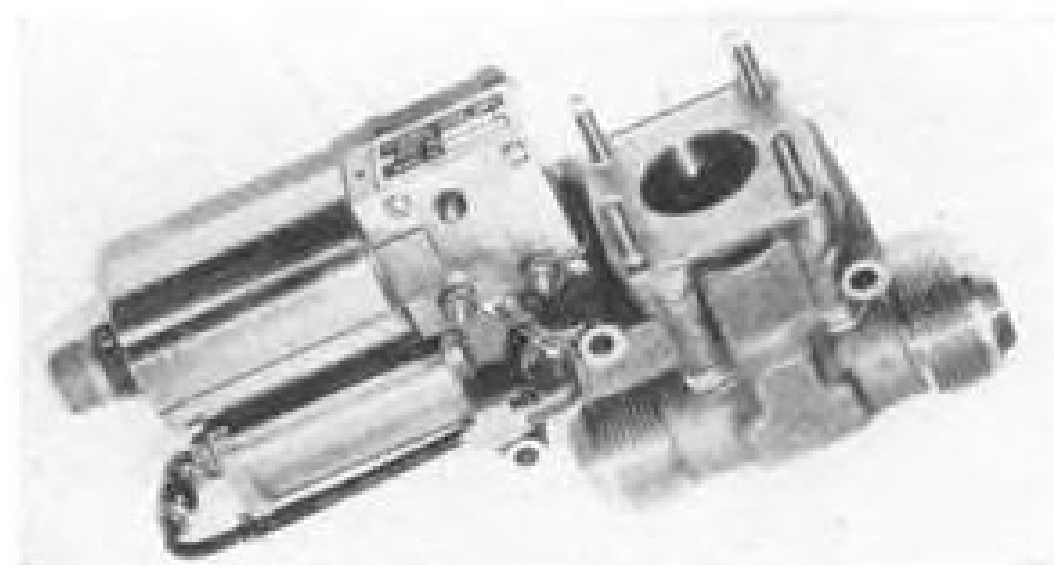
The latch employs "over-center" or toggle action movement to assure positive door closing. Once closed, doors can be accidentally opened in flight only by forces strong enough to cause

structural damage, while on the ground, fingertip pressure on the flush button is enough to open them, the company says. It adds that the latch is specially designed to withstand extreme loads, vibrations and accelerations encountered in high-speed planes.

The device weighs 1 oz., is ruggedly made of corrosion-resistant steel and has fewer parts than older latches, keeping costs at a minimum, according to the maker. Rubber gaskets around latch opening make it splash-proof, moisture resistant and minimize air leakage.

The latch is attached to doors with four $\frac{1}{8}$ -in. diameter rivets spaced $1\frac{1}{4}$ in. on center.

Designated Series M-1000 Tite Seal, it is $3\frac{1}{2}$ in. long and comes in models accommodating doubler thicknesses from .051 to .091 in. and door thicknesses from .040 to .072 in. Other sizes are available on request. Address: 2812 S. Main St., Los Angeles, Calif.



Jet Engine Valve

One of the latest additions to Hydro-Aire, Inc.'s, expanding line of high and low temperature mechanisms for aircraft is a shut-off valve for hot air applications in jet engines and similar uses.

The device is designed for operation through temperatures from -65 F. to over 700 F. It takes $\frac{1}{2}$ second for the unit to open or close, Hydro-Aire says.

The valve operates on 14 to 30v. d.c. and is actuated by pressures ranging from 35 to 215 psi. Maximum operating current is 10 amps. instantaneous, while maximum holding current is $\frac{1}{2}$ amp.

High-Flying Varnish

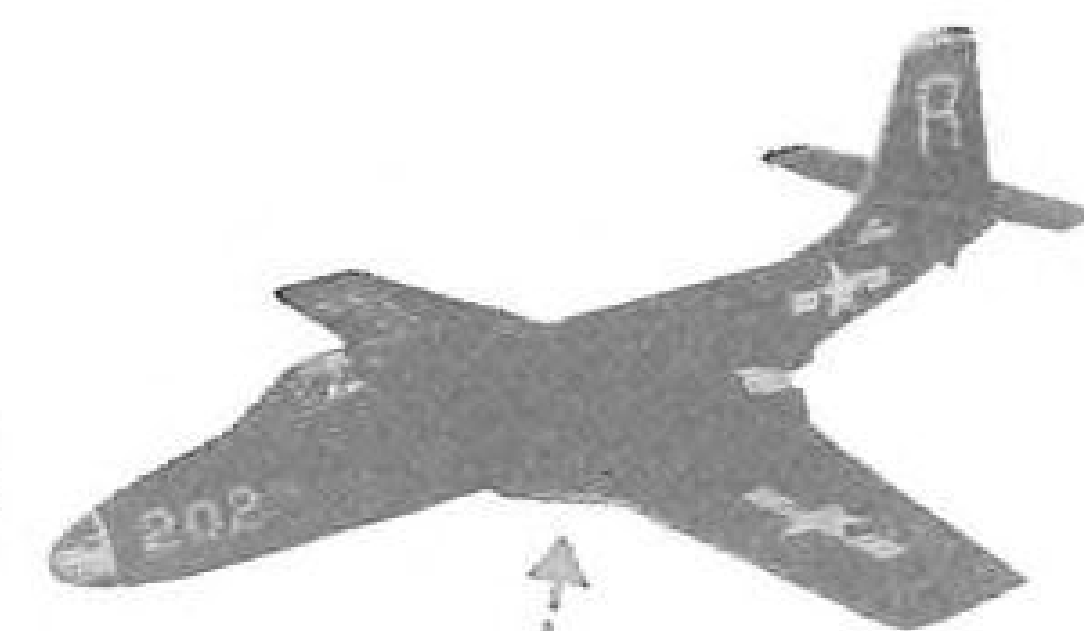
Three years of intensive research and field testing have perfected development of an impregnating varnish which combines the qualities of high resistance to both oils and very low temperatures.

The product, ABC Impregnating Varnish, was developed by Frederick S. Bacon Laboratories, Watertown, Mass. It is designed to protect electrical components in military aircraft at temperatures down to -70 F.

The company says the new varnish has been field-proven over a period of a year on instruments used by the Air Force. Here is performance of the ma-

MICRO SWITCH ENGINEERING

is geared to "tough application" problems!



Development of jet propelled aircraft has created new problems and placed new demands on materials and component parts.

Engineers of McDonnell Aircraft, St. Louis, called on MICRO SWITCH ENGINEERING, long experienced in solving aircraft switch problems, to help them meet the stringent switch requirements for the Banshee jet-propelled Navy fighter.

MICRO SWITCH designed new dependable precision switches for control of the wing-lock mechanism as well as switches to meet other exacting requirements. The long-continued efficient operation of these MICRO products is a matter of record.

MICRO precision switches are widely used in aircraft designs where components must combine positive, dependable performance with utmost economy of size and weight. MICRO engineers are specialists in solving aircraft switching problems, have developed many switches which fulfill rigid "AN" requirements. For full information on the MICRO line of precision switches for aircraft, write or call MICRO SWITCH, Freeport, Illinois, or any branch office.



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terial after it has been applied in a film to strips of brass and cured one hour at 150 F., then another hour at 212 F:

- No change after 48-hr. immersion in chlorinated diphenyl, acryloid resin dissolved in dioctyl sebacate, petroleum base lubricating oil or fluorocarbons.
- No change after repeated cycling in cold crack test of 15 minutes at 150 F., then 15 min. at -70 F.

Other specifications are: dielectric strength ($\frac{1}{16}$ -in. thick), 500 volts/mil; dielectric constant at 60 cycles, 3.3; power factor at 60c., 0.16; loss factor at 60c., 0.05.

The varnish is a three-part product which remains stable when stored in a cool place for four months. After mixing, pot life is at least 24 hours, the firm says.

Bacon Labs asserts development of the product was undertaken "because after investigation of the most promising commercial insulating varnishes demonstrated there were none of the oil-resistant types available which would fulfill the low temperature requirements encountered in aeronautical . . . applications."

ALSO ON THE MARKET

A galvanometer, reportedly so sensitive it can be used in most applications directly from source without amplification, is available in three types having nominal, undamped natural frequencies of 100, 150 or 200 gps. For applications where severe vibration is encountered, unit can be balanced to less than .001 in. deflection per G., says maker, Midwestern Geophysical Laboratory, Tulsa, Okla.

Centrifugal clutch coupling for industrial machinery can be disconnected in a manner which permits driven or driving member to be lifted out vertically when part is being dismantled. Particularly convenient where space restrictions make telescoping of a coupling for assembly difficult. Made by Centric Clutch Co., 22-26 South Ave., Cranford, N. J.

Sturdy industrial pallet racks and shelves, which can be assembled and locked without bolting or welding, and taken apart without need for cutting, are available from American Sales Engineers, 141 W. Eight Mile, Detroit 3, Mich.

Ram for handling open-center loads such as coils of wire now is available with Towmotor trucks. It's controlled by standard fork lift mechanism used in vehicle, and is made by Towmotor Corp., 1226 E. 152 St., Cleveland 10, Ohio.

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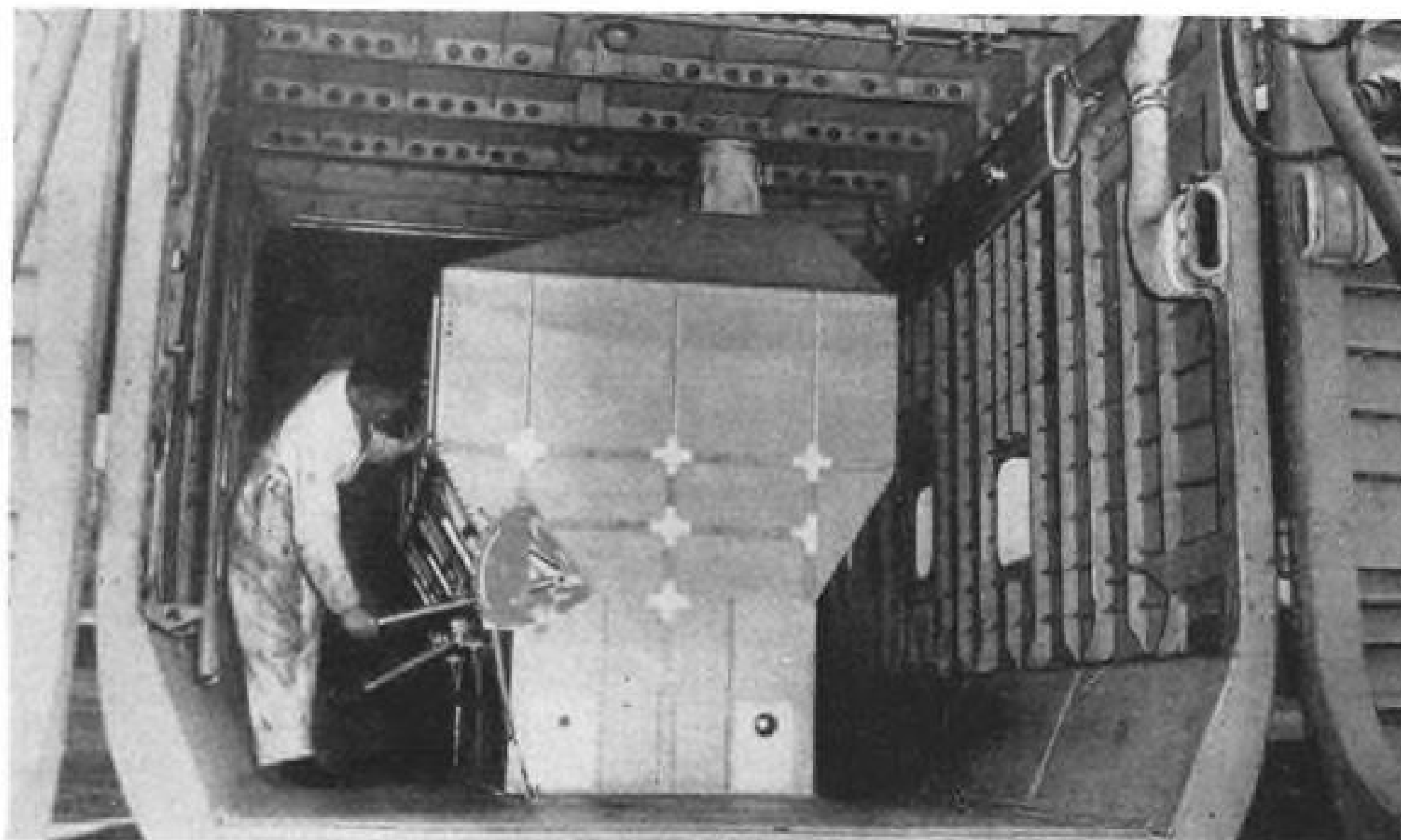
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AVIATION WORLD NEWS



AGRICULTURAL FREIGHTER demonstrates aerial top dressing over Wales farm.



HOPPER INSTALLATION in Freighter, showing levers for dumping fertilizer pellets.

Freighter Reworked to Aid Farmer

Big twin-engine craft adapted to carry internal hopper for dispersing top dressing to reclaim marginal land.

(McGraw-Hill World News)

London—The British are gathering some useful information on the efficiency of big fixed-wing aircraft for applying top dressing to large areas of land in attempts to check soil erosion and reclaim land for farming.

A successful adaptation of a Bristol Freighter for aerial top dressing has been ordered by the Royal New Zealand Air Force. The New Zealanders already have some experience along these lines

with a specially modified Grumman Avenger fitted with a large external hopper.

British experts believe that present light helicopters are not efficient for large-area dust/spray work. They are studying copters with much larger capacity—such as the three-ton Cierva Air Horse—with increased capacity and longer flight duration.

►Bristol's Experiments—A Bristol Freighter was experimentally fitted with a one-ton hopper. Bucket-type shutters

operated on the simple lever principle for releasing pellets.

Static tests showed that a four-inch shutter opening gave a flow and density of 2-2½ cwt. per acre of pelleted superphosphate top dressing.

An electrically driven agitator is fitted to ensure a continuous flow of material through the release shutters.

Flight tests were conducted over the company's Filton airfield onto a runway constructed in 20 ft. square slabs. At an airspeed of 125 knots, drops from 400 ft. gave a swath 180 ft. wide with a density of ½ cwt. extending over 128 ft. and a peak density of 3.4 cwt. per acre in the center. From 700 ft., the swath increased to 360 ft., with average density of ½ cwt. over 196 ft. and a peak density of 1.88 cwt.

The specially modified Freighter made an actual test on farm land in Wales. The drop showed considerable accuracy, even though gusty wind conditions necessitated flying at higher speeds than desired. The total area covered by superphosphate pellets was 800 x 320 yd., with a stretch of 800-yd. x 180 yd. getting over ½ cwt. per acre and 16 acres receiving a dressing of 1 cwt. per acre.

►Enlarged Capacity—Bristol has plans for installation of three two-ton hoppers in the Freighter.

Advantages claimed for the three-hopper system are:

- High density dumping of material such as lime could be accomplished by opening all three shutters simultaneously to maximum width.
- Simultaneous drop of three different types of material would be possible when desired.

Another method would utilize a single six-ton hopper, said to be capable of treating 60 acres per sortie—about 720 acres in a working day. On this basis, one Freighter could treat 180,000 acres per year.

Using the Society of British Aircraft Constructors' formula for assessing aircraft operating costs, and assuming an annual utilization of 1500 hr., cost of using the Freighter is estimated at between \$112 and \$126 per flight hour.

On an average radius of action of about 30-40 mi. from the takeoff strip, one plane fitted with a six-ton hopper could operate a sortie of optimum duration—about 30 min.—every 45 min., allowing 15 min. for turnaround and loading. At this rate, 12 sorties could be flown in a normal day.

At the higher operating expense of \$126 per flight hour, cost of distributing fertilizer to the density described directly above would be \$1.05 per acre, or \$10.50 per ton of phosphate distributed. At \$112 per hour, cost per acre would be 93 cents or \$8.91 per ton. The figures are exclusive of cost of fertilizer.



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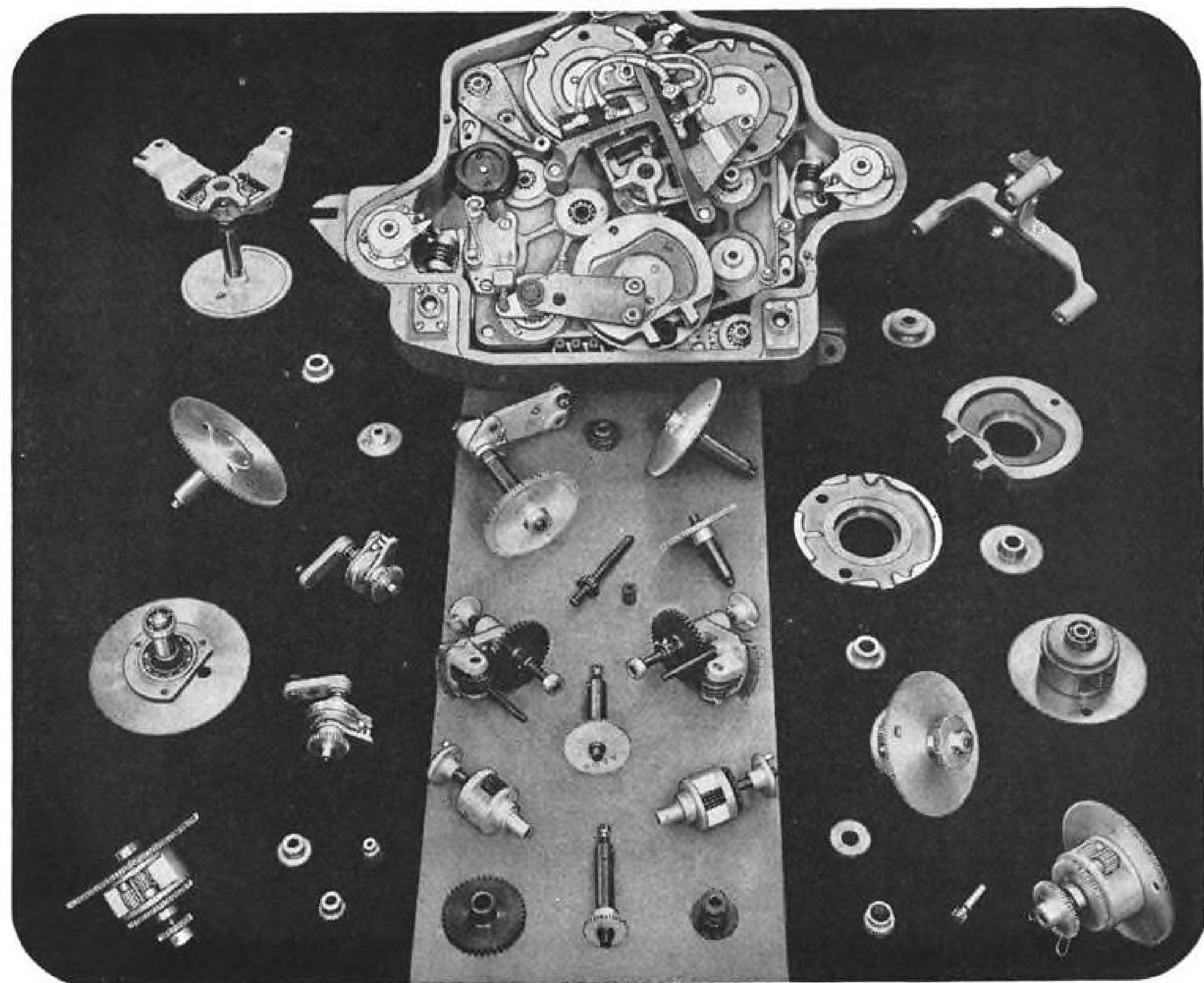
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FINANCIAL

Relative Market Action Listed Aircraft Common Stocks

Company	1946 High	1947 Low	Dec. 31, 1949 Close	Dec. 5, 1950 Close
Beech*	16	4	7½	10½
Bell	36	11	12½	26
Boeing	35	14	23½	35½
Convair	34	11	10½	15½
Curtiss-Wright	12	4	7½	10½
Douglas	109	45	72½	85½
Fairchild Engine	8	4	4½	7½
Grumman*	13	4	9½	21
Lockheed	45	11	25	33½
Martin	46	14	10½	17½
No. American	17	7	11½	15½
Northrop	15	5	6½	12½
Republic	25	4	6	13½
United Aircraft	37	17	26½	32

Notes: No adjustments made for cash dividends.
All fractions omitted for 1946 and 1947 quotations.
* Adjusted for all stock split-ups.

Aircraft Shares Continue Strong

But proposed excess profits tax legislation is being studied to see how it may affect industry position.

As the international crisis dictated a sharply accelerated armament program, aircraft shares demonstrated outstanding strength in a generally nervous and weak market.

This condition was nothing more than the obvious reflection of anticipated rising production volumes with the hope of mounting earnings for the aircraft builders.

The initial shock of the Korean invasion in July sparked considerable interest in aircraft equities. At that time backlogs were rapidly being bolstered, assuring sustained operations for at least one to two years for most aircraft companies.

This rising trend has been rapidly intensified until it is no longer unusual to have unfilled orders on individual books aggregating from five to ten times the amount of sales reported in the last annual period.

► **Consistent Pattern**—Reviewing the historical record of military aircraft procurement and attendant market reflections, a consistent pattern is seen by the observer.

Major bursts of strength in price for aircraft equities invariably accompany the anticipation or actual announcement of orders. The recent market behavior of aircraft shares is no differ-

ent from that which prevailed in the late '30s and continued through the '40s.

Remaining unanswered is how soon can the separate companies attain volume production levels and, most important of all to the investor, what will such results mean when translated to available earnings.

It is obvious that increased taxation must become a major adjunct to our rapidly mobilizing economy. This will be represented largely in the form of excess profits taxation. With the House quickly passing a measure which it hopes will help pay for the armament effort and prevent excessive profits for industry, the shape of this added tax impost as it affects aircraft manufacturers is beginning to clarify.

► **Alternatives Studied**—The various alternative methods industry can apply to excess profits taxation are being carefully studied as a guide to potential earnings under this proposed tax measure.

This sort of calculation, together with projected output schedules, will become the dominant factors in determining the market course of aircraft equities in the period immediately ahead.

The ability to obtain business is no

longer a problem—a booming seller's market for the aircraft industry exists again, and additional bookings no longer carry the same impact as the earlier awards.

Recent events have carried the price of aircraft equities, as a group, to their best levels since the peaks attained in 1946.

For the most part, previous highs for the aircraft shares were established in 1946.

An outstanding exception to this general showing was Boeing which sold at \$49.75 per share in the late thirties, compared with \$35 in 1946. It is interesting to note that in the late thirties Boeing, as a leader in the bomber design program, received considerable Army Air Force business. But this production was not translated into profitable operations. As a result, its market action ran counter to the general trend of that experienced by the aircraft group as a whole. With 1950 indicated earnings at a postwar high, Boeing's market price has recently passed its 1946 peak, but remains some distance from its all-time high.

► **Grumman Outstanding**—The most outstanding market performance among the aircraft shares is Grumman's. As indicated by the accompanying table, Grumman's equity has almost doubled in market value since its 1946 peak valuation.

This market performance is nothing more than a reflection of the company's outstanding production and earnings record. This pioneer builder of Naval aircraft has shown consistent gains in billings and demonstrated the ability to convert this increased volume to net profits.

Grumman Aircraft's remarkable showing has also been accompanied by a very astute financial operation in declaring two separate 100-percent stock dividends in recent years.

A stock dividend, in itself, does not create any additional value, as the equity interest in the security remains unchanged.

But it does serve to broaden ownership in a company and also dramatizes effectively the progress being made. It serves also as a means of providing a new base upon which increased cash dividends can be paid. As long as the basic earning power is present, the stock dividend device hurts no one and is of considerable benefit to shareholders whose market values are enhanced by this type of operation.

The effect of the Grumman action becomes apparent in that its shares now have a total market value almost equivalent to that of the common stock of Douglas Aircraft. Yet, at their respective 1946 price peaks, the total market valuation of Grumman was less than one-half of Douglas. At their 1947 lows,

Grumman was theoretically available at around one-third that of the Douglas market valuation. In viewing these comparisons it must be noted that Grumman now has four shares outstanding for each share of stock out in 1946.

► **Below Peak**—Despite the recent strength in aircraft equities, a number of issues have some distance to travel before their previous peak values are again attained.

Convair, for example, is currently selling at less than one-half of its 1946 high. Similarly, Martin, while up materially from the 1949 year-end, is far removed from its 1946 top. The same applies to Republic.

Bell, which has shown considerable market strength of late, is closer to its 1946 peak than it has ever been in the postwar period. This applies also to United Aircraft.

Close to previous best levels are Curtiss-Wright, Fairchild Engine, North American and Northrop.

Another measure shows the tremendous improvement all the aircraft shares have made in comparison to their postwar lows, generally established during 1947, as well as from the 1949 year-end.

For example, Lockheed stock is now selling at more than three times its 1947 low. A two-fold or greater gain since 1947 is recorded by all equities shown, with the exception of Convair, Douglas, Fairchild, Martin and United Aircraft.

As has been indicated here frequently in the past, there is a complete lack of uniformity in the market movements of the aircraft group. Not all issues showed the same percentage decline from their 1946 peaks to their 1947 lows, nor have the subsequent recoveries assumed any consistent pattern for the entire group.

In retrospect, for example, had an investor in Douglas sold 100 shares of that stock at the 1946 peak and re-invested his proceeds of about \$10,900 in Grumman, his holdings today would consist of about 840 shares of the later having a total market valuation of about \$17,640. Yet, if the Douglas holdings had been left undisturbed, his market valuation would be only \$8550 or less than one-half of the amount now realizable through the assumed switch. No adjustments are made for cash dividends paid.

As in the past, shifting fortunes and the relative degree of profitability will again leave their separate imprints on the records of the separate aircraft companies. In the final analysis, it is this determination which will dictate the pattern of future market price movements for the individual aircraft equities.

—Selig Altschul

LETTERS

Sneering at Cargo

If there are many informed people sneering at air freight as a future source of aviation transport income, it is mostly those who have a stake in passenger transport, and who want to scare any eager beavers away from good "fill up" business for lightly loaded passenger transports.

The stakes are much too large in their future possibilities to be fully developed by any belly compartment accommodations. I would suggest that your encouragement of those pioneers who have enough money to energize the development period is all to the good since, if they can carry on long enough to discover the real economic problems inherent in the air freight transport business, then the manufacturers can do something positive about overcoming the purely mechanical aspects of making the business self sustaining. At this time, a good deal of the technical side of the problem has been solved from the aerodynamic viewpoint. There are in existence large freighter types that can move more than one ton-mile of freight per horsepower-hour of energy.

If a freighter can move one ton-mile of freight per cruise horsepower-hour expended then the average cost per cruise hp.-hour will also be the break-even price per ton-mile. The equation demands recognition of the most direct possible relationship between the expenditure of the energy in the fuel used, the efficiency of the aircraft and the cost of its product to the customer.

Because a freight operation does not have to have cheese-cake and all that goes with the lush type of passenger service, it is possible to make considerable savings in the type of overhead that is a constant burden, flying or not. A small saving in the cruise hp.-hour cost for direct charges can be made, and rather large savings in the indirect costs for all salaries and for non-airborne activity. The direct cost per cruise hp.-hour for a large air freighter therefore should not exceed 3.5 cents, and the indirect cost should not exceed 7 cents, or a total of 10.5 cents per cruising horsepower-hour.

If the specification of the aircraft provides for a performance of one ton-mile per horsepower hour cruising, then the break-even price of freight will be 10.5 cents per ton-mile. If the route will only provide a 75 percent full load for the roundtrip then the break-even price will be 10.5/.75, or 14 cents.

The improved specifications of performance for specialized large freight aircraft removes this portion of the problem as a target from the "sneering" target area, since anyone with a dull pencil and a cigarette box can prove the vehicle. The sneerers therefore will have to be content with doubting the ability of any route to provide the required loading density on a round-trip basis for any given aircraft or fleet.

Judging the air freight potential of any given route is any man's prerogative. . . . so why the sneers? The real trick is to find the route that will provide roundtrip load-

ings to the order of 75 percent and a daily utilization rate that will provide for normal depreciation rates on the equipment involved. This trick becomes progressively easier as the price per ton-mile to the customer approaches 10 cents.

The necessity for pure speed as such is not so important in freighting as in passenger transporting. The designer has a bit more elbow room in dealing with freight transport speed since the desirable speed is the most ton-miles for the power exerted over a given period of time. Freight seldom needs to travel at sonic velocity. The future mass movement of goods will be based upon non-premium rates in the neighborhood of 10 cents per ton-mile. The current specifications of flight equipment already brings such rates into focus.

D. S. ATKINSON
495 Niagara St.
Winnipeg, Man., Canada

I have just had the opportunity of reading your editorial of Oct. 30 captioned "Why Sneer at Air Freight?" It was a peach. . . .

GEORGE T. CUSSEN, Vice President
The Flying Tiger Line, Inc.
Lockheed Air Terminal
Burbank, Calif.

I am certainly glad to see from your editorial in the current AVIATION WEEK ("Why Sneer at Air Freight?") that you are still beating the drum for air freight. Congratulations.

J. E. WINCHESTER, Sales Manager
Airplane division
Curtiss-Wright Corp.
Columbus, 16, Ohio

Credit Where Due

Your illustrated item Nov. 13 regarding the new jet noise abatement apparatus at the McDonnell Aircraft Corp., St. Louis, contained no reference to the firm which actually developed and manufactured this unique muffling device. I think it worthy of mention that the jet muffler pictured was engineered and manufactured by Industrial Sound Control, Inc., Hartford, Conn., pioneers in noise suppression devices and manufacturers of the majority of all such mufflers now in use in the aviation field.

ISC holds many patents on noise control methods in the aviation, power, and other industrial fields. . . .

HERBERT J. KRAMER
Julian Gross Advertising Agency, Inc.
11 Asylum St.,
Hartford 3, Conn.

Praise

George Christian's handling of the Romec story received compliments here. Andy Haiduck, Romec Vice President and General Manager, asked me to convey his congratulations on the manner in which you told the story (AVIATION WEEK Nov. 6).

W. K. DRAKE
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Commercial Airlift Potential

Number of U. S. Planes in Commercial Transport Use

Four-engined planes (suitable for Pacific airlift):

Stratocruiser (60-100 passengers)	45
DC-6 (55-70 passengers)	117
Constellation (50-65 passengers)	98
DC-4 (45-60 passengers)	254

Total four-engined 514

Twin-engined planes (suitable for shorter lifts):

Convair-Liner (40 passengers)	114
Martin 2-0-2 (36 passengers)	34
DC-3 (21-28 passengers)	505
Curtiss Commando (cargo only)	123
Miscellaneous	21

Total twin-engined 797

TOTAL THEORETICAL COMMERCIAL LIFT 1311 planes

Actual Pacific airlift today (almost all DC-4s)

Air Force (MATS)	172
United Nations (other than U.S.)	14
U.S. commercial transports	66

Total actual Pacific airlift 252

Source CAA

Pacific Airlift Builds Up Again

Crisis in Korea pushes planned schedules to 1000 trips a month, higher than last Summer's peak

By F. Lee Moore

In two weeks enough airline planes will be on the Pacific airlift to restore its mid-summer peak level of operations. This winter's airlift is scheduled at a total of 252 military and airline DC-4s—to make about 1000 trips a month.

They'll be carrying about 5000 tons load outbound and about 5000 soldier and marine casualties homebound.

► **Is that enough?**—The 1950-51 winter airlift is scheduled at more than 30 percent over the 1950 summer peak—mainly because of the military transport buildup.

But a lot of new questions pop up now, in light of the "new war."

• **Are the 66 American commercial planes, 14 foreign planes, and 172 military air transport service planes enough to cope with the present drift of the Korea-China war?** If not, the airlines can send more planes.

• **How fast could the Airlines convert more of their planes for the long overseas run?** Military Air Transport can't answer that question. MATS hasn't asked the industry for an immediate report on it, nor has the air force sup-

plied the facts the individual airlines must know to answer it.

The Industry Task Group studying airline mobilization says mobilization speed depends on two things presently unknown: How much warning and preparation can there be ahead of the



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New fiberboard containers are specially designed for cigarette shipments. Here Pan American loads 2000 packs into each 12 lb. carton at Miami for Latin America.

possible emergency? And how fast will Air Force's Air Material Command supply the fuel tanks, sextants, and other equipment needed to make a domestic airplane Pacific-worthy?

• **Would more foreign overseas airlines pitch in along with Pan American, Trans World, Northwest, Sabena, and Canadian Pacific in case of sudden emergency?** So far, there's been no promise of it, to the airlines' knowledge. Yet American carriers like Pan American would hope that the other big United Nations overseas air fleets planned to match Pan American contributions to the war effort, in accordance with ability. Air Coordinating Committee and National Production Authority gave foreign airlines equal priorities with U.S. carriers on new planes and spare parts made in this country.

• **What would happen if we needed 100 more Pacific airlift planes tomorrow?** Nobody knows now.

The airlines mobilization task study group (sponsored by NSRB and headed by CAB Chairman Delos Rentzel) is working on such plans. But there's no interim plan. Presumably, a quick emergency would require charter of the services of Pan American, Trans World, Northwest and a few others who have longhaul capacity already operating. Then domestic airlines would scramble around trying to get fuselage tanks and other equipment from Air Material Command at Wright-Patterson AFB.

► **Standby Plan**—There's no stand-by plan now that would produce 100 more planes for the Pacific airlift in a hurry if they were needed.

But the airlines say they stand ready to do whatever is required—as quickly as they can. Total U.S. commercial airlift potential of 514 4-engined planes is theoretical. From it must be taken the 66 planes already committed to the airlift, plus a minimum of say 100 planes that would have to keep urgent domestic and international traffic going. That leaves a present reserve of at least 300 U.S.-owned commercial 4-engined planes. Since the airlines are subsidized partly in anticipation of such a need, nobody questions the legality of preparing such a stand-by airlift for emergency.

If an airline has the fuel tanks and other equipment on hand, it takes about three days to fit out a plane for Pacific airlift. But the fuel tanks are mostly at AMC, now. When the first Korea emergency came, and the airlines were pressed into service, some lines made deals on their own initiative with local Air Force depots to get the needed fuel tanks. Then a few weeks later the tanks ordered from AMC arrived. The airlines turned these over to replenish local air base warehouse stocks. With that sort of thing

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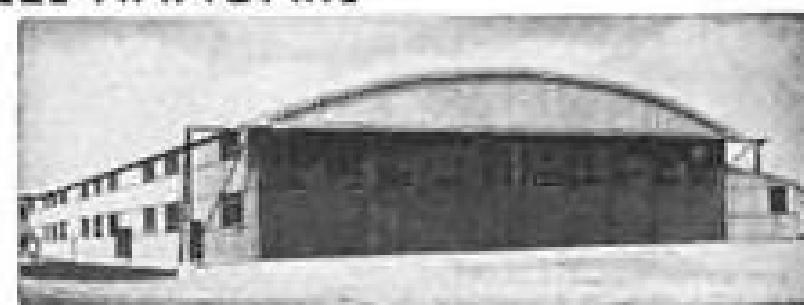
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going on, it's hard to tell how fast airlines could produce 100 more planes for the lift.

► **Charter Rate**—Air Force has not negotiated stand-by contracts with airlines. If more planes are needed, the question of compensation will be negotiated later. Airlines that phased out of the Pacific lift this October are returning planes under the old contract.

If far more planes are later chartered for military duty, the economics will come after. First there's the negotiated compensation for services. Then there's the unknown result of this on airline income plus higher commercial load factor at home. Finally, if the lift continues, Civil Aeronautics Board takes a look at the profit and loss and outlook of the individual airline.

► **Scheduled lift**—This winter's airlift will probably be:

- 100 MATS planes.
- 72 troop carriers operating under MATS.
- 8 Royal Canadian Air Force planes.
- 3 Canadian Pacific planes.
- 3 Sabena planes, contributed by the Belgian government.
- 66 commercial airline planes, under negotiated charter.

Individual airline contributions planned aren't all definite yet, but probably a large part of the 17 planes going onto the lift again this month will be Pan American contracts.

The contract airlift hit a rock-bottom 37 planes in November, after the government decided in September that MATS' own would be enough.

Right now the build-up is about half completed. About the first of the year the DC-4s called back should all have been re-modified and ready to go. Then the prime contracts will stand about as follows:

Northwest 9 planes; United 6; Pan American about 20; Seaboard & Western 7; Transocean 7; Flying Tiger 7; Overseas National 5; Alaska 3; California-Eastern 2.

Pan American was down to 8 of its own planes at the low point. Now PAA has already called back 12 subcontractor planes: American 6; Capital 2; Eastern 3; Panagra 1. Trans World is putting its 5 planes back, subcontracted under Northwest. If a wee bit more lift is needed after it reaches 66, here are possible additions: PAA 2; American 2; Capital 1; Eastern 2; Panagra 1. Then Transocean may add more planes—has one coming from Pakistan and one from the East Coast, but still plans to make the nonsked flight to Honolulu, after cancelling two earlier this month. California Eastern is trying to get more equipment, but won't say if it's been asked to supply more to the airlift.

► **Utilization**—Mats isn't saying how good its aircraft utilization is. Now the added personnel is shaping up, prob-

ably about six hours per day is conservative. Top performer on the lift is Seaboard & Western, with fleet utilization of 14 hours per day.

During the first three months of the lift (July through September), Seaboard averaged 12,260 pounds per outbound trip. This is 1,400 pounds higher than any other carrier's average and 1,800 pounds higher than most of the others. In the same period, Seaboard has had a combined average of 10,120 pounds per trip inbound and outbound, which was more than 1,000 pounds higher than any other carrier's average and from 1,600 to 4,000 pounds higher than most of the others. Seaboard carried 113.34 tons per aircraft in use during the first three months of the airlift. This also was better than the performance of any other carrier, and exceeded some of them by 40 to 50 tons.

Note: (Formal name coined by group is Air Transport Task Group A (Airlines) of the NSRB Air Transport Mobilization Survey.)

Flying Tiger Cuts Eastbound Rates

Flying Tiger Line has cut eastbound transcontinental air freight rates from 25 to 42 percent on two commodity groups. This is the second rate cut the Tiger line has made the past six months to boost eastbound volume.

Civil Aeronautics Board authorized the reductions despite objections from some passenger carriers that operate cargo planes.

No Cry-Babies

Airlines can assure prospective baby-toting travelers that infants fare better than their parents during air travel. Air sickness in infants is extremely uncommon. This is reported by the American Medical Assn.'s November issue of "Today's Health."

In the case of temporary disorder known as areo-otitis media (pain in the ears during flight descent), infants do much better than adults. A child's ear has a comparatively short and straight tube connecting the middle ear chamber and the throat. This makes for easier opening and closing of the channel to equalize pressure.

The advice the medical consultant gives to mothers carrying children aloft: Waken the child and feed him when the plane begins letting down. Try to keep the child from swallowing air bubbles as he eats. Burp him frequently.

Excess Profits Tax: How It Would Affect Carriers

CARRIER:	1950 Income (Proj.)	Excess Profits Tax	Normal Tax (42%)	Net Inc. After All Taxes
American	\$17,571,500	\$1,898,533	\$7,380,030	\$8,292,937
Eastern	4,482,471	434,562	1,882,638	2,165,271
TWA	7,283,155	833,900	3,058,925	3,390,330
United	12,754,000	1,371,824	5,356,680	6,025,496
Braniff	1,891,606	186,856	794,475	910,275
Colonial	*275,000	none	none	*275,000
Continental	365,625	20,817	153,563	191,245
Capital	1,870,627	257,812	785,663	827,152
C&S	625,000	24,676	262,500	337,824
Delta	1,801,900	180,567	756,798	864,535
Inland	615,000	94,800	258,300	261,900
Mid-Continent	608,586	63,026	255,606	289,954
National	1,600,000	177,094	672,000	750,906
Northeast	260,240	none	109,301	150,939
Northwest	*3,500,000	none	none	*3,500,000
Western	1,376,270	160,493	578,033	637,744

*Loss.

**Air Transport Assn. computation.

ATA Suggests EPT Alternatives

Ramspeck asks: Exclude mail pay in tax determination or allow higher return for air transport carriers.

A 5-percent return on invested capital may be enough for a public utility, but its too strict an excess profit rule for the airlines, the Senate has been told by Robert Ramspeck, Air Transport Assn. executive vice president.

The House-passed Excess Profits Bill (H.R. 9872) allows airlines, along with railroads and utilities, to earn 5 percent on invested capital before getting hit by the 75-percent excess profits rate. It's before the Senate now.

Ramspeck offers two alternative formulas for airlines:

- Exclude air mail pay from income subject to the excess profits tax.
- Allow 8 to 10 percent return on invested capital—the rate range that Civil Aeronautics Board usually figures is right for airlines.

Either of these ATA-proposed formulas puts the Board, in effect, in the airline profits saddle. Excluding mail pay means the Board would really continue to decide how much the airlines should earn. Allowing 8 to 10 percent return gives the airlines what CAB usually aims to give them.

► **Millions Chopped**—The "Excess Profits Tax" table above shows the cut that the House's EPT bill would probably take from each airline.

American Airlines and United Air Lines alone would pay more than \$3 million additional taxes under such an EPT formula—the cost of three DC-6Bs.

Right now, the airlines have 168 modern planes on order, at a cost of

\$136 million. These planes, like the 66 airline planes in the Korea airlift today, would be ready at any time.

But, says the ATA to the Senate:

"This bill would require us to attempt to finance this development on the basis of a 5-percent return on investment.

"We do not believe it can be done."

Airlines are subsidized by the U. S. for a reason. The Civil Aeronautics Act states it is "to maintain and continue the development of air transportation to the extent and of the character and quality required for the commerce of the United States, the postal service, and the national defense."

The act was written in peaceful 1938, just 20 years after World War I and before the outbreak of World War II. Airlines earnings and investment under that act since then have been inadequate, says Ramspeck, even without an excess profits tax.

The airlines took such heavy losses after the war that the entire 1946-49 period shows no net profit. Yet 1946-49 average earning is one of the three bases allowed for computation of the proposed excess profits.

And because the airlines had to buy new equipment at the same time they were losing money, they increased their long-term debt from zero in 1944 to \$172 million in 1948.

The average return of 9.3 percent during the war was not enough to allow the airlines to grow with their mar-

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Scheduled Lines Investment Return

(Domestic Trunklines)

Year	Income	Investment	Return
1938	\$ 1,653,000 (loss)	\$ 36,032,000	loss
1939	3,682,000	45,994,000	8.7%
1940	4,637,000	71,285,000	7.0%
1941	4,183,000	86,656,000	4.6%
1942	14,119,000	122,121,000	11.5%
1943	12,226,000	154,368,000	7.8%
1944	17,489,000	187,719,000	9.0%
1945	21,194,000	248,703,000	8.4%

ket after the war was over. Dangerous debt was the result.

► **No Railroad**—The 5-percent return to be allowed before excess profits levies on railroads and utilities does not fit the airline picture at all, Ramspeck pointed out to the Senate Finance Committee. Here are some reasons:

• **Airlines must plow back earnings** to grow for national defense as well as their commercial markets.

• **Airlines are riskier investments.** Railroads and utilities are older, and do not operate internationally. Equipment of utilities and rails lasts many years before even beginning to come into the obsolescence category.

• **Lower capital base of airlines per dol-**

lar of gross revenue makes the use of a single investment-base yardstick for judging utilities, rails and airlines foolish. For example, in the case of a railroad and airline each with an investment of \$1 million, the railroad would do \$350,000 of business annually, whereas the airline would gross \$1 million. Thus, the airline with a \$50,000 net profit under the proposed EPT bill would deserve three times the revenue traffic that the railroad would on the same available profits.

Ramspeck's final plea to the Senate is that if it will not exempt mail pay from EPT, the bill should substitute the CAB-recommended investment return for the flat 5 percent in the EPT bill.

AAA Hopes for Early CAB Action

All American Airways is prodding the Civil Aeronautics Board to start action on AAA's new route extension—especially the Newark-Atlantic City extension. The Newark-Atlantic City via Asbury Park run would boost All American's revenue greatly, yet the only added costs would be the new station at Asbury Park, says Sales Vice President David Miller.

These AAA route applications have been on file with the Board for over a year:

• **Newark-Atlantic City via Asbury Park** (Docket 4015).

• **Scranton-Harrisburg via Hazelton, Pa.** (Docket 4597).

• **Bradford-Williamsport, Pa., nonstop** (Docket 4596).

• **Jamestown, N. Y.-Cleveland via Erie, N. Y.** (Docket 4596).

• **Several southern extensions into West Virginia** (Docket 4016).

► **8-Month Gold Mine**—The Atlantic City-Asbury Park traffic potential is terrific from March through October, AAA says. On either side of the summer vacation period is the continual convention jam—sometimes 15,000 people converge on the resort city at one time.

• **No new planes are needed to serve the proposed Atlantic City route be-**

cause AAA's planes now spend eight idle hours at the turn-around spot—usually Newark. No matter how AAA schedules its planes, the long layover occurs at Newark, Philadelphia or Atlantic City. The only major cost of joining the two terminuses—Atlantic City and Newark—would be the station at Asbury Park.

• **Eastern Air Lines serves Atlantic City** from both LaGuardia and Newark. Eastern will probably object to All American's application to serve the same city from Newark. But, says All American, there is plenty of business Eastern doesn't touch. And Eastern's DC-4s going nonstop to Atlantic City are a superior service to AAA's proposed DC-3 run stopping en route at Asbury Park.

AAA and Eastern both serve Atlantic City from Washington, D. C. Here AAA has three intermediate stops while Eastern's run is nonstop or via Baltimore or Baltimore and Wilmington.

► **Feeder Function**—All American points out that 45 percent of its business is interline, so it helps trunkline business a lot.

Right now, All American is sponsoring a joint promotion of air travel to Miami with Eastern and National Airlines. All American promotes Eastern, Capital, American, Trans World and other airlines using their brochures, posters and movies.

► **CAB Action?**—All American's certificate expires Jan. 11, 1952. The Board

hasn't said whether it will process the route applications as such, or will come out with a show-cause order. A Board show cause order might propose that the certificate be extended with route alterations and/or extensions.

With the expiration date only a year off, the Board should come to grips with the All American question soon, as it takes time to study it, schedule hearings.

All American hopes its proposed route extensions and connections will be considered by CAB sooner than a year from now—before AAA's certificate is up for renewal and another summer has gone.

Bonanza's Beacon

Bonanza Air Lines plans to install three complete flash-type beacons along its routes to make night navigation simpler and straighter.

Bonanza has already set up the first such beacon installed by a scheduled airline. It is on Spring Mountain Range, northwest of Las Vegas, Nev. The Civil Aeronautics Administration helped Bonanza make final test survey flights and has approved the installation.

Light Products, Inc., Beverly Hills, Calif., built this first beacon. Planes on the Reno-Las Vegas trip now save time by its use. They no longer need fly a roundabout course.

The beacon is a self-contained, bat-

tery-powered unit. Its four neon-type lights flash a red light in each direction. A photo-electric cell turns the lights on at dusk and turns them off at dawn.

The airline will put the next beacon on the same route as the first. The third will go in the area approaching Kingman from Prescott, Ariz.—on the southern end of Bonanza's route.

BEA Considers Internal Routes

(McGraw-Hill World News)

London—British European Airways is considering enlarging the sphere of freedom still allowed private scheduled airline operators in Britain. BEA chief executive Peter Masefield and his staff have held meetings with private operators interested in extending their services and are looking over some 93 route applications from 21 private companies.

Of these BEA has approved 73 which it will recommend to the Air Transport Advisory Council. The carrier is approving the majority of the applications for five years.

BEA, which has allowed private operators to handle services as "associates" on routes it couldn't, or didn't, want to serve, also plans to discuss with the operators ways and means of handling exceptionally high summer traffic.

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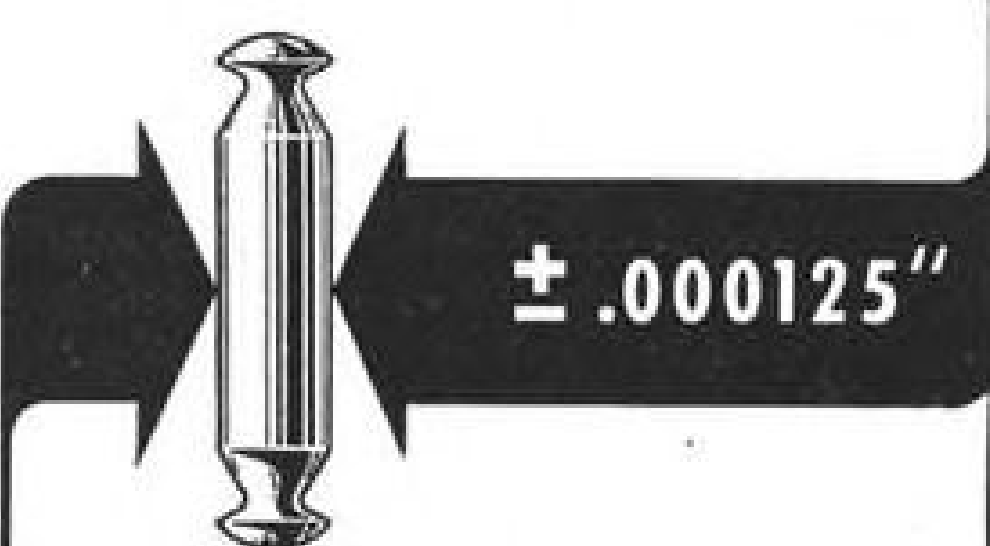
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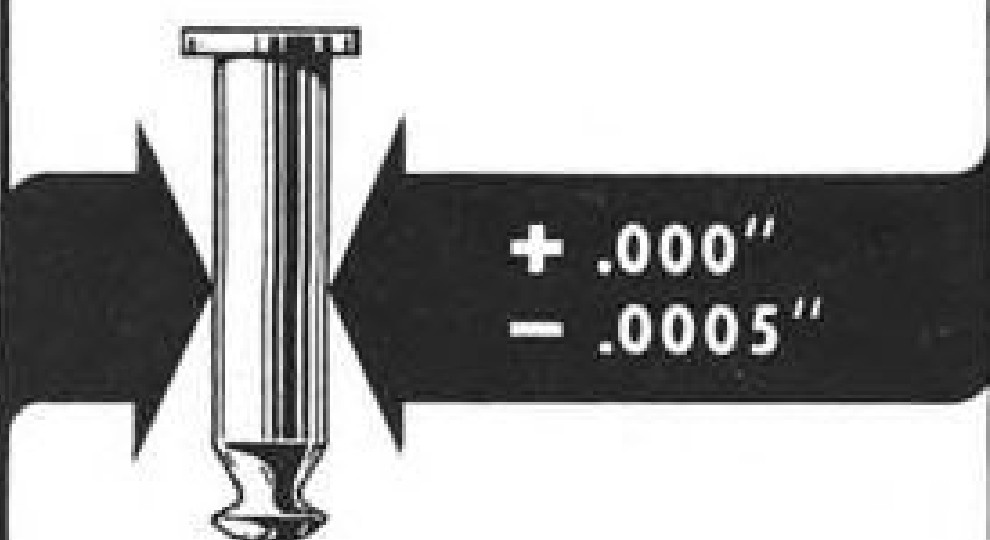
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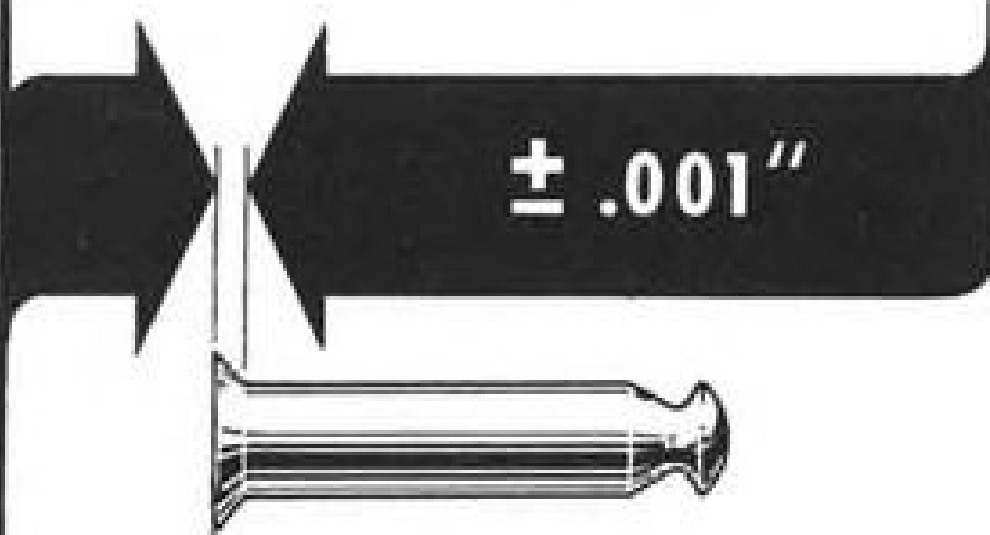
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S. F. Airport Raises Rates

The San Francisco Public Utilities Commission has approved higher rates and charges at San Francisco Airport—over the strong protests of several airline and oil company representatives.

Net change in rates should raise airport revenues about \$100,000 a year. These are only interim rates, however, and the San Francisco Board of Supervisors must approve them before they become official.

The airline and oil men testifying before the commission claimed there were two things about this that are worse than the raised rates themselves:

- It might start other airports doing the same thing.
- The rate raise is only temporary, so the users can't know what rates to count on in the future.

► **Slow-Down**—At least two of the lines hint they had planned expansion of ground facilities at San Francisco Airport, but would not go ahead without knowing what their future charges will be. Some of the airline representatives indicated after the hearings that they would rush over to Oakland Airport to see what they could do about increasing schedules there and decreasing them in San Francisco.

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Untying Washington Traffic Knot

More radar and a new airport may be the only final solutions to Washington's air traffic snarl. But several specific interim improvements are recommended by the Joint Industry-Government Airport Use Committee.

► **Action**—Here are recommendations to unsnarl the Washington traffic problem.

- **Expedite new airport construction.** Congress this fall appropriated \$1 million for land acquisition, but no site has been selected yet. CAA will soon announce selection of a consulting firm to help pick and design the site. Congress has authorized \$14 million for construction of the proposed airport.
- **Expedite new radar installation and radar traffic control.**

► **Hurry completion of the new airport traffic control tower by nudging the top echelon of the PBA.**

• **Close east-west runway of Washington National and use it for parking additional planes.** This will also cut maintenance costs at the airport.

• **Consolidate traffic control tower operations at Anacostia and Bolling Fields into a single airport traffic control tower.**

• **Divert traffic whenever the controller thinks growing congestion warrants diversion.** Formerly a specific delay period was used as the criterion for initiation of diversion requests.

• **Speed up testing of airport runway and taxiway markings, and get improved system into Washington soon as practicable.**

• **Cut radio use by tower personnel—by not requiring them to notify planes about restrictions to, or deviations from, established traffic patterns.**

• **Air Force ought to continue efforts to transfer bulk of proficiency type flying to Andrews Field.**

• **"H"-type beacons should be installed at Shadyside, Huntingtown and Charloote Hall air traffic intersections.** H-beacon is a low-powered non-directional transmitter used with a plane's direction finder as an aid in making a more precise approach, a double check on position, and a great help in flying a holding pattern.

• **Let military planes in at Washington instead of Bolling or Anacostia in bad weather, whenever Washington control tower people think that may avoid hazardous air traffic conditions or will speed traffic handling.**

► **Committee Makeup**—The Airport Use Committee working on this and other airport problems has representatives of Air Transport Assn., Aircraft Owners and Pilots Assn., Air Force, Air Reserve Forces, Navy, Civil Aeronautics Board, Civil Aeronautics Administration, and Airport Advisory Committee.

SHORTLINES

► **Air France**—International carrier is building guest houses near airports in the French part of Africa. Designed mainly to bed down air travelers, like Pan American's Latin American hotels, they're available to local patrons, too. Projects are slated for French West Indies and Tahiti later.

► **Air Line Dispatchers Assn.**—Union President W. F. Kinnard is moving ALDA headquarters to Alexandria, Va., (105 So. Washington St.) this month. . . . Member Edgar J. Striffler of Capital Airlines has been appointed chairman of the General Advisory Committee on Labor of the NSRB.

► **Bonanza Air Lines**—Feeder expects quick CAB decision on its request for extension of the Reno-Phoenix route to Ajo and Yuma, Ariz., and El Centro and San Diego, Calif.

► **British European Airways**—European carrier is whittling its deficit. BEA profits reported are: June £9145 sterling; July, £116,774; August, £134,871; and September, £124,828.

► **Canadian Pacific Airlines**—Trans-Pacific fleet has four more DC-4s, bought recently in the U.S., but right now they're going to the U.N. Korea airlift.

► **Capital Airlines**—Company made an operating profit of \$338,811 in October, compared with \$128,851 a year ago. Net profit of \$175,084 was on revenues of \$2,985,424. Passenger revenues of \$2,205,130 compare with last November's \$1,737,013. . . . Two Constellations with a 60-mph. Tailwind claim new time records: 415-mi. Detroit-Washington time of 1 hr. 21 min. is a record for any scheduled flight; 613-mi. Chicago-Washington run in 1 hr. 50 min. is a record for Connies, but an earlier American DC-6 trip beats it.

► **National Airlines**—Carrier wants to offer next summer the lowest regular service fare ever set by a scheduled airline New York-Miami—roundtrip \$99.90, excursion rate. Washington-Jacksonville roundtrip fare \$53.80.

► **Miami International Airport**—Traffic continues to break all records in passengers, cargo and air mail. First 10 months, airport handled 1,171,904 passengers (compared with 885,553 last year); 56,630,344 lb cargo (last year 41,182,905 lb.); and 5,223,999 lb. air mail (last year 4,755,426 lb.). . . . War situation is sending a larger proportion

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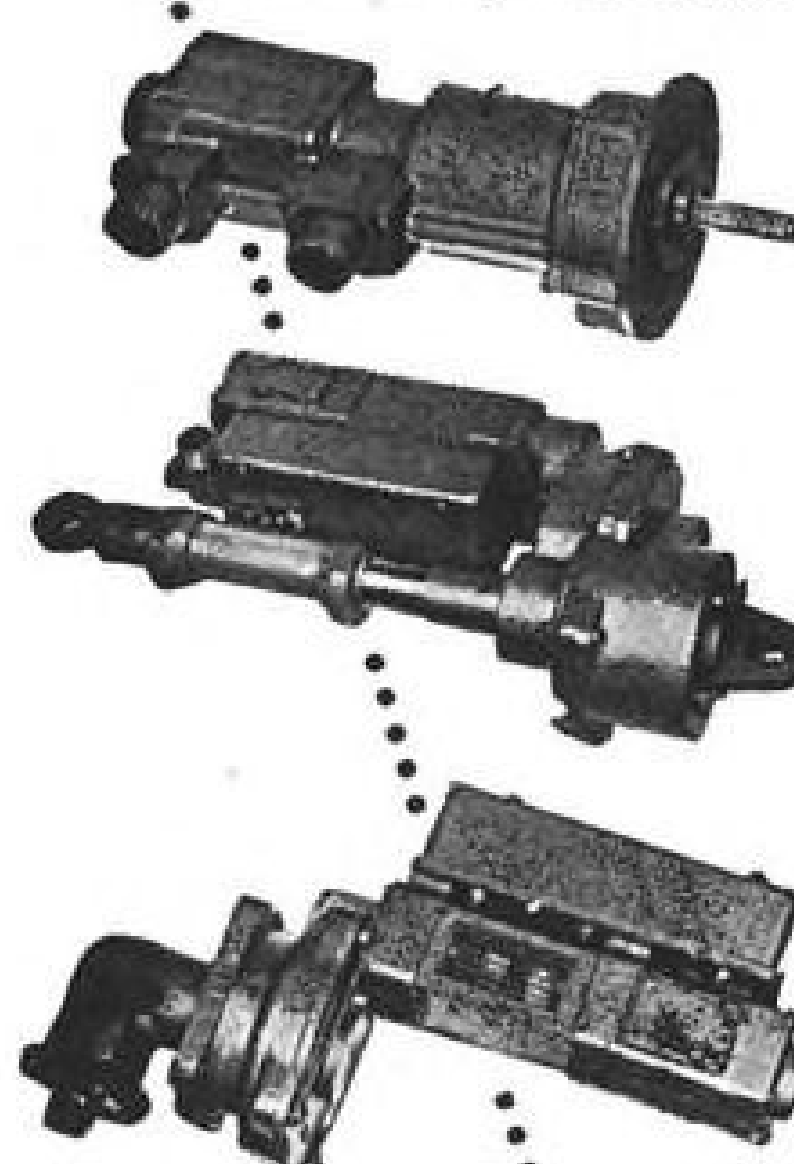


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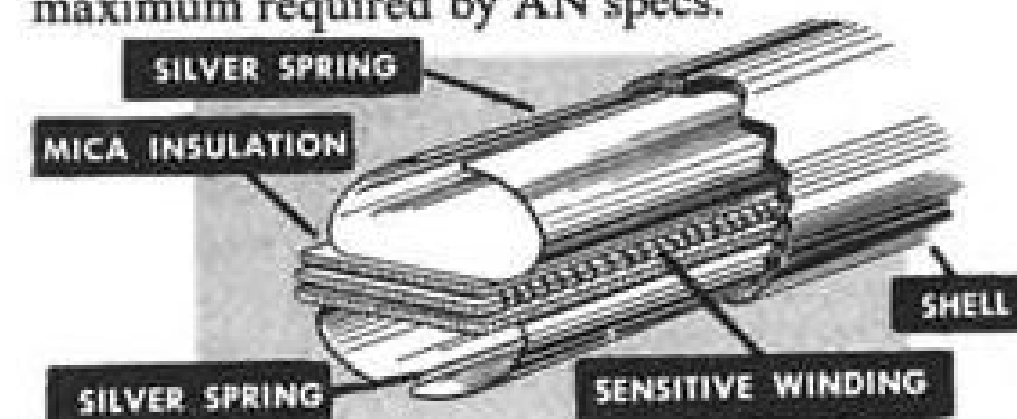
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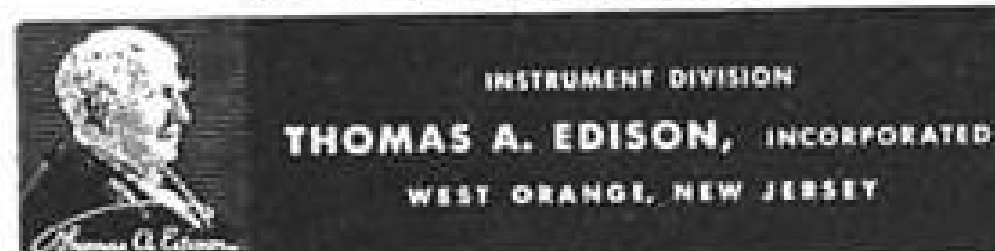
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130 LAKESIDE AVENUE



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"The old equipment in my Bonanza was both unreliable and difficult to maintain. Southwest Airmotive analyzed my needs, removed some of my old gear, reworked some of the other, and added an ARC omni-receiver. The system now functions smoothly and safely. Incidentally, I am especially pleased with the fact that ARC gives a full year guarantee on all its new products. As a businessman, I consider this factor an important one in making an aircraft radio purchase."

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of vacationists to the Caribbean and Latin America.

► **Pan American World Airways**—Company plans to convert its Clipper color scheme to white-paint top, if tests on one of its Convairs continue to show big improvement in cabin cooling. PanAm for 23 years has kept its planes unpainted, except for decoration. New scheme is white upper half, with engine nacelles and horizontal stabilizer lettering in blue. Preliminary testing shows the painted Convair is 10 degrees cooler. . . . Company is releasing this month a free 40-page booklet—"It's a Pan American World"—showing how an airline works.

► **Pan American-Grace Airways**—Panagra reports October passenger miles at 9,547,000—a million over a year ago and almost a million over September.

► **Southwest Airways**—Feeder on its fourth anniversary this month had flown 408,000 passengers 75 million passenger miles without accident. It has received National Safety Council's Aviation Safety Award three years in row.

► **Trans World Airlines**—International and domestic carrier expects 1951 international air travel to be 5 percent over this year (this year is 20 percent over last). Latter part of next year, TWA should have 66 Constellations—claimed to be the largest standardized four-engine airline fleet in the world.

► **United Air Lines**—UAL President W. A. Patterson says that when Strato-cruiser engine performance is improved he expects same profit margin on UAL's Honolulu service as on its domestic system.

► **Slick Airways**—Cargo carrier wants CAB to make its certificate permanent instead of being limited to the period ending Aug. 12, 1954. The reason Slick needs permanent status now is this: Shippers must change their warehousing and marketing set-ups to get the best out of air freight. Yet they won't do that if large-scale air freight may not be here to stay, as implied by limited-period certification. Also, it's hard to convince investors they should put more money into more flying equipment (even though the demand is there) if there's a "temporary" feel about the company. CAB can always cancel a permanent certificate anyway, but there's a definite difference between temporary and permanent certification.

► **Washington, D.C.**—Five airlines have opened Washington's first joint ticket office at the Continental Bldg., replacing their five former individual offices. Airlines are Northwest, Trans World,

Branniff, Colonial, and Scandinavian.

► **Western Air Lines**—Trunkline celebrates its silver (25th) anniversary Apr. 17 as "the oldest airline" in the U.S.

► **Mid-Continent Airlines**—Company pays a 25-cent dividend Dec. 21. Previous 25-cent dividend this year was paid in June. . . . October net profit of \$52,721 compares with \$44,536 year ago. Net for 10 months is \$296,545, compared with \$307,788 the same period last year. . . . Revenue per plane mile in October was \$1.0627. October, 1949, it was \$6.65 cents. Passenger load factors were the same this October

and last—56% of total capacity. MCA put on a third daily roundtrip between Chicago and Waterloo, Ia., to relieve congestion on that segment of the Chicago-Sioux City route. The line has also started one-carrier service between Milwaukee and Kansas City via Rockford, Dubuque, Waterloo and Des Moines.

► **Spain**—The Spanish government is sending a delegation to Montreal to arrange Spain's entry into the International Civil Aviation Organization. Tomas Suner, Undersecretary for Foreign Economic Affairs, heads the delegation.

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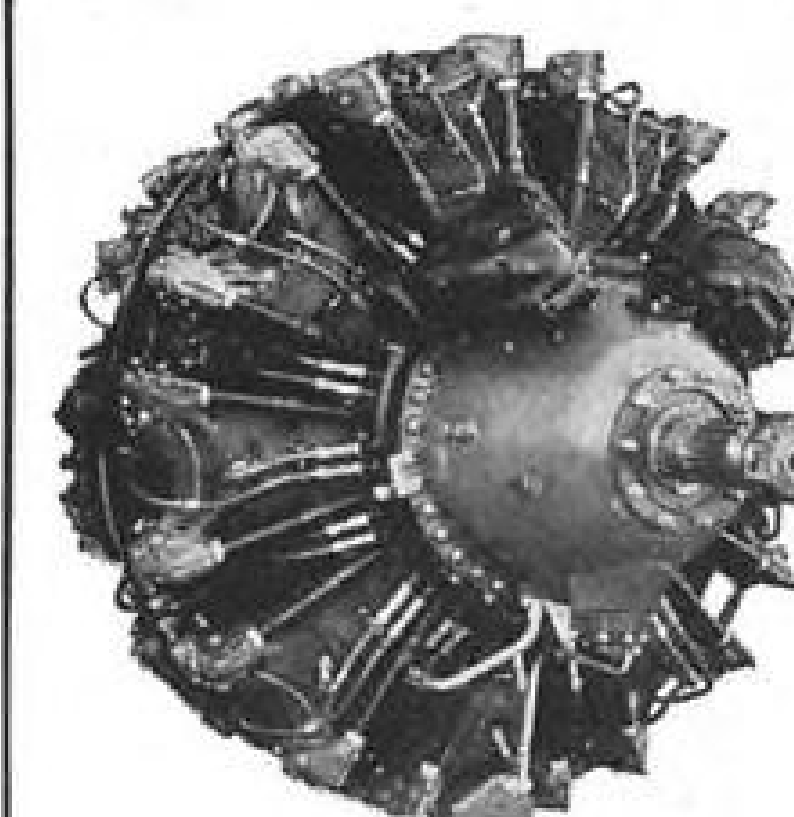
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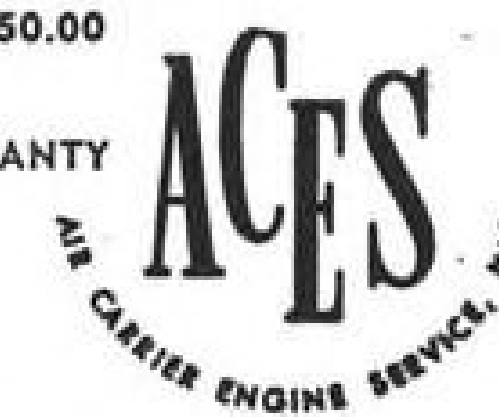
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STRICTLY PERSONAL

METEOROLOGIST: MAN OF SCIENCE

The Weather Bureau recently celebrated its 80th birthday. Since its humble beginning it and the profession of meteorology have come a long way. One of the most exacting jobs is that of forecaster, truly a man of science!

Life for the modern weatherman is a complicated maze of millibars, adiabatic diagrams, lapse rates, gradients and the like. He is surrounded by delicate devices and can be found at the local airport poring over his impressive maps—that only he can really understand—to decide tomorrow's fate.

The task of the airline meteorologist is especially difficult. To know simply that it will rain tomorrow is not enough. He must determine the exact hour. He must also know the height of the clouds for any given hour, the visibility and a few other tough things.

One of the basic ingredients of his trade is that layer between two masses of air of different temperature, the front, where most bad weather occurs. Finding the exact location of one of these fronts is sometimes a delicate job. The prediction as to where it will be in several hours is even more ticklish. But we always knew he was surrounded with all of his fancy equipment and that he was also thoroughly trained in some mysterious and secret occult powers we pilots have never been able to fathom.

I was in this state of silent reverence for the meteorologists one night when I stopped at a teletype at Washington National Airport. It was late and the line wasn't busy, so two forecasters, in different places, were conversing via the teletype. It took some 20 minutes of head scratching and pecking at the keys for them to complete their little chat. Except for the decoding in the parentheses here's the chat:

DO YOU HAVE A FRONT ON YOUR MAP VERY NEAR WASH. JUST ABOUT 20 MILES NORTHWEST? WE HAVE IT SOUTH OF QUANTICO.

OH, YOU HAVE A DIFFERENT FRONT THAN I HAVE.

IT'S THE ONLY ONE WE HAVE.

WHAT KIND OF FRONT?

COLD BECOMING STATIONARY INTO WAVE [Meaning it will come to a stop and cause trouble.]

WELL, WHAT WILL HAPPEN TO DCA [Washington] SFC [surface] WINDS IN HALF AN HOUR OR SOONER?

WITH WHAT I HAVE THE WINDS SHD [should] GO TO NE [northeast] AND SLWLY [slowly] BACK TO NORTH. THAT WOULD BE A FRONT OR SOMETHING PASSING DCA. WITH THE WINDS AT DCA THE WAY THEY ARE NOW I CAN'T SEE HOW A FRONT IS SOUTH OF US. NO CHANGE IN TEMPERATURE THAT I HAVE NOTICED.

I SEE WHERE YOU HAVE YOURS. THERE IS SOME BASIS FOR IT.

YES, ESPECIALLY THE TEMPERATURE.

YEAH, BUT WE HAVE ANOTHER WEAK FRONT THAT IS SOUTHEAST OF DCA AND HAS BEEN CARRIED ALONG AHEAD OF WHAT I CALL THE MAIN FRONT.

GEE, I THINK IT RUNS BETTER NORTH OF DCA TO BETWEEN CHW [Charlestown, W. Va.] AND TRI [Tri-Cities, Va.] AND OVER TO JUST EAST OF BRR [Berry Field, Nashville].

OK, BUT I'M AFRAID WE WILL KEEP IT AS IS. GOTTA GO NOW.

THAT WILL MAKE YOU MISS YOUR FCST [forecast].

YEAH, WELL THAT WILL BE THE FIRST TIME.

HEY, DON'T YOU THINK THERE IS SOMETHING BETWEEN FDK [Doncaster, Va.] AND DCA ON THE 0430 WEA? [4.30 am. Eastern Standard time weather report] TAKE A LOOK. NAH. WHY?

WIND SHIFT AND TEMP DIFFERENCE. IT SURE WOULD BE DIFFERENT IF THE FRONT WAS SOUTH OF DCA.

THE DIFFERENCE IS DUE TO SHELTERING HILLS AND ALTITUDE.

HILLS? WHO'S TALKING ABOUT PIT? [Pittsburgh]

I GO YOU A BEER THAT DCA WINDS SHIFT TO SOUTH AND CIG [ceiling] GOES TO 1000 FEET WITHIN ONE HOUR. OK.

FLASH, AN AIRLINE CAPTAIN SAYS HE WAS ON INSTRUMENTS AT 250 FEET.

CAN YOU CHECK THAT?

WHAT YOU MEAN? AIRLINES ARE ALWAYS RIGHT.

OK, BUT LET'S GET A CHECK ON THE CEILING NOW.

WE'RE CHECKING.

WHAT IS IT?

ABOUT 300 FEET.

YOU WIN.

All of which must go to prove something but I can't figure out what it is. Or maybe they mean that if it rains tomorrow it will be wet.

—R. C. Robson, AAL

WHAT'S NEW

New Books

Introduction to Helicopter Aerodynamics, by W. Z. Stepniewski, is a straightforward approach to the subject of performance in power-on and power-off flight. Author is chief aerodynamicist at Piasecki Helicopter Corp. and has used for this text the basic material of a series of lectures previously given at the company.

The presentation has a flavor of simplicity, is effectively illustrated with sketches, and mathematical complexity is avoided where possible to enable one with theoretical background of a mechanical engineer to grasp the fundamentals of copter aerodynamics.

The text begins with a review of aerodynamic fundamentals and progresses through the simple momentum, blade element, and vortex theories; practical methods of calculating rotor thrust and power in hovering and vertical flight; performance in hovering, vertical ascent and powered forward flight; and autorotation. A complete list of symbols and references are included.

The volume is an initial offering in what is planned to be a complete series of works on rotary-wing craft. Multilithed, plastic-ring-bound text covers 158 pages and is priced at \$2.50, plus postage. Rotorcraft Publishing Committee, P.O. Box 55, Morton, Pa.

New Publications

A Guide to Air Shipping via the Port of New York is a booklet of condensed general information for shippers, air traffic managers and exporters and importers. It covers domestic and international air cargo rates through the New York-New Jersey Port. Obtainable free by writing Port of New York Authority, Dept. of Airport Development, 111 Eighth Ave., New York 11.

A Study and Appraisal of United Airlines, Inc., is a handsome 46-page report by Selig Altschul, AVIATION WEEK financial writer and independent aviation advisor, dealing in detail with UAL's inherent position, the various factors influencing its operations and separate elements entering into its outlook. Write on letterhead to Selig Altschul, 25 Broad St., New York 4.

Employee Pensions is an informative new report pointing out the benefits and drawbacks of such schemes. Write C. A. Macauley & Associated Consultants, Inc., 3308 David Stott Buildings, Detroit 26.

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EDITORIAL

Air War Forum

(We recently forwarded the following questions to Ben Lee, AVIATION WEEK'S Military Editor, in Washington. We present his answers, obtained from official Air Force sources in the Pentagon, which he covers daily.—R. H. W.)

Our Jets

Q. What shortcomings have been experienced in jet fighters, other than endurance, in contrast to piston engine fighters?

A. None particularly. In fact, the jets have proven more effective. Because of lack of torque, they make a more stable gun platform. Maintenance problems of jets are not as great as on piston fighters. With use of the large external fuel tanks the endurance problem as far as operations in Korea are concerned has been eliminated to a great extent. The jet fighter also has obvious advantages of speed, climb, and added ability to defend itself and friendly ground troops against enemy air attack.

Q. What is the effect of machine gun fire on jet engine components (compressors, turbines, and cans) in comparison to the effect of gunfire damage to piston engine parts? Is there less chance of inflicting vital damage to a jet engine than to a piston engine?

A. Jets are standing up surprisingly well. There have been reports of jet fighters coming home with bullet holes in almost every major component—burner cans, oil system, impeller blades, tail pipe, etc.

Q. What disadvantages have developed with respect to field maintenance of jet aircraft?

A. Jet engines have always been easier to work on because of their relatively simple design. This has been carried over into field operations. There are no problems peculiar to the jet types.

Q. Has fuel consumption of jets proven a serious tactical disadvantage?

A. Since development of large, specially modified wing tanks, fuel consumption of jets has ceased to be a serious problem in Korea. F-80s could operate from Japan against a target as far north as Seoul and spend more than an hour over the target. Since the 5th Air Force began operating out of South Korean bases, range has been no problem.

Communist Air

Q. What conclusions have been drawn about the MIG-15 by our pilots who have seen it in action? Were any parts salvaged from the MIG-15 shot down on this side of the Yalu?

A. The Russians have sacrificed armor, armament and range—in which the MIG is inferior to the F-80—to achieve a little more speed than the F-80. We can obtain no reports of the salvage of any MIG-15 pieces.

Q. Has any special tactic been necessary to cope with MIG attacks?

A. No. Standard tactics have been effective.

Q. Is there any indication that Russian jets are now operating from bases in North Korea as the Communists move south?

A. No.

Q. Approximately how much air support have the Chinese Communists been able to mount in the current offensive?

A. There has been no evidence of air support of ground troops by the Chinese. The Chinese planes encountered have been pitted against our own aircraft.

Weather

Q. The press has said operations against the enemy are considerably hindered by weather. What has happened to our technique of bombing through an overcast using radar? Is this type of bomb-

ing used only in "strategic" operation, or can it also be used in "ground support" operations?

A. The Air Force at present has no effective means of bombing moving targets from low altitudes by use of radar. Stationary targets can be bombed with some accuracy by this method. USAF is currently working on the problem of ground support by use of radar. Strategic bombers bomb by radar consistently in bad weather.

Q. How much has winter handicapped the liaison plane operations that were so effective at the beginning of the Korean conflict. What has been their role in the retreat?

A. Except for occasional days of extremely low ceilings and visibility, winter weather has had very little effect on any of our air operations in Korea. T-6 aircraft are currently averaging between 50 and 60 sorties each day searching out enemy strength concentrations.

Night Operations

Q. Has the USAF, Navy or Marines had a high percentage of success in night tactical operations?

A. Obviously, it is always more difficult to interdict enemy lines of communication in darkness. However, throughout the Korean campaign, night tactical recon missions using electronic methods and flare drops have been carried out. B-26s are regularly used on night missions. Bomber pilots drop flares and then attack the targets sighted. Ground forces in the area can also illuminate enemy movements to mark them for air strikes.

B-29s

Q. During our retreat in Korea why haven't we been reading about those B-29s we used earlier in North Korea?

A. As the air war moved into high gear, USAF had in the theater one B-29 group. These were later augmented by "elements" of other SAC B-29 groups from the U. S., Alaska, and other Pacific bases. Total B-29 strength six weeks ago was "estimated" at five groups. During early stages of war, B-29s were used for all sorts of missions merely because they were on hand—from high-level strategic to ground support. As other aircraft moved into the theater, B-29s were withdrawn from "general support" activity and were reassigned to strategic roles. As strategic objectives were destroyed the necessity of the B-29 dwindled. Two groups during the last six weeks have been returned to the U. S. The remaining groups—about three—are averaging about 40 missions a week. Present B-29 missions are confined mostly to interdiction.

Special Questions

Q. What aircraft armament has been shown most effective against enemy ground troops: machine guns, rockets, napalm, or bombs?

A. Machine guns and napalm bombs have proven most effective.

Q. Are more aircraft going to Korea? If so, what types?

A. Information is classified until planes are in operation in the theater and their presence is apparent to the enemy.

Q. During the Pacific phase of World War II, we used parafrag bombs against the Japs in island battles. Have we employed parafrag bombs in Korea?

A. None have been reported.

Q. Everybody has been talking about the A-Bomb, but nobody mentions gas any more. If the choice had to be made, what would be their relative effect?

A. No comment. However, gas utilization is presently forbidden by the Geneva convention.



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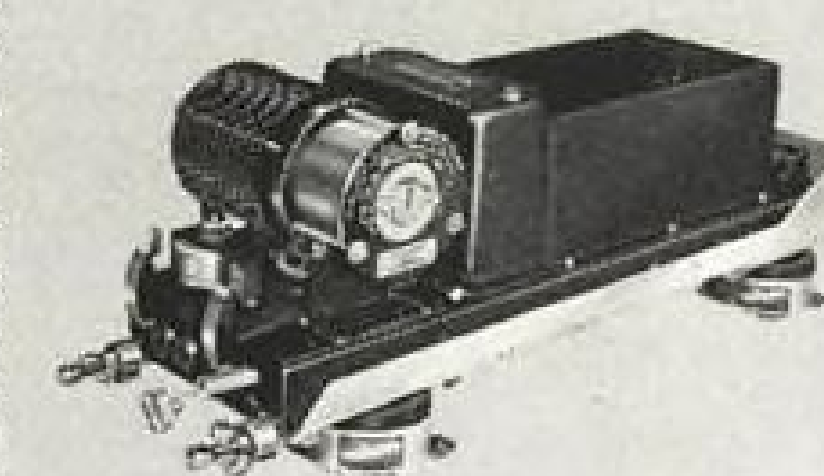
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