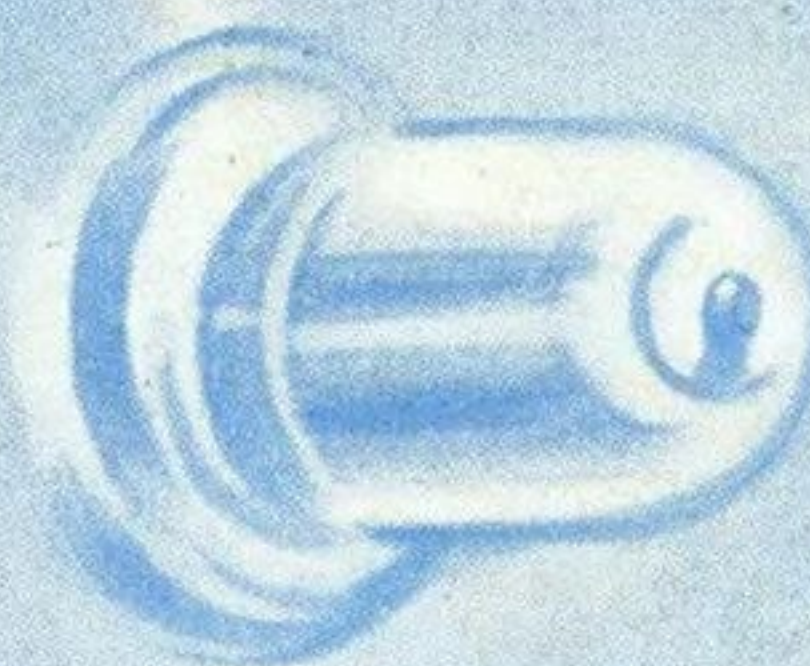
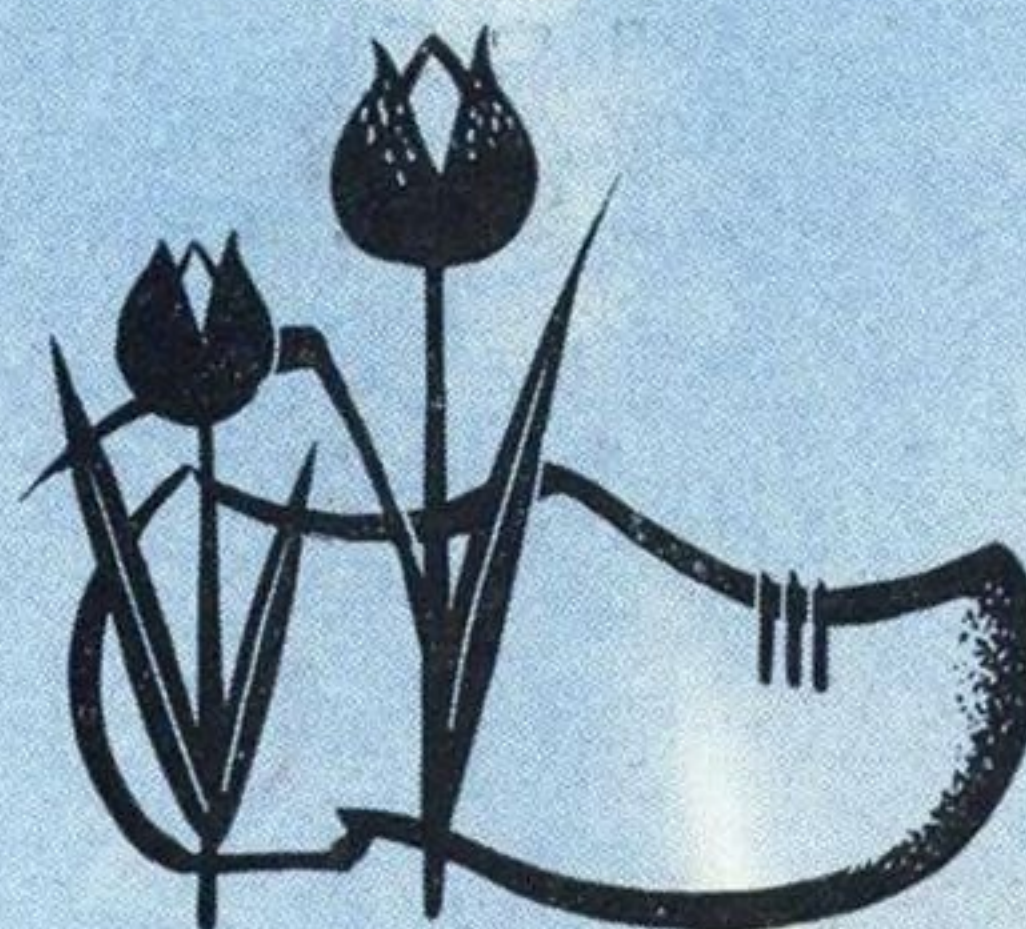
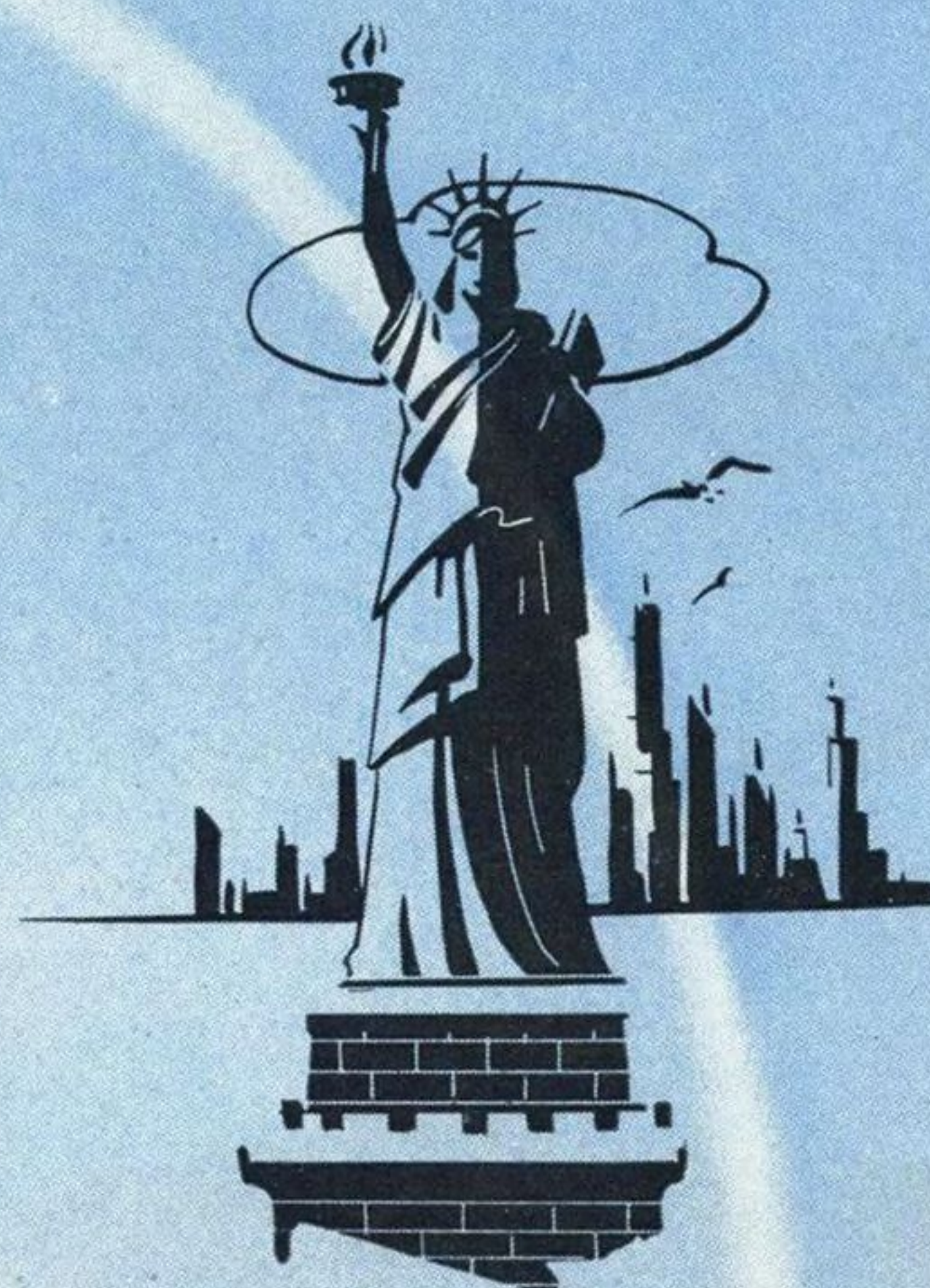
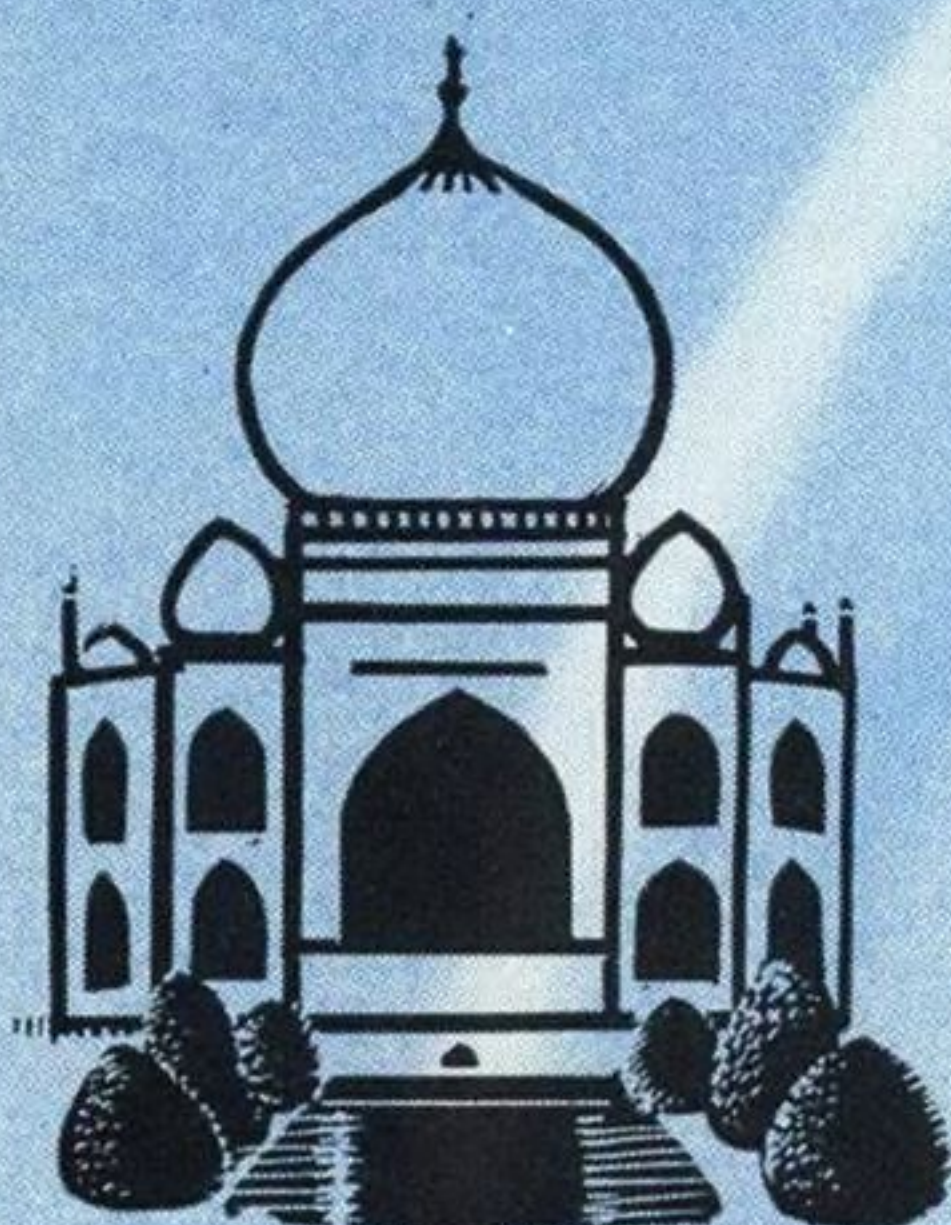


AVIATION WEEK

NOV. 8, 1948

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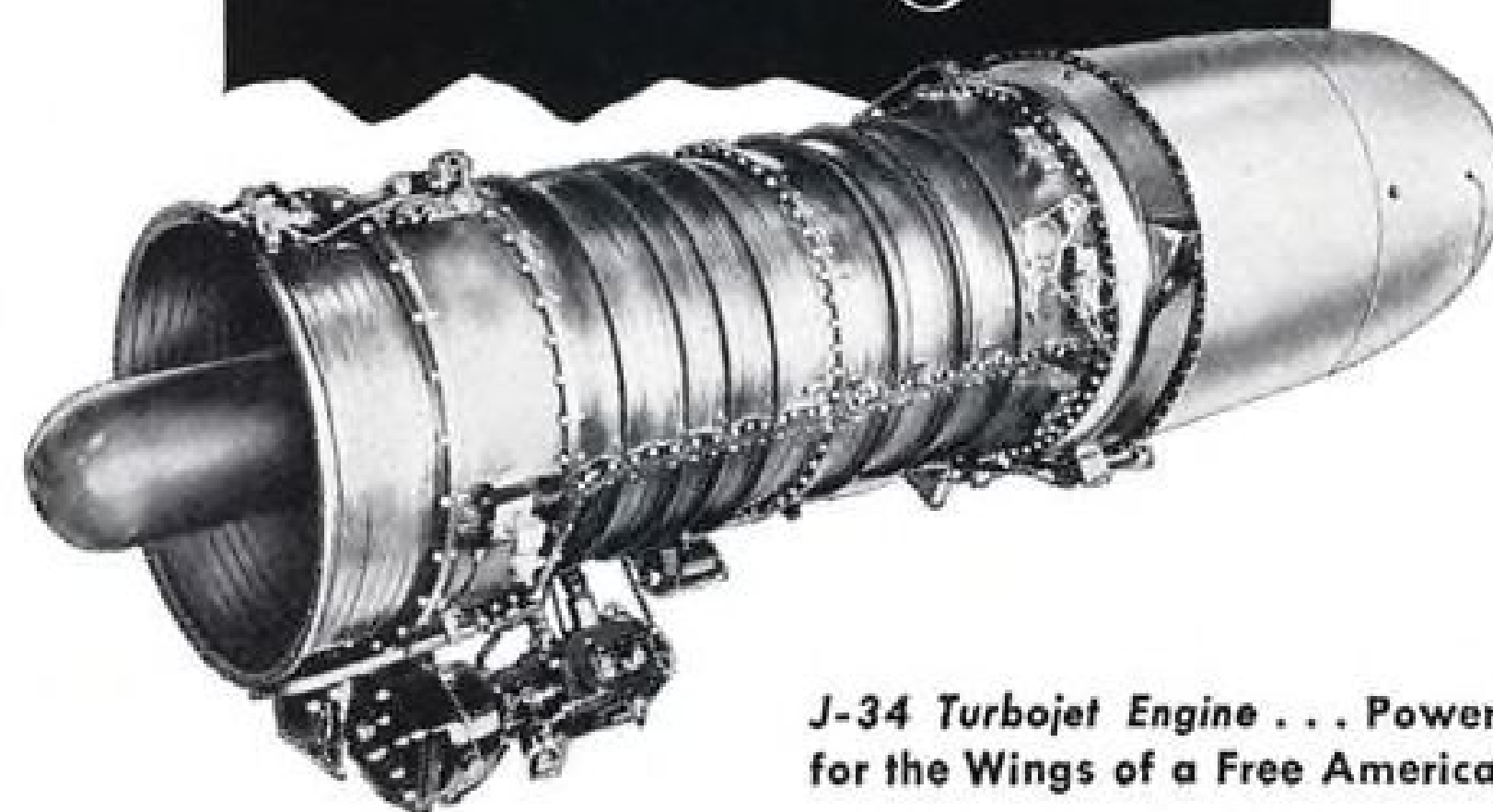
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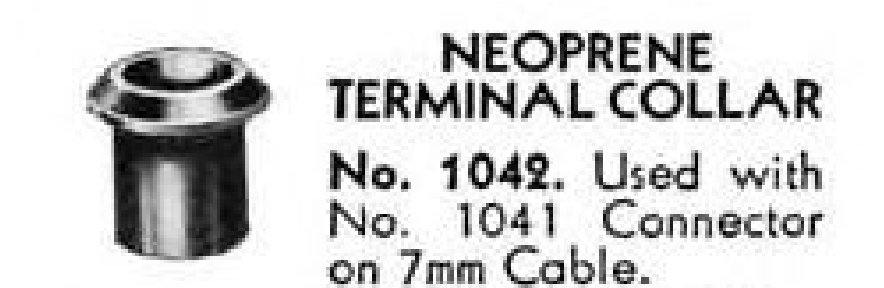
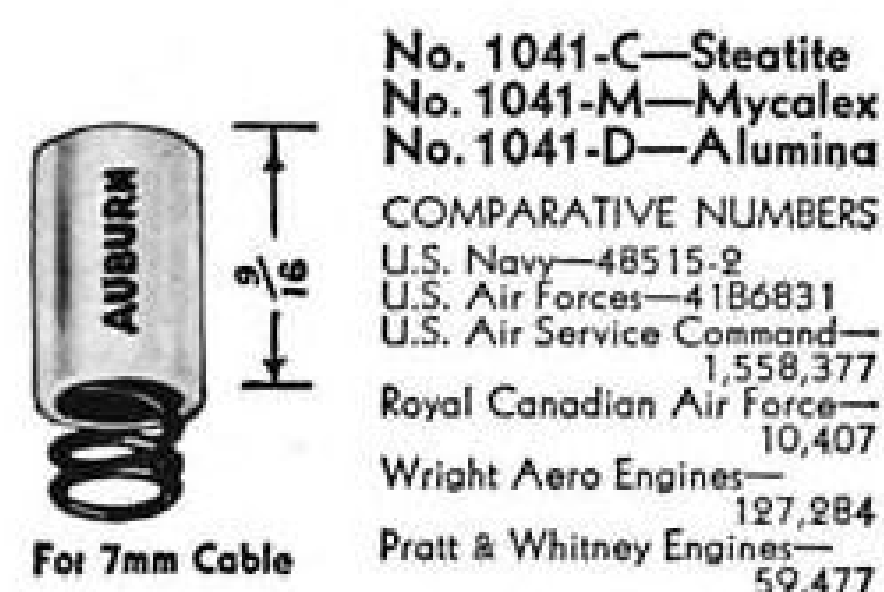
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AVIATION WEEK

Vol. 49, No. 19 November 8, 1948

| | | | |
|-------------------------|----|---------------------------|----|
| The Aviation Week..... | 7 | Engineering | 21 |
| Aviation Calendar | 8 | New Products | 36 |
| News Digest | 11 | Sales & Service..... | 39 |
| Industry Observer | 11 | Briefing for Dealers..... | 40 |
| Headline News | 12 | Air Transport | 43 |
| Letters | 17 | Strictly Personal | 56 |
| Production | 18 | What's New | 56 |
| Editorial | 58 | | |

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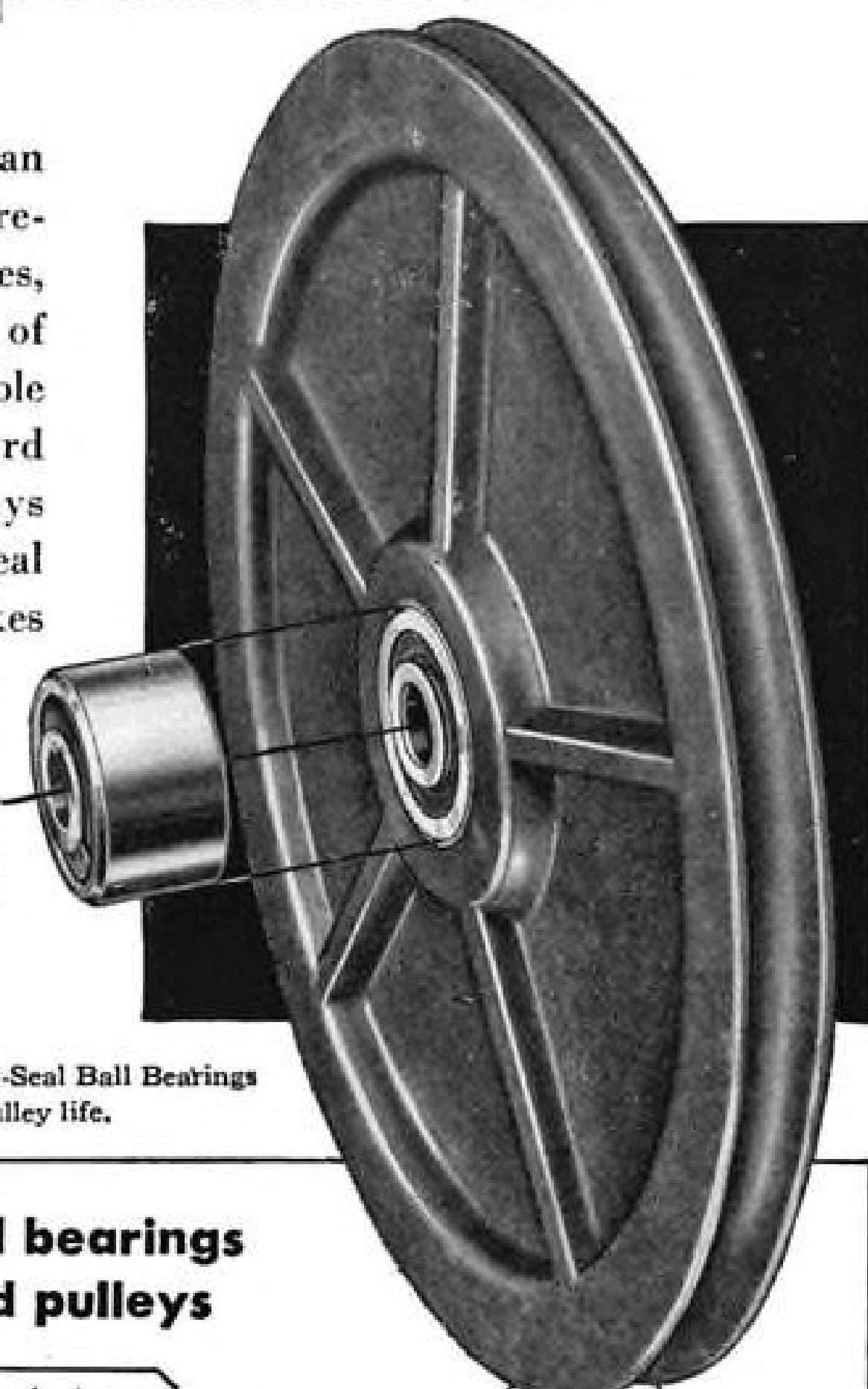
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Three types, five sizes of ball bearings for the eleven NAS standard pulleys

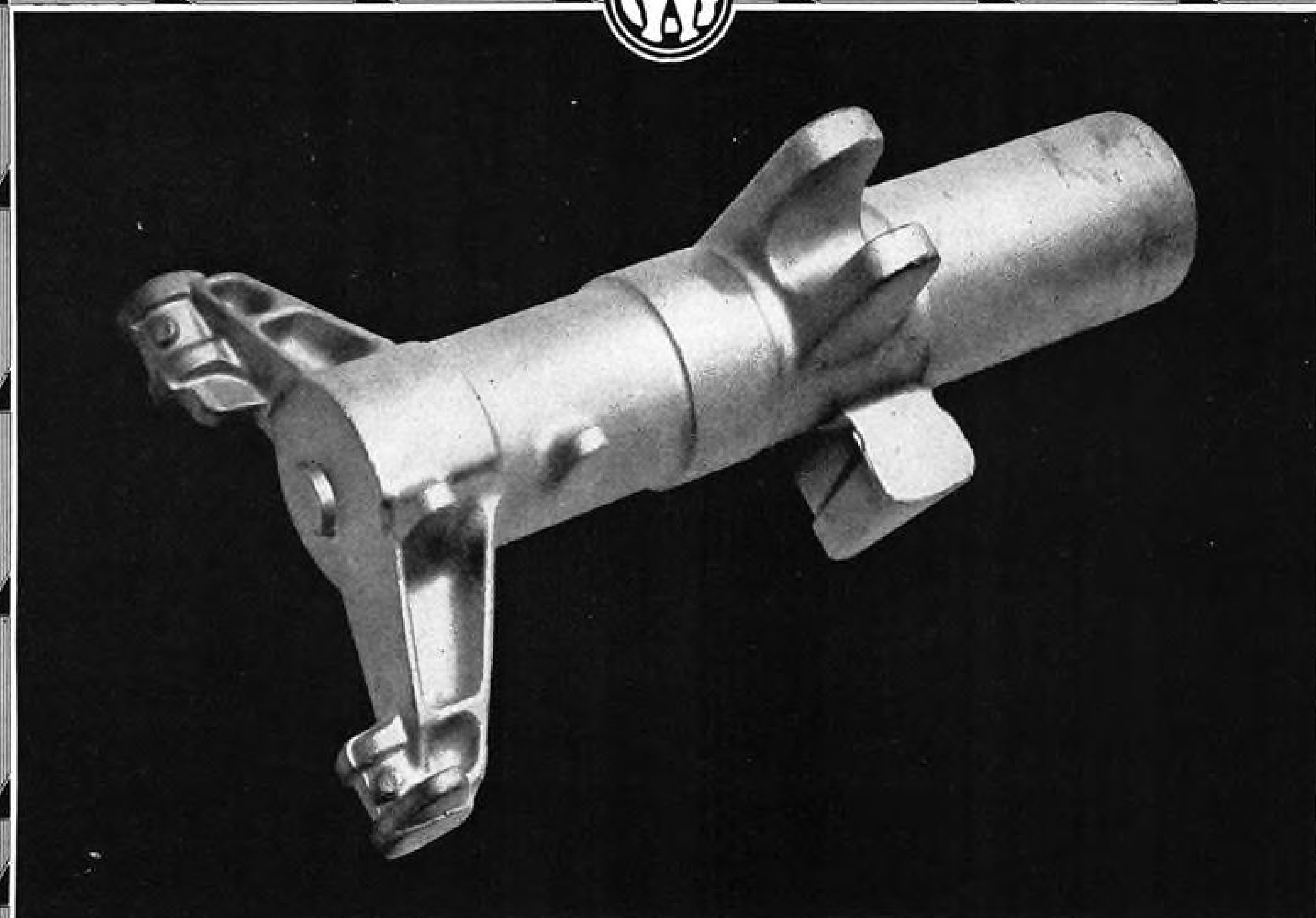
P4 Bearing for NAS 376-2-4 Pulleys
P5 Bearing for NAS 377-1 Pulley
P8 Bearing for NAS 377-2-3-4 and NAS 378-1 Pulleys

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THE AVIATION WEEK

Battle of the Budget

Although the ballots have barely been counted and the gavel calling the 81st Congress to order will not fall for another two months, the airmen and the admirals are maneuvering for another bitter battle over the future of American air power. From all preliminary estimates the 1949 campaign should be a bitter and more decisive encounter than the fray of last spring. Skirmishing is already brisk on the public rostrums with a host of newly-promoted air generals extolling the virtues of the independent Air Force on its first birthday early in the fall and on Navy Day last month 150 admirals solemnly proclaiming 150 reasons why bigger and better carriers are needed.

The Struggle

But the real blows are not being traded on the speakers platforms however acrimonious may grow the debate. It is in the budget hearings of the National Military Establishment now in progress that the hand to hand struggle is waged.

It is the emergence of the National Military Establishment budget for fiscal 1950 that will draw the lines along which the Congressional battle will be fought. Preparation of the budget, normally due in mid-September, has been twice postponed and indications now are that it will be a tight squeeze to get it into the President's January budget message to Congress. The Budget Bureau has already set a \$15,000,000,000 ceiling on the national defense budget. It is obvious that all three services cannot be satisfied under such a ceiling. Whichever is squeezed the hardest will put up the strongest appeal to Congress.

The Air Force has already fired its opening blast in the Congressional battle with a declaration by Senator H. Styles Bridges (R., N. H.) in the Aircraft Industries Association publication *Planes* that the 70-Group Air Force bill will get top priority from the next session of Congress. Bridges is a powerful voice on Capitol Hill as chairman of the Appropriations committee and a member of the Armed Services committee.

Navy Need

In the same publication Rep. Chester Merrow (R., N. H.), a lesser Congressional luminary, chants of the

Navy's need for 17,549 new planes in the next six years.

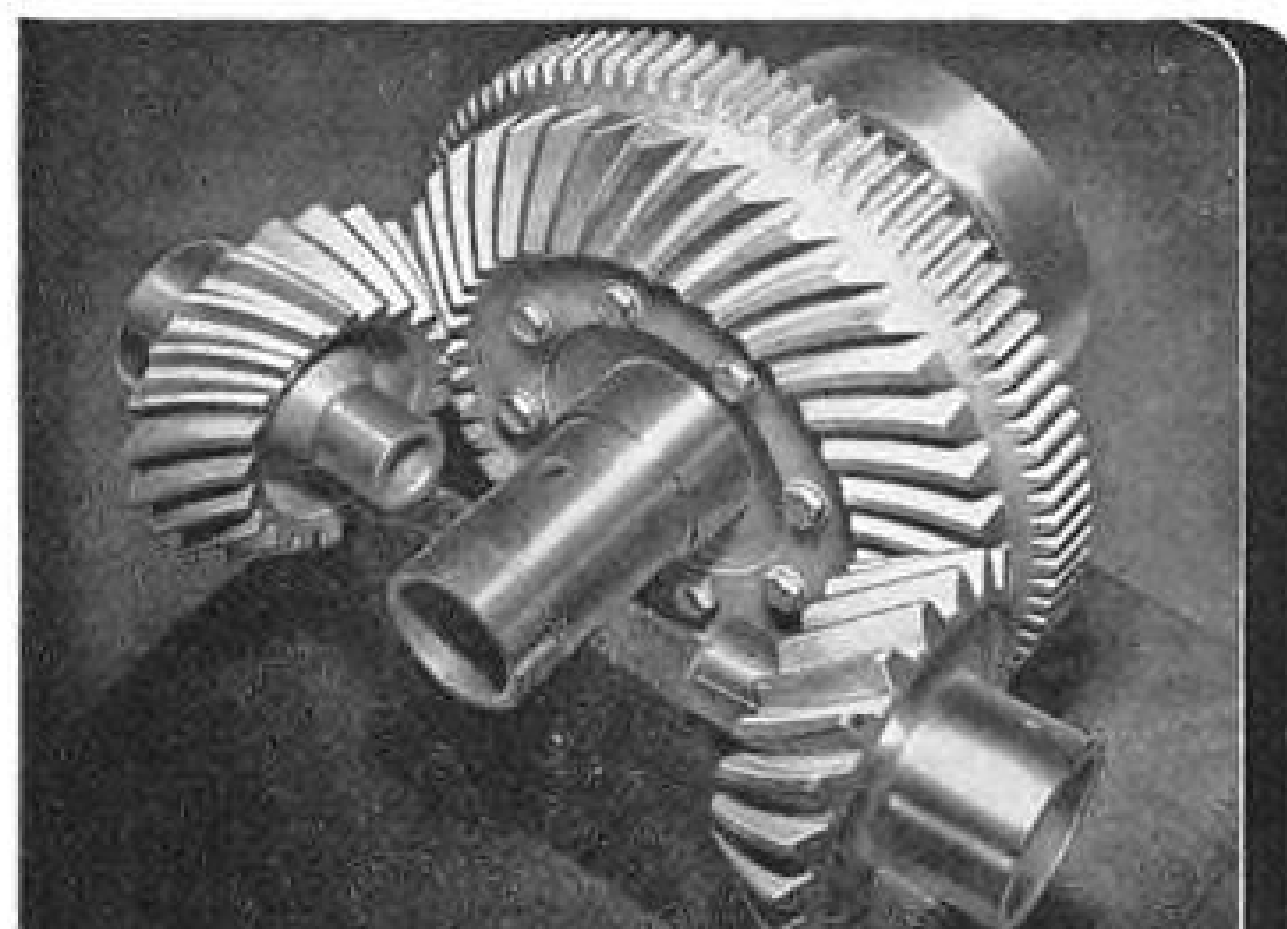
With Democratic control of the Congress, President Truman will probably have more success in enforcing his budget edict than he did during the last session of the 80th Congress. An end run around the White House to Capitol Hill such as was staged by the Air Force last spring will be difficult if not impossible to manage during the 81st Congress.

It now appears that whatever tactics the Navy employs in its fight on Capitol Hill, it will be essentially a rear guard action. The Air Force won the smashing victory during the last Congress and will still be on the offensive pushing the second step in its five-year 70-Group program with the momentum it gained from almost unanimous support last spring. It will have the added advantage now of having for the first time in history a weapon technically capable of waging the kind of strategic air warfare that airmen have been talking about for 30 years. The proving out of the Convair B-36 has materially strengthened the Air Force hand, at least temporarily. For Air Force generals can now tell Congress with a straight face that they have the means to deliver atomic bombs anywhere within the significant northern hemisphere without the use of advanced bases on foreign soil.

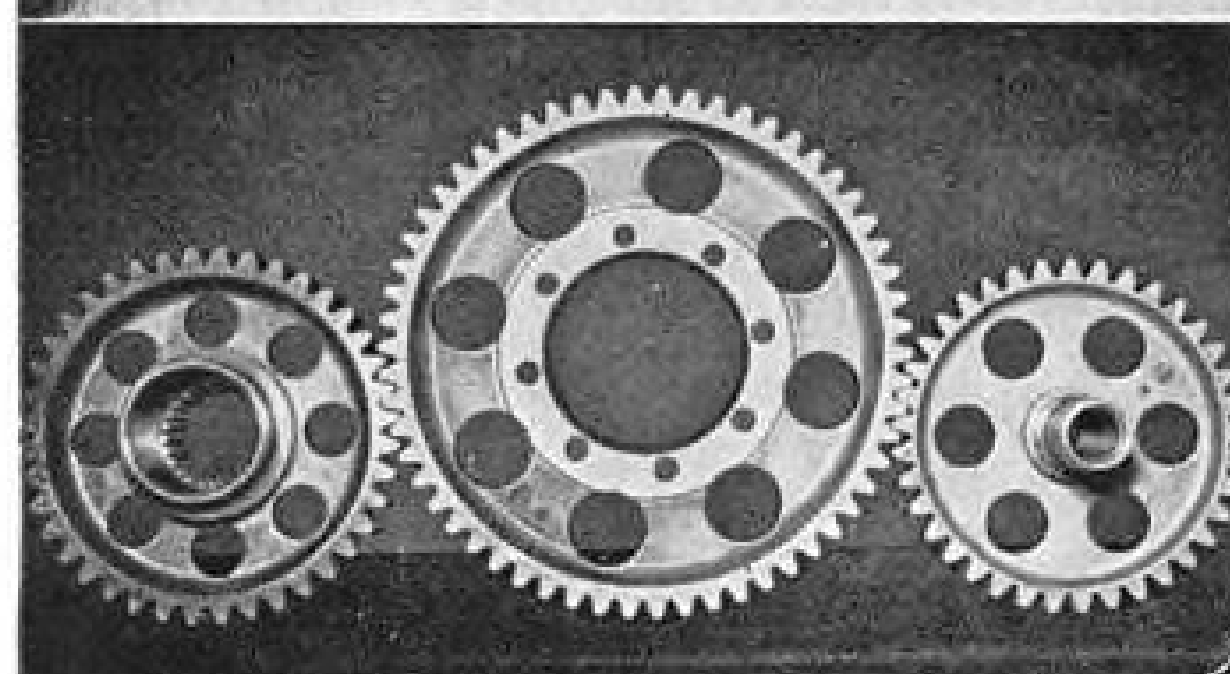
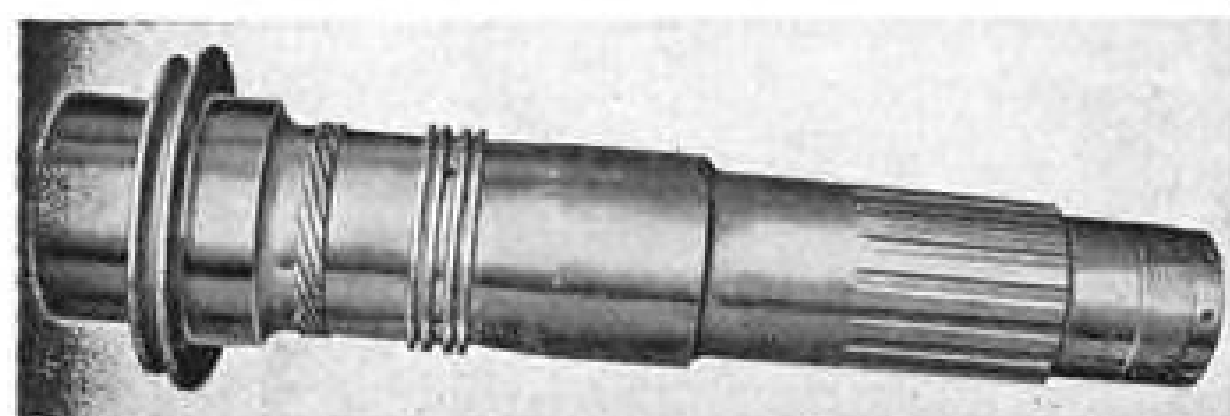
Can't Match

Granting all of the possible tactical shortcomings of the B-36 in combat, the Navy has nothing that can match this weapon at the present time. Its supercarrier is at least five years away. It does not yet have a plane properly equipped to carry the atomic bomb and no practical carrier based atomic bomber that could put to practice the Navy's theories on sea-based strategic air power.

Perhaps the best case the Navy can muster for its immediate role in strategic air war is the proposal by Capt. Schildhauer reported elsewhere in this magazine for a combination of submarine and flying boat tankers sustaining a Navy type bomber on its long haul to and from a potential land target. The current carrier-based aviation of the Navy could be useful only in support of amphibious operators and in sweeping the seas of enemy warships and submarines. At the moment that need seems less urgent to legislators and public alike than the requirement for the means of delivering atomic bombs swiftly and surely deep into the heart of a potential foe. Perhaps this will be the issue on which the coming battle of the budget will be fought.



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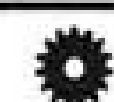
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AVIATION CALENDAR

- Nov. 7-12—Flight Safety Foundation aircraft accident investigation course, Woods Hole, Mass.
Nov. 9—Wings Club annual dinner, Wings Club, New York.
Nov. 9—ICAO Operations Division, Montreal.
Nov. 9—Air Line Pilots Association convention, Hotel Stevens, Chicago.
Nov. 10—Aircraft Industries Assn., ETC-PTC committee meeting, New York City.
Nov. 13-16—American Society for Testing Materials, petroleum products and lubricants, Drake Hotel, Chicago.
Nov. 15-17—Aviation Distributors and Manufacturers Assn., sixth annual meeting, Hotel Statler, Cleveland.
Nov. 15-17—National Aviation Trades Assn., annual meeting, Allerton Hotel, Cleveland.
Nov. 16—Aircraft Industries Assn., ATC panel meeting on AN-D-12A, Van Cleave Hotel, Dayton, Ohio.
Nov. 16-17—American Society for Testing Materials, plastics, Atlantic City, N. J.
Nov. 16-18—National Association of Travel Officials, Miami Beach, Fla.
Nov. 17-18—Aircraft Industries Assn., Air Force-Navy-Industry (ATC) meeting on AN-D-12A, Wright-Patterson Air Force Base, Dayton, Ohio.
Nov. 17-19—American Society for Testing Materials, electrical insulating materials, New York City.
Nov. 18-19—American Society for Testing Materials, structural sandwich materials, Philadelphia.
Nov. 23—ICAO southeast Asia regional air-navigation meeting, New Delhi.
Nov. 28-Dec. 3—American Society of Mechanical Engineers, annual meeting, Hotel Pennsylvania, New York City.
Dec. 1-2—Aircraft Industries Assn., Air Force-Navy-Industry (ETC) meeting on accessory oil seals, Washington, D. C.
Dec. 2-5—Annual meeting of the Society for Experimental Stress Analysis, Hotel Commodore, New York City.
Dec. 2-5—Fourth annual international aviation celebration, El Paso.
Dec. 3—American Helicopter Society, Inc., annual dinner and presentation of honorary fellowships, Hotel New Yorker, New York City.
Dec. 14-15—Aircraft Industries Assn., Air Force-Navy-Industry meeting on accessory drive requirements, Power Plant Lab., Wright-Patterson Air Force Base, Dayton, Ohio.
Dec. 17—Annual Wright Brothers Lecture, Institute of the Aeronautical Sciences, U. S. Chamber of Commerce Bldg., Washington, D. C.
Jan. 5, 1949—Florida Flying Alligator Club, 14th annual reunion, Melbourne, Fla.
Jan. 10-14—Society of Automotive Engineers, Annual Meeting and Engineering Display, Hotel Book-Cadillac, Detroit, Mich.
Jan. 11—ICAO Communications Division, Montreal.
Jan. 24-27—IAS seventeenth annual meeting, Hotel Astor, New York City.
Jan. 27—Society of Automotive Engineers, metropolitan section, fuels and lubricants meeting, Engineering Societies Bldg., New York City.
Feb. 8—ICAO Operations Division, Montreal.
Feb. 22—ICAO Airworthiness Division, Montreal.
Mar. 3—Society of Automotive Engineers, metropolitan section, air transport meeting, Engineering Societies Bldg., New York City.
July 3-4—First Annual Southern California International Air Race, Long Beach.

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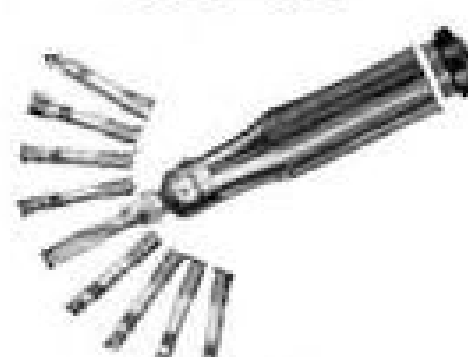
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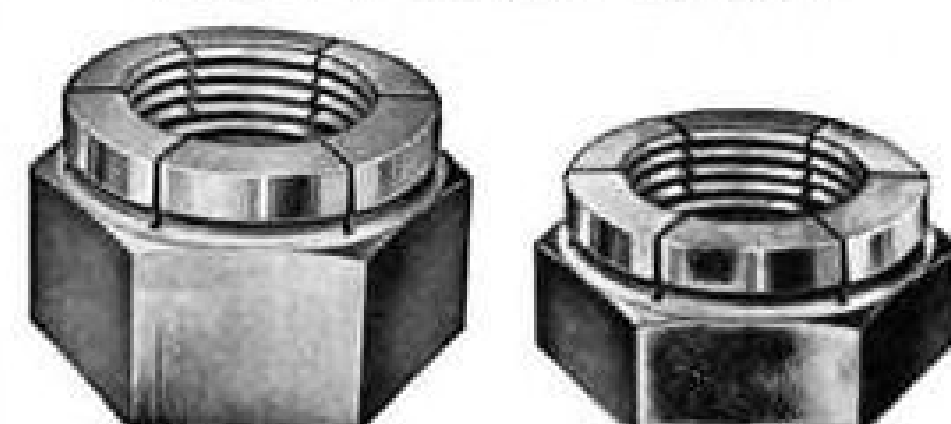


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NEWS DIGEST

DOMESTIC

Flight Safety Foundation transferred its aircraft accident investigation course (AVIATION WEEK, Nov. 1), opening today, from Woods Hole, Mass., to Mitchell Air Force Base, Hempstead, N. Y., better to demonstrate fire rescue.

Air Line Dispatchers Assn. elected Marvin C. Merrill president. He has been a dispatcher for Inland Airlines and Western Airlines. He succeeds George E. Deininger resigned.

Personal aircraft shipments for September reported to Aircraft Industries Assn., fell to 575 from 680 in August. Value totaled \$2,460,000, against \$2,764,000 in August. Shipments included 359 four-place, 216 two-place.

American Airlines stores department workers at LaGuardia Field, members of Local 501 of Transport Workers Union, ended a two-day strike which began when the union members protested use of other employees in taking inventory. About 150 employees were involved. AA's operations were not affected.

FINANCIAL

Douglas Aircraft Co. reports net income after taxes of \$1,950,795 for nine months ended Aug. 31, on sales of \$80,251,121. For the nine months ended Aug. 31, 1947, company had net loss of \$1,170,037. Aug. 31, 1948, backlog was \$202,201,000, 93 percent of which was military. Backlog does not include about \$70 million in military contracts not yet signed.

McDonnell Aircraft Corp. reports net income after taxes of \$1,675,327 for year ended June 30 on sales of \$20,704,996. For previous year, net was \$540,870. June 30 backlog totaled \$90,872,077, 95 percent in Navy production contracts, 2 percent Navy experimental and 3 percent USAF experimental work. Backlog is highest in company history.

Republic Aviation Corp. reports net income after taxes of \$2,274,870 for nine months ended Sept. 30 on sales of \$39,371,559. Earnings include carry-forward federal income tax credit of \$397,000. Backlog is about \$70 million, mostly for F-84 Thunderjet fighters.

Cessna Aircraft Co. declared dividend of 25 cents per share on 700,000 shares of outstanding stock, payable Dec. 8. In fiscal year ended Sept. 30, company's sales increased about 40 percent to approximately \$14,250,000.

Konrers Co. announced dividend of 50 cents a share payable Jan. 2, 1949, to holders of record Dec. 17, as first step in new policy of paying total of \$2 in dividends annually.

INDUSTRY OBSERVER

► Fairchild Engine and Airplane Co. has completed first two prototypes of the C-119, an improved version of the Packet and the mockup of the C-120, another version of the Packet with a detachable fuselage. Production line is being set up to handle the initial 10 production models of the C-119 while small parts are being fabricated for the C-120 prototype.

► Prototype of the Australian-built de Havilland Drover has completed its company tests and is now with the Royal Australian Air Force for service tests. Second experimental model of this tri-motor transport will add servo tabs to aileron controls as the only major change over the first model.

► A pusher type Goodyear racer is being designed by Maurice Delanne. The racer will be built in Texas. Delanne claims his design will get 230 mph. out of the 85 hp. Continental engine required for the race. The Delanne plane is 17 ft. 3 inches long with a wingspan of 16 ft. 4 inches.

► Second Martin XB-48, six-engined jet bomber has been flown to Naval Air Test Station at Patuxent, Md. for preliminary flight tests before delivery to Wright-Patterson Air Base. First XB-48 which made its first flight more than a year ago is still undergoing flight tests at Wright-Patterson.

► Boeing Airplane Co. will expand its activities at its wartime, government-owned Renton, Wash. plant. Boeing is now using about one-third of the Renton plant for storage but will eventually produce experimental models of the XB-52 and XB-55, giant turboprop bombers there. Production of the B-54, an improved version of the B-50 powered by Pratt & Whitney VDT engines is also scheduled for Renton.

► Certification of the Constellation for a new gross takeoff weight of 105,000 lb., adding nearly 3000 lb. to useable load, will be sought by Lockheed in flight tests due to start immediately. Moderate strengthening of several structural points will be required for the new load condition, but will increase empty weight by not more than 450 lb. Lockheed plans to make modification kits available to new-type Constellation owners for modification of their equipment to new weight allowances after certification is gained.

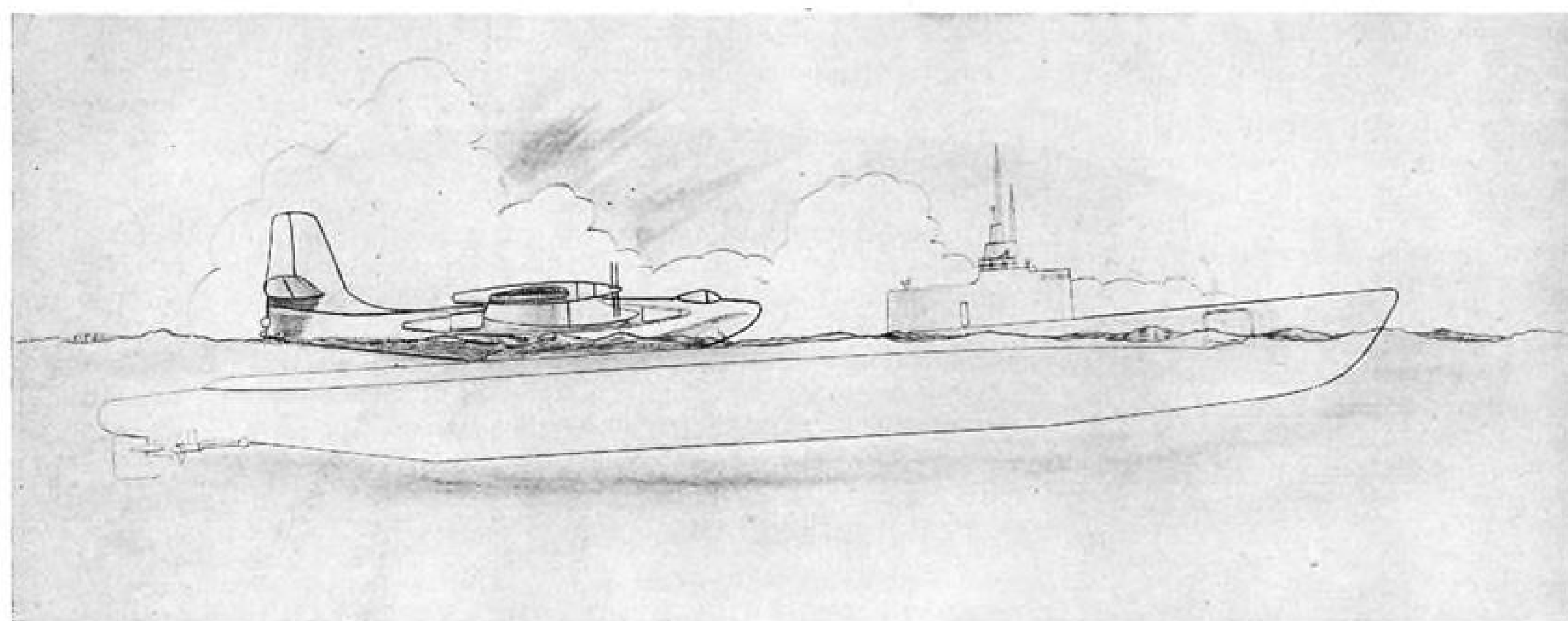
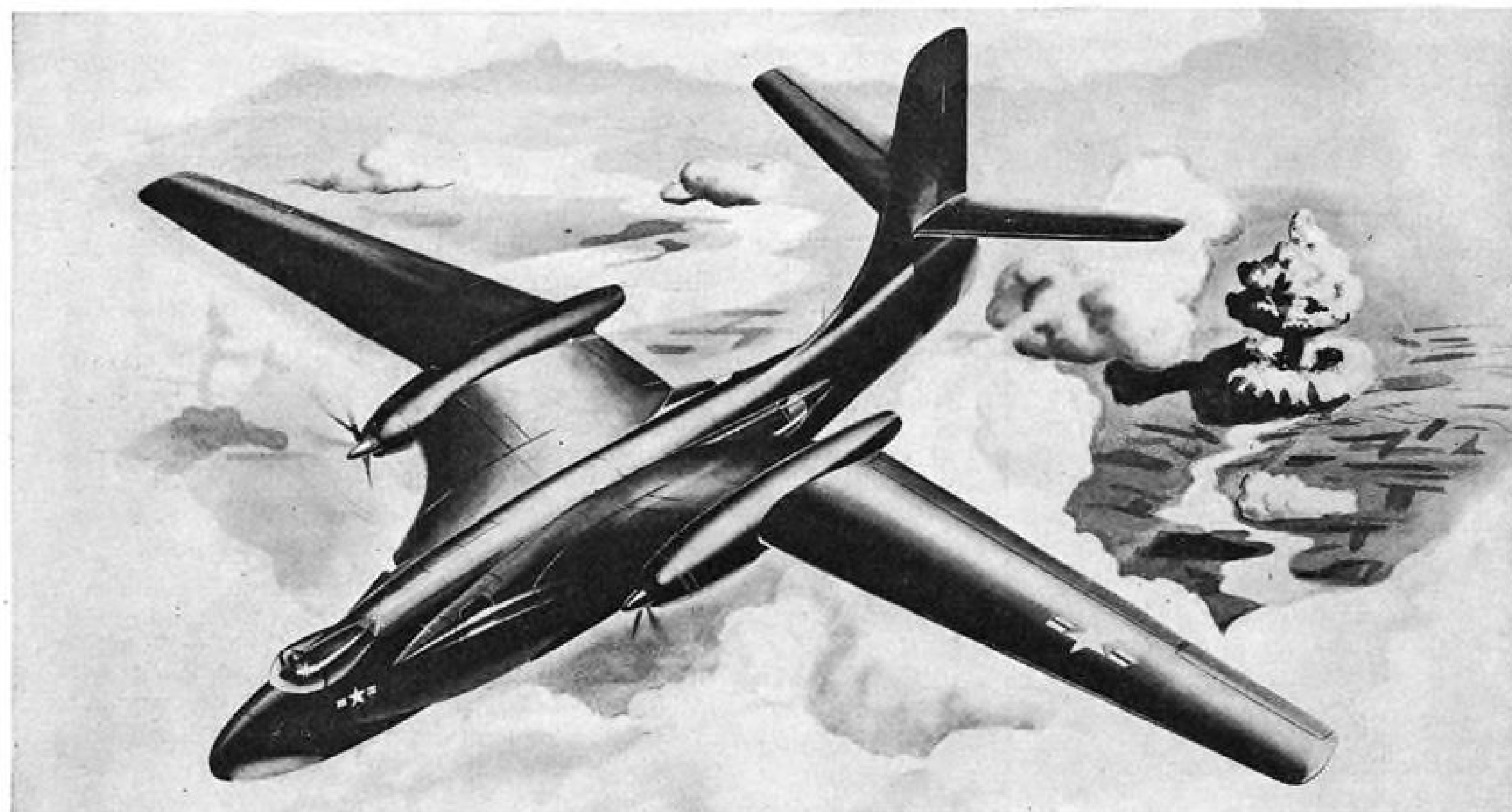
► Ryan Aeronautical Co. is now at work on a \$1,325,000 subcontract from Boeing for the construction of Stratocruiser fuselage sections. The 14-ft. dia. sections comprise the rear fuselage of both the commercial Stratocruiser and the Air Force C-97A cargo carrier.

► Industry observers wonder how long Air Force and Navy experimental test pilots are going to have to buy their crash helmets out of their own pocket because Wright Field and BuAer procurement officials refuse to provide them with the new types of protective helmets used by most aircraft company test pilots.

► Trans-Canada Air Lines is switching from four to three-bladed propellers on its North Star (DC4M-2) transport in an effort to alleviate passenger complaints of excessive noise. Exhaust stacks are also being redesigned to channel their noise away from the cabin.

► The Italian four-engine transport, Breda-Zapata 308, has completed its initial test flight at Milan. This transport is powered by British Bristol Centaurus engines and is on order for Italian Airlines and the Argentine Air Force.

► Avro's Shackleton bomber is nearing completion and is expected to fly early next year. The long range reconnaissance bomber, originally designed for Coastal Command, is larger than the Lincoln and is powered by four Rolls-Royce Griffon reciprocating engines.



Plane-Sub Team Devised for Navy

By Robert Hotz

A new type of Naval air strategy was proposed last week for the long range delivery of atomic bombs on enemy targets. It would link the new type flying boats now under development by

the Navy with submarines in a tactic that could, according to its proponent, deliver atomic bombs economically and effectively.

The operation is predicated on two developments already well advanced: first the development of a fast, long

range flying boat with performance equal to that of the best land-based bombers now in prospect and second, the provision of submarines equipped to function as flying boat tenders capable of refueling and arming these planes at sea.

► **Use U. S. Base**—Utilizing this equipment a flying boat could take off from any port in the United States, refuel from one or more submarines at sea and take aboard its atomic bombs from the final submarine contacted; make its attack on any land target within 2000 miles of its last refueling point; and return to another submarine for refueling on the way home. Advocates of this tactic point out that it offers the twin advantages of surprise and economy.

Cost of a speedy flying boat and its submarine tenders would be only a fraction of the price of a super-carrier and its train or a land-based very heavy bomber group and its housekeeping and defense auxiliaries. By using mobile, disappearing submarine bases the possibilities of surprise for this type of attack are enhanced.

► **Japs Use Method**—During the last war the Japanese used this type of attack to bomb Hawaii three months after their initial attack on Pearl Harbor. This little publicized attack was made by two Japanese Emily type flying boats based on Wake Island. On the night of March 4-5, 1942, they were refueled off French Frigate Shoals, west of Hawaii, by three specially equipped tanker submarines of the Japanese sixth fleet. They flew to Hawaii where one dropped bombs near a high school in Honolulu. The other veered off before it reached Oahu and did not bomb. Neither Navy nor Air Force planes were able to make an interception.

The Navy has already announced it has converted one of its submarines to an experimental tanker. Submarines capable of housing and servicing aircraft were developed before the last war by the French and Japanese. Conversion of a modern submarine to a flying boat tender would be relatively simple according to Naval experts.

► **Schildhauer Is Proponent**—The use of flying boats and submarines for long range, surprise atomic bomb attacks was proposed by Capt. C. H. (Dutch) Schildhauer, USNR (ret.) a pioneer in the development of long range flying boats.

It has been discussed unofficially with a number of high ranking Naval air admirals none of whom have offered any insurmountable technical obstacles to its execution. Navy refrained from any official comment on the proposal. It is believed that official Navy endorsement of the project might be construed as a violation of the Newport agreement in which the Joint Chiefs of Staff gave the Air Force primary responsibility for strategic bombing.

► **Flying Boat Pioneer**—Schildhauer has been a Naval aviator since 1921. He was a test pilot at the Naval Aircraft Factory where he was associated with the testing of the Glenn L. Martin Co.

Latest Orders Announced by AF

U. S. Air Force last week confirmed AVIATION WEEK's exclusive story on Sept. 27 that final aircraft procurement awards for fiscal 1949 would go to Northrop, Boeing, Cessna, and Sikorsky division of United Aircraft Corp. USAF also confirmed AVIATION WEEK's exclusive story on October 4 that Convair had won the Air Force twin engine trainer competition with a modified version of its commercial transport Convair-Liner.

Latest orders for fiscal 1949 as announced by the Air Force:

- **Boeing Airplane Co.**—10 B-47 six jet bombers.
- **Northrop Aircraft Inc.**—30 Raider (C-125) tri-motor transports.
- **Convair**—37 T-29 twin engine navigator and bombardier trainers.
- **Cessna Aircraft Co.**—12 Model 195 four place executive transports.
- **Sikorsky Division of UAC**—26 H5G four plane rescue helicopters.
- **Kellett Type Ordered**—An order for 10 Kellett XH-10 ten-place transport helicopters will also be placed but USAF has not yet determined who will produce the Kellett-developed model.

USAF still has \$96,000,000 of its fiscal 1949 procurement funds to spend.

Approximately \$16,000,000 is earmarked for guided missiles and the other \$80,000,000 is scheduled for buying a new type night fighter after cancellation of Curtiss-Wright's order for production of 88 F-87s.

► **Type Changes**—Changes in plane types ordered since the original procurement schedule was planned has cut the total number to be bought from 2727 to 2539. Shifts from low cost liaison planes and helicopters to expensive jet bombers and twin-engine trainers caused the reduction of 188 planes from the original procurement program approved by the final session of the 80th Congress. Purchase of 10 Boeing B-47 jet bombers at approximately \$4,000,000 apiece and a switch from standard Convair-Liners to be used as pilot trainers to an extensively modified version suitable for bombardier and navigator training were the major changes in the final procurement allocations responsible for the 188 plane reduction.

Meanwhile the Navy put a request to spend an additional \$84,900,000 for new aircraft, plant facilities and guided missiles. Of this fund \$67,600,000 will go for new planes.

submarine plane in 1924. This seaplane operated from a submarine at sea and was hangared in a watertight tank when the submarine submerged. Schildhauer resigned from the Navy in 1930 to become associated with General Motors Corp. in its Dornier Co. of America, a subsidiary of the German flying boat manufacturers.

He joined Pan American Airways in 1933 and directed survey operations for commercial flying boat service across the Atlantic and Pacific. During the war he organized the Naval Air Transport Service and was Navy project officer on development of the giant Martin Mars flying boats. After the war he became associated with the Glenn L. Martin Co. in the development of large, high speed flying boats.

► **Design Features**—The flying boat-submarine combination will require a flying boat of the design type (top sketch) featuring the high length-beam ratio already used on the Convair XP5Y-1; turboprop power for cruising and turbojet power for maximum speed in the target area; a gull wing to keep propellers clear of the water and retractable wing floats. This flying boat would gross about 140,000 lb.; have a range of more than 4000 miles and be capable of 400 mph. at 35,000 ft.

All of the design features required for a flying boat with this performance

have been proved feasible by research of the National Advisory Committee for Aeronautics and many of them are already incorporated in experimental flying boats now nearing completion.

► **Tender Requirements**—The submarine tender would take the flying boat aboard its semi-submerged stern (bottom sketch) and lift the plane into position for refueling and taking aboard atomic bombs by blowing its stern ballast tanks and bringing the stern to the surface. Schildhauer pointed out that extreme rough water handling characteristics would not be required for these flying boat bombers since the refueling operations could be conducted in relatively shallow waters, the lee of islands or other protected anchorages.

If immediate operations of this type are required it would be possible to execute the tactic, Schildhauer believes, through the use of a flying boat tanker of the Mars type refueling a long range land-based bomber such as the Lockheed P2V type. This plane already holds the world long distance record of 11,239 miles nonstop from Australia to Columbus, Ohio. The flying boat tanker would take on fuel from a submarine tanker, and refuel the bomber in the air for its final run to the target. This admittedly would not be as simple or effective as the flying boat-sub team that would be possible in the future.



F-80 Flies on Ramjet Power Alone

As part of engine development program, more than 100 flights made with units mounted at wing tips.

A piloted aircraft has been flown solely on ramjet power. The feat was accomplished for the first time Nov. 21, 1947 by Tony Levier, Lockheed chief engineering test pilot, in a Lockheed F-80 jet fighter with ramjet units mounted at the wingtips.

Subsequent ramjet flights have been made by H. R. "Fish" Salmon, Lockheed test pilot, with E. L. Joiner, flight test engineer, as observer. The flights have been made from Lockheed's flight test base at Van Nuys, Calif., and at Muroc Air Force Base, Calif.

► **Marquardt Engines**—The ramjet engines were designed and built by Marquardt Aircraft Co., Venice, Calif., under an Air Force development contract. Two sizes have been used, one 20 in. diameter and 7 ft. long and another 30 in. diameter and 10 ft. long.

Since the ramjet engine must attain an incoming airflow of 250-300 mph. in order to sustain combustion, the F-80 is taken off with its Allison J-33 turbojet engine and flown to a speed of about 400 mph. and an altitude of 20,000 ft. before the ramjets are ignited. After the ramjet engines commence firing, the turbojet engine is throttled and the plane flown on ramjet power alone.

► **Research Project**—The ramjet project, which has been under way for more than a year at Lockheed, is a research program on the development of the ramjet engines and is not designed to increase the performance of this F-80, which is used merely as a high-speed test vehicle. More than 100 flights have been made during the program.

The F-80 is instrumented to record thrust, drag and fuel consumption of the ramjet engines. Recording is made by means of a camera mounted before a

special instrument panel, providing a continuous photographic record of instrument readings, which include airspeed, air temperature, fuel temperature and altitude data.

► **Flame Trail**—Initial firing of the ramjets produces a flame trail 30-40 ft. long from the aft end of the units. As firing progresses this trail is reduced to 15-20 ft. As soon as the proper relationship between airspeed and fuel speed is obtained, the flame trail disappears. The ramjets are extremely noisy, however, and the airplane can be heard for miles. This is one of the tactical objections to their use.

Major advantage of the ramjet engine is its ability to produce increasing power at increasing speed and it has been held the ideal powerplant for high supersonic speed. Its primary disadvantage is its high fuel consumption rate, which is second only to the rocket in the propulsion spectrum. However, at high supersonic speed, its fuel consumption per mile is comparable to that of present reciprocating engines.

Air Force Confirms YB-49 Record

The Northrop YB-49 has remained aloft 9 hours to smash all jet aircraft distance and endurance records. The huge, eight-jet bomber covered 3458 miles over a circuitous course remaining in the air for 9 hours 30 min. The flight took off from and landed at Muroc Air Force Base, Calif.

The 100-ton craft carried a crew of five, a total of 13,000 gal. of fuel and extensive test instrumentation. Although the high altitude portion of the

flight was made at an average ground speed of 382 mph., the flight was an endurance test and no attempt was made to achieve high speed. The Air Force announcement confirmed an exclusive AVIATION WEEK story of June 28, 1948.

► **Used Eight Engines**—All eight of the Allison J-35 turbojet engines were used throughout the flight with the exception of one engine that developed a hot bearing after 6½ hr. running and had to be shut down. Power was increased on the remaining engines to maintain the original cruising speed. There was no increase in fuel consumption created by the change in power.

The cruise portion of the flight lasted 9 hr. 3 min. and was made at 35-40,000 ft., 27 min. being consumed in takeoff, climb and descent. Long vapor trails extended across the sky for as much as 100 miles behind the bomber.

► **Test Crew**—The five-man crew consisted of Air Force Capt. Jay Wethe; Max Stanley and Fred Bretcher, Northrop test pilots; Orva H. Douglas and Don Swift, Northrop flight engineers. The crew members were rotated at the controls during the flight.

Indicative of the range potential of the low drag Flying Wing bomber is the fact that the YB-49 took off at a gross weight considerably less than its maximum 213,000 lb. Although about 13,000 gal. of jet fuel were carried, this capacity can be increased to more than 18,000 gal. by the use of bomb bay fuel cells, permitting the craft to stay aloft more than 13 hr. and cover well over 5000 miles.

► **Production Model**—Although the propeller-driven YB-35 Flying Wing version is classed as a heavy bomber because of its 10,000 lb.-for-10,000 mi. performance, the shorter range of the YB-49 results in its being classed only a medium bomber by the Air Force. Air Force has ordered 30 jet-Wings, the production RB-49 being designated a photo-reconnaissance version carrying a large variety of camera equipment.

British Bombers—Present, Future

Piston engine Avro Lincoln to remain standard bomber of RAF until advance jet projects become reality.

Recent "mock war" exercises over England and the new panic expansion of the sadly depleted Bomber Command of the Royal Air Force throws the spotlight on British bomber policy.

Close of World War II saw the sudden and complete disinterest of the British government in new bomber projects. Because of the amazing advances in the jet field, nearly all postwar projects have been scrapped. Those that remain are listed below. None is of the piston engine type.

► **Advanced Types**—According to one British spokesman, financial considerations, and, more important, the shortage of facilities and skilled design personnel prevent any attempt at a heavy bomber such as the Convair B-36. Instead concentration is directed on advanced projects, jet-powered swept-wing long-range medium-load carriers. The spokesman said, "We don't want any interim bombers such as are being produced in the States. We want bombers which will out-perform existing types by a wide margin."

Inference then is that in the event of any war in the next five years, Britain would have to look to the United States for strategic bomber supply or rely on flight-refuelled Avro Lincoln medium bombers.

► **RAF Standard Bomber**—The Avro Lincoln B.Mk.2 is the mainstay of Bomber Command and is powered by four 1635-hp. Rolls-Royce Merlin 68A liquid-cooled V-piston engines driving from blade propellers. A mid-wing monoplane with out-rigged twin fins and rudder, the Lincoln B.Mk.2 has a gross maximum weight of 82,000 lb. (empty weight, 44,188 lb.). Span is 120 ft.; length 78 ft. 3 in. With 14,000-lb. bomb load, carrying nearly 2400 gal. of fuel, the Lincoln B.Mk.2 has a best combat range of just over 2600 mi. at 215 mph. at 20,000 ft. Maximum speed is a little over 300 mph. at 18,000 ft.

A slightly larger development of the Lincoln B.Mk.2 is the new Shackleton G.R.Mk.1, which weighs over 12,000 lb. more than the Lincoln. In comparison, the maximum bomb loads for short-range operation are 22,500 lb. (Lincoln), 25,000 (Shackleton). The Shackleton is powered by four 2450-hp. Rolls-Royce Griffon 57 V-liquid-cooled piston engine. Little is known regarding the future of the Shackleton except that it is destined for the RAF Coastal Command and may be built in small numbers only. In outline the Shackleton resembles the Lincoln. It is not yet in production.

► **New Jet Prototypes**—Oldest design belongs to a little-known company, the English Electric Co., Ltd., of Preston, Lancashire, which has been mainly responsible for bulk production of the de Havilland Vampire series of single-jet fighters. Before that, EEC concentrated on the Handley-Page Halifax four-motor heavy bomber (over 6000 were built by EEC and other subcontractors during World War II). What shape the new jet bomber takes is as yet unknown, but reports indicate that it is of advanced configuration and is powered by four centrifugal-compressor units.

Second design which is going ahead is the Bristol Type 173, under construction at the Filton, Bristol works. It is powered by two or four jet units situated in the fuselage and wing roots with sweptback wing and tail surfaces.

► **"All-Wing"**—Third design is under way at the Cricklewood home of Handley-Page, Ltd. This is an "all-wing" design. Wing data have been gained from the Handley-Page H.P.75 Manx twin-engine flying scale all-wing monoplane.

None of these three jet bombers is ready for flight trials. It is doubtful if any further details will be forthcoming until after they have flown, which will not be before next year at the earliest.

Meantime the British Air Force will have to be content with squadrons of Avro Lincoln and Lancaster heavy bombers which are outclassed by the Boeing B-50 Superfortress, Convair B-36 and the Northrop B-49 Flying



PHANTOM BELLY TANK

First published photograph of special, form-fitting jettisonable belly fuel tank used for more than a year on the McDonnell FD-1 Phantom Navy and Marine Corps fighters. (Information was just declassified by Navy.) The tank contains 295 gal. and nearly dou-

bles Phantom supply. Tanks are not standard equipment for carrier operation due to high oleo travel of carrier landings but are used for cross-country land-based flights permitting low approach angle. Short landing gear renders installations complex.

Wing. British are not likely to have jet bombers in service before 1952-3.

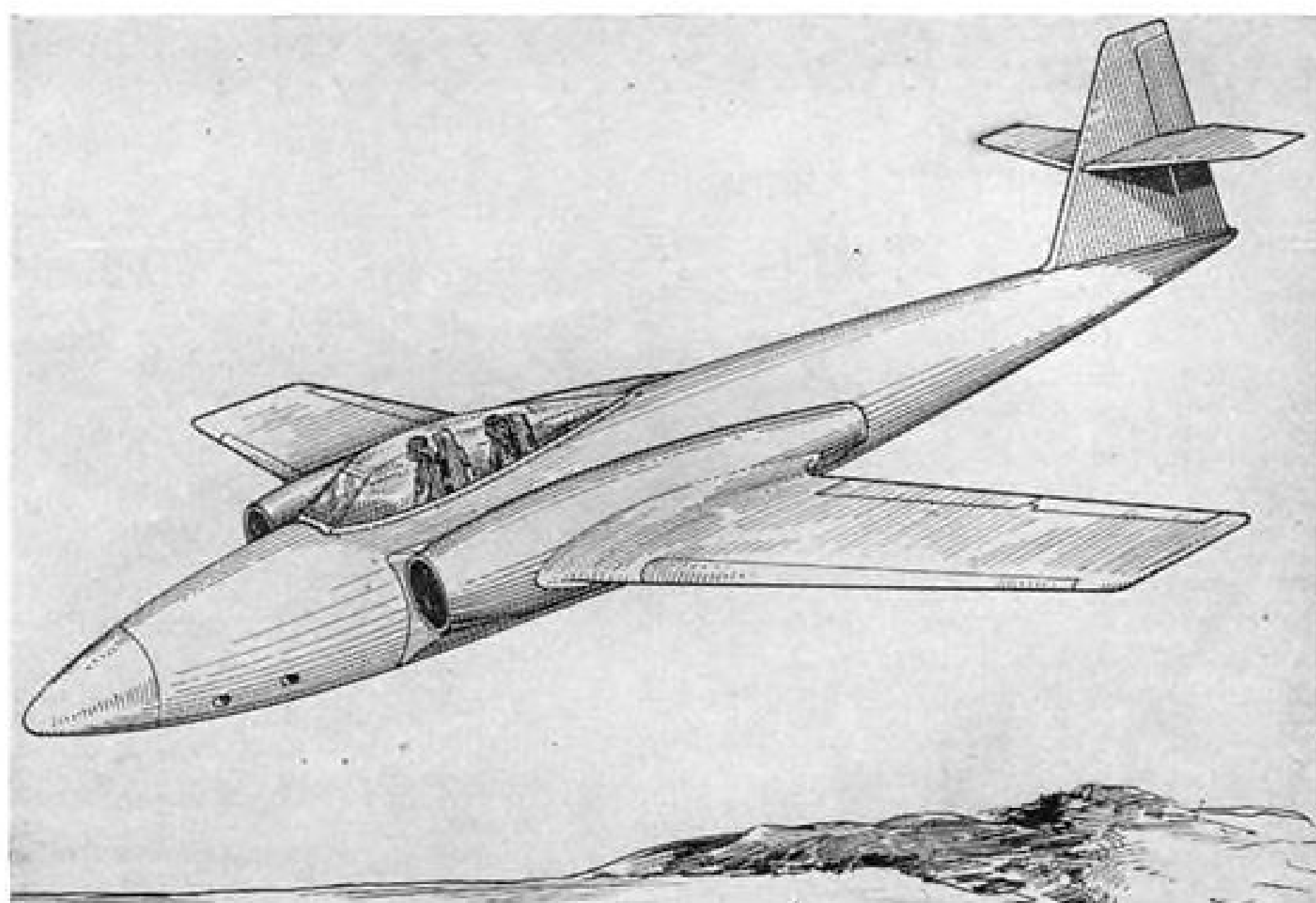
American and Delta Ask Equipment Interchange

American Airlines and Delta Air Lines have asked Civil Aeronautics Board approval of an equipment interchange arrangement which would establish the first through one-plane transcontinental service between the Southeast and the West Coast.

Ten carriers had applied previously to the Board for new southern transcontinental routes, but CAB is seeking ways to provide better service without authorizing additional and possibly destructive competition. Accordingly the Board recently instituted a proceeding to determine whether single-plane service between the Southeast and the West should be established by equipment interchange (AVIATION WEEK, Nov. 1).

Under the American-Delta pact, through DC-6 service would be provided from Miami, Jacksonville, Atlanta, Birmingham and New Orleans to Los Angeles via Dallas, El Paso, Tucson and Phoenix. Other cities may be added. Equipment interchange point would be Dallas-Ft. Worth, and service would start as soon as CAB approval is received.

Planes of both carriers would proceed over the other company's routes in each direction. Delta and TWA are presently operating the only domestic equipment interchange between Detroit and various southern cities through Cincinnati. C. E. Woolman, Delta president, reports that after five months of operation the TWA arrangement is working smoothly to the public advantage.



The Avro Canada XC-100

Details on Canada's Jet Fighter

Canada is producing its first pure-jet fighter.

First details reveal that the Avro Canada XC-100 is a tandem-seat, all-weather fighter powered by two 6500-lb. static thrust Rolls-Royce Avon axial-flow turbojets, capable of a speed of 675 mph. The XC-100 is built to a Royal Canadian Air Force specification.

► **Designer** — Prototype XC-100 now nearing completion at the Malton (Toronto) plant is primarily work of J. C. M. Frost, British designer, who worked with Chief Designer Bishop on the de Havilland D.H.-108 swept-wing craft that broke the sonic barrier.

If the XC-100 proves the success that Avro Canada expects, it will be offered to both British and American governments.

► **Fuselage** — An all-metal low-wing monoplane of between 23,000-27,000 lb. (according to range), the XC-100 employs a fuselage refrigeration system which keeps skin temperature, at high speeds, to 80 F.

Nose portion carries American night interceptor radar, four cannon, and a rearward-folding nose wheel leg.

Crew of two is protected by an optically flat cannon-proof windshield and a one piece canopy.

Fuel is carried in tanks situated behind the rear crew member.

► **Wing, Tail** — A high conventional tailplane and straightforward fin and rudder are employed.

The wing has no dihedral but incorporates the German "droop-snoot" leading-edge flap.

► **Landing Gear** — Dowty liquid-spring units are employed, the main gear using small diameter twin wheels which retract inward and fit snugly into the

underside of the fuselage and bulky wing root.

► **Jet Units** — Although the new Avro Canada T.R.5 Orenda axial-flow turbojet was first considered, the British Rolls-Royce Avon model will power the prototype, delivering a total of 13,000 lb. static thrust—or an even higher total if present development continues in England.

Most novel feature of the XC-100 is the mounting of the jet units above the wing root and close to the fuselage.

Several German projects of 1944 favored this particular external positioning of the jets. Avro engineers decided on this course because wind tunnel tests in the early stages proved satisfactory.

The circular intake was decided upon in preference to the narrower oblong and more streamlined entry because of the greater, and more equally distributed air flow.

► **Armament** — Utilizing four 30 mm. cannon the XC-100 will be one of the most powerfully armed jet fighters in existence. The 30 mm. gun was developed from a wartime German design and the XC-100 will be the first airplane to employ this newly developed unit.

► **Application** — The Canadian government has been impressed by the possibilities of the XC-100, which incorporates all the latest ideas culled from winterization and sub-zero experiments carried out by the RCAF in recent years.

The British have no all-weather fighter and the combination of speed, range, adaptability and firepower may prove an important factor in the ordering of this airplane for mass production.

Plane Development Clash Expected in New Congress

Air transport and manufacturing interests appear headed for a clash over commercial plane development policy in the new Congress.

Air Transport Association's executive vice president, Robert Ramspeck, recently reiterated ATA's advocacy of the Brewster-Hinshaw bill authorizing government development of new cargo and transport types. Opposition of aircraft manufacturers was largely responsible for blocking enactment of the measure this year, and threatens its chances in the next Congress. Manufacturers, who originally pushed the proposal, now look with increasing disfavor on the government domination of commercial plane development and manufacturing which would follow from the measure. Two firms—Consolidated Vultee Corp. and Glenn L. Martin Co.—are apprehensive that it would interfere with current transport sales by holding out the prospect for advanced government-financed types in four or five years to airlines.

► **Seek Compromise**—Aircraft Industries Association will make a last-ditch attempt to arrive at a compromise proposal agreeable to its members and other aviation interests at its board of governors meeting in December. Sentiment is now strong in manufacturing circles that private firms, financially buttressed by this year's increased military business, will be able to handle commercial development.

Ramspeck tabbed this as "no solution at all" to the problem. "Manufacturers might have the money now to undertake development," he said, "but they will expect the airlines to write off the development cost in the purchase price. The problem is to get advanced types on the market at a price airlines can afford, and the only way to accomplish this is by government financing."

► **Committee Planning**—Meanwhile, the interdepartmental committee, headed by Grant Mason, assistant to Assistant Secretary for Air Cornelius Vanderbilt Whitney, is moving ahead with planning on a prototype program as proposed in the Brewster-Hinshaw bill, anticipating its enactment next year. Under the bill, the program would be administered by a five-member civilian-controlled board with representatives of Civil Aeronautics Administration, Civil Aeronautics Board, National Advisory Committee for Aeronautics, Air Force, and Navy.

The group is working in three sub-committees—on requirements, technical matters, and expenditure recovery—and will probably hold conferences with Sen. Owen Brewster (R., Me.) and Rep. Carl Hinshaw (R., Calif.) later.

LETTERS

GCA & ILS Problems

In an article of AVIATION WEEK for Aug. 16, entitled "Stability Chief Approach Problem," written by H. C. Bostwick and Robert B. Roe of Sperry Gyroscope Co., the characteristic instability of the beam type (ILS) instrument approach system was outlined. Briefly the authors explained the fact that since the actual width of the ILS beam decreases and the sensitivity gradient increases as the pilot approaches the runway, it becomes increasingly difficult to remain on course. The possibility of losing the beam and developing a dangerous oscillation in an attempt to relocate the localizer beam is so great as to preclude safe and satisfactory instrument operation during the last part of the approach, the most critical portion.

Despite the fact that characteristic hunting (oscillation) and interference hamper the use of ILS, the GCA operational experience accumulated by the U. S. Air Force does not substantiate the statement by Messrs. Bostwick and Roe that "in the case of GCA, additional human delays are incurred at the ground station" with the obvious implication that GCA is even less an answer to the problem of low weather landings than is ILS.

We of the Radar division of Headquarters Airways and Air Communications Service (AACS) subscribe to inherent weakness of beam type approach systems. And additional weakness of the present amplitude comparison type of ILS, whether it be very high frequency or microwave, is the inability of the equipment to safely handle two or more aircraft having relatively small in-flight separations in range.

This is because an aircraft flying down a beam type ILS causes an interference in the relative field strengths of the radiation pattern of the ILS causing on-course anomalies in the beam behind the aircraft making the approach, thereby causing a succeeding aircraft to receive erroneous data. This is particularly true in ILS equipment using a frequency of 100 to 120 megacycles. Even taxiing aircraft, moving about on the surface of the airport and near the equipment, influence the ILS adversely.

In the microwave spectrum, the ILS beam does not suffer from the same type of wavelength interference as in the VHF frequency range; however, a blanking effect is noted whereby the first aircraft might mask out a portion of the signal, preventing succeeding aircraft from obtaining correct ILS indications.

At the present time, though admittedly not the ultimate answer to full all weather instrument landing, GCA is already so superior to the ILS as a landing aid as to render comparison unnecessary.

The fact remains that a human element has been introduced in the person of the GCA controller, and that, in general, the human is not as accurate as the machine. But this presupposes a machine which has been fully developed, and which has been demonstrated as superior to the human.

Since the human element enters into the

present ILS system as well as the present GCA, an argument "contra humanum" does not enter. Moreover we have seen the severe limitations of ILS, precisely in the two fields where it is most needed: first, as a very low weather landing aid to permit all weather operation; and second, as a traffic expediter, to land planes in rapid sequence, and ease the congested air space at terminal locations.

GCA, while it has the possibility of human error as does the ILS, is a much more accurate and precise navigational aid. The GCA, a radar system, does not employ the principle of "over-lapping" radio signals or "beams" of equi-signal strength, like the radio range, ILS and similarly operated navigational aids. Hence the troublesome factors of "bends," "course shifts," "multiples," etc. are non-existent.

The method utilized by GCA is simply a scanning process in which a radar ray scans across an area much in the same manner as that of a moving searchlight. If an observer was stationed behind the hypothetical light, each time its ray swept across an object, the light ray would momentarily illuminate the object, thereby permitting the observer to readily determine its azimuth position with reference to a fixed line, or other constant visual references (not possible in ILS) and its elevation above the local terrain.

The radar goes a step further than the searchlight and tosses in a third item, range. Now by running a continuous succession of these "still pictures," the radar system yields a "moving picture" showing the relative altitude, course and distance of one or several aircraft at the same time, in addition to fixed visual (radar) references.

This radar picture is not subject at "X" band frequencies to any interference from aircraft or terrain features which will prohibit safe operation. The continuous and precise knowledge of altitude and range is a special feature of GCA not found in any other current landing aid.

At the present time Gilfillan Brothers, Inc., manufacturers of GCA, are producing a pilot model of a fully automatic GCA, which will land aircraft with the unerring accuracy of radar. It is expected that workable models of this ultimate landing aid will be available for testing in the near future. When perfected, this will provide an automatic landing system which also shows a picture of what is happening on the radar scope. It is conceivable that the radar image will be televised to the pilot as well as monitored by ground personnel.

HENRY F. X. HESSON, Captain, USAF
Airways & Air Communications Service
Washington, D. C.

DeHaven Controversy

With reference to your Oct. 4 Strictly Personal column: In the interest of fair play, I'd like to straighten out J. L. Nollan of North American Aviation, Inc., who attempts to belittle the gamut hero of the air races. By twisting up takeoff and ar-

rival times, Nollan tries to prove that Maj. Bob DeHaven, the National Guard pilot of Van Nuys who unofficially bettered the Navy's Bendix flight, was actually four minutes behind the best Navy record.

I didn't see Nollan present—or any other newspaper, magazine or other representatives—when I greeted DeHaven upon his arrival at Cleveland, nor did they show up during his first hour here when his "unofficial" times were thoroughly checked. What Nollan doesn't know is that the press computed his take-off time at 11:27 as Nollan now suggests. We have his correct time past Cleveland tower at 18:37 Eastern Daylight Time, however, while Nollan erroneously gets it at :41. Adjusting the take-off time to Cleveland time it would be 14:27, totaling four hours, 10 minutes for the flight, while the Navy did it in four hours, 10 minutes, 34 seconds. Since we didn't get DeHaven's time to seconds, we'll call it a tie but for the record let it be known that DeHaven was not permitted to enter the airport area and circled for a good two minutes because the Navy show was in progress!

Of course, the record for the jet Bendix is still four hr., two min., 18.6 sec., a solid 507.255 mph., set by an F-80 in 1947. But for the sake of NA's Ed Ryan, who is a swell guy, I'll agree that the FJ is a great plane considering that it's built for carrier operation.

CHARLES L. TRACY
Aviation Editor
Cleveland Press

A Passenger's Complaint

The various articles pertaining to the aviation industry are interesting. However, the airline customer is not interested in who makes money, and who does not. He is interested in two things, first, when the flight time arrives will he be on his way, and second, arrival time at his destination.

The inability of the major airlines to maintain proper schedules has always been a source of wonderment to me. One can understand the cancellation or delay of a flight through adverse weather conditions, but when the sky is clear and the company has neither the equipment or the personnel available, then the company should be penalized the same as the passenger for non-show.

Another factor is the inherent ability of the major airlines to irritate passengers through the following factors:

- First—Their inability to maintain schedules.
- Second—Handling of baggage.
- Third—Flight cancellations and the status of the passenger . . .
- Fourth—The inability of the passenger to obtain truthful information from the airline personnel as to what to expect . . .

As to the meals served, most airline passengers would rather buy their meals . . . than eat the meals now being served by the major air lines today.

FRANK G. PARKER Co., Inc. (engineers)
FRANK G. PARKER, President
14 Liberty St.
New York 6, N. Y.

PRODUCTION

AMC Pilot Plant

Michigan factory would be proving ground for high volume techniques.

Air Materiel Command of the U. S. Air Force plans to lead Air Force contractors by the hand toward new high volume production techniques for aircraft fabrication.

The plans call for AMC to operate a plant at Adrian, Mich., where the largest hydraulic press equipment in the world would be installed. They are being received with mixed industry approval and disapproval, an AVIATION WEEK survey disclosed last week.

Maj. Gen. K. B. Wolfe, AMC's director of procurement and industrial planning and principal backer of the project, sees the Adrian plant as a proving ground for new manufacturing methods which might add greatly to volume of aircraft production in war emergency, and yet which an individual airframe builder might not wish to undertake because of initial costs and risks.

► **Resolution Opposes**—Aircraft Industries Association expressed its opposition to the proposal in a resolution passed by the board of governors last spring. Opposition stand was again reiterated at an October conference called at Wright Field to discuss the project further.

If the plan is carried through as projected, a huge new extrusion press, together with supplementary preforming presses and furnaces will be installed at Adrian for Air Force operation on industry projects. It is understood that the presses would be available to industry for making specific parts.

► **German Presses**—Preceding the installation of the big new presses is projected installation at Adrian of two other large existing vertical presses of 15,000 tons and 7000 tons, which are being shipped from German plants in the American zone in Germany.

Ability of the big presses to form large components of aircraft structure which require relatively few finishing operations is expected by AMC to reduce greatly man hours on some phases of aircraft fabrication. Similar pieces are now made by assembly from smaller components, or by expensive machining down from solid stock.

► **Larger Ingots**—A supplementary problem in the use of the big presses is the supplying of larger ingots for making larger single parts.

Designation of Richard F. Trimbach,

civilian chief of AMC's industrial planning division and one of Wright Field's top-flight civilian executives, to monitor the project, indicates its high priority in AMC eyes.

► **Drawbacks Cited**—Three objections to the proposed operation cited by industry representatives to AVIATION WEEK:

• **Government operation** of the Adrian plant might be considered an early step in a trend toward nationalization of the aircraft industry.

• **Advantages of the method** to be used at Adrian over existing methods of producing the same parts are offset in large measure by the complications of centralizing manufacture of major components at one plant, with ensuing bottleneck possibilities.

• **Operation of similar equipment** by private industry should be more fully explored before the government establishes its own operation.

The Adrian plant is a Defense Plants Corporation structure, operated in World War II by Bohn Aluminum Co. as an aluminum extrusion plant. It has 700,000 sq. ft. of floor space. Part of the plant is now being leased by Kaiser-Frazier Sales Corp. from WAA for warehouse purposes, but Kaiser-Frazier has agreed to vacate space as it is needed for the new project. It is understood that installation of the big new projected presses would require additional building construction to house them.

► **GFE Question**—If AMC operation of the plant is carried through it presents another possibility in the extension of government furnished equipment (GFE) in the future, to include actual components of the aircraft structure. Conceivably, this could even involve original specifications requiring that a certain aircraft be designed to include a specific model wingspar or similar component. Whether limiting effect of this type of specification on the aircraft designer would over-shadow the production advantages of such a system, is another phase of the old design vs. production dilemma which may eventually have to be resolved.

SEC Reports Increase In Aircraft Sales

Second-quarter sales of leading aircraft manufacturers were up \$44,069,000—20 percent—over last year, according to the Securities and Exchange Commission. Nineteen firms had a sales volume of \$261,385,000, compared with \$217,316,000 for the second quarter, 1947.

Second-quarter volume was up \$35,227,000—15 percent—from first-quarter sales of \$226,158,000.

► **Four Leaders**—Four firms showing the sharpest sales increases for the second quarter (with second quarter, 1947, volume in parentheses) were: North American Aviation, Inc., \$20,073,000 (\$3,560,000); Boeing Airplane \$17,760,000 (\$8,134,000); Glenn L. Martin \$15,712,000 (\$4,630,000); Republic Aviation Corp. \$12,763,000 (\$6,023,000).

Manufacturers with the biggest sales volume for the second quarter:

• **United Aircraft Corp.** \$54,597,000. Sales were down from \$56,038,000 for the second quarter, 1947.

• **Lockheed Aircraft Corp.** \$33,146,000. Sales were up from \$29,949,000 for the second quarter, 1947.

• **Douglas Aircraft Co., Inc.**, \$27,611,000. Sales were down sharply from \$38,553,000 for the second quarter, 1947.

• **Curtiss-Wright Corp.** \$25,802,000. Sales were up from \$18,916,000 for the second quarter, 1947.

In addition to Douglas and United Aircraft, five other manufacturers showed sales declines for the second quarter from second quarter, 1947. They were (with second quarter, 1947, sales in parentheses) as follows: Northrop \$6,924,000 (\$8,063,000); Beech \$5,573,000 (\$7,899,000); Piper \$1,344,000 (\$2,551,000); Ryan \$2,054,000 (\$2,077,000); and Bellanca \$73,000 (\$318,000).

SEC reported as follows on sales increases of other firms (with second quarter, 1947, sales in parentheses): Bell \$6,066,000 (\$4,230,000); Cessna, \$4,753,000 (\$2,145,000); Consolidated Vultee \$10,830,000 (\$8,750,000); Fairchild \$9,669,000 (\$9,105,000); Grumman \$6,580,000 (\$9,350,000); and Waco \$55,000 (\$25,000).

PRODUCTION BRIEFING

Chance Vought Aircraft division of United Aircraft Corp. expects to have F6U-1 Navy jet fighters rolling off the production line of its new Dallas factory by February. F4U-5 piston engine fighters will begin coming off the line in April. Present employment at Dallas is about 1400.

Texas Engineering & Mfg. Co., Dallas, has agreed to wage increases of 10 cents an hour for about 2000 hourly workers. Old rates ranged from 90 cents to \$1.65. In addition, an automatic pay raise program is effective Jan. 1.

Cee-Bee Chemical Co. is arranging for the manufacture of its cleaning compounds in St. Louis, as well as at the Los Angeles home plant.

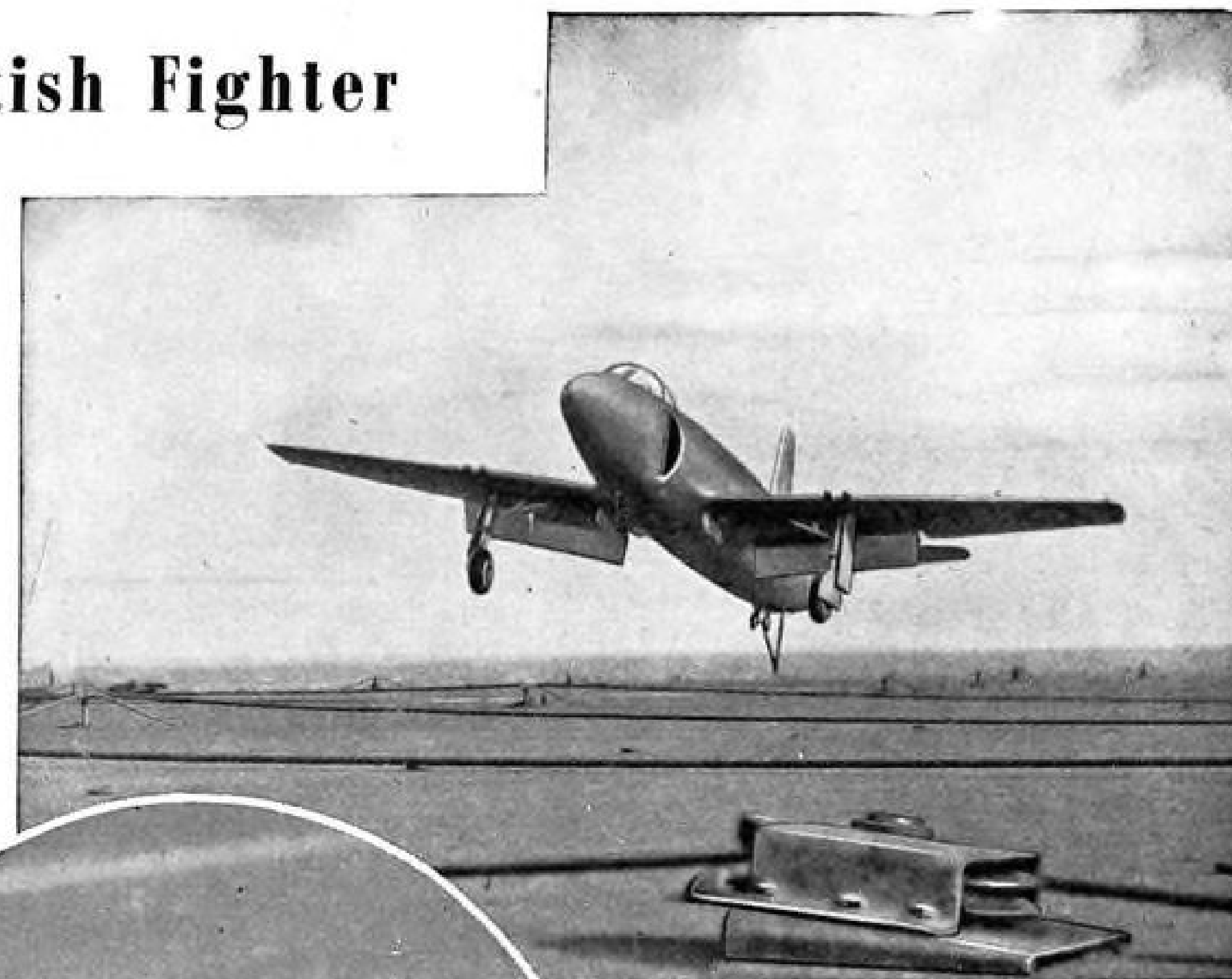
THE SUPERMARINE 'ATTACKER'

Outstanding British Fighter

Recent performances of the Vickers Supermarine 'Attacker' have confirmed it to be the World's most outstanding jet fighter. The speed and general manoeuvrability of the 'Attacker' were amply demonstrated on February 27th of this year when, carrying full military equipment, it covered the International 100 Km Closed Circuit at an average speed of 564.8 m.p.h. Previously, the 'Attacker' had carried out a series of successful deck landing trials on the Aircraft Carrier H.M.S. 'Illustrious'. These trials confirmed its adequate control characteristics under the low speed conditions necessary for deck approach. A feature of particular interest to Pilots called upon to manoeuvre at great speeds is the excellent visibility from the cockpit.

IN THE AIR

Superb manoeuvrability, rapid acceleration and rate of climb are features which make the Vickers-Armstrongs 'Attacker' unparalleled as a service fighter. With four 20 mm. Hispano cannons as standard armament the 'Attacker' lives up to her name.



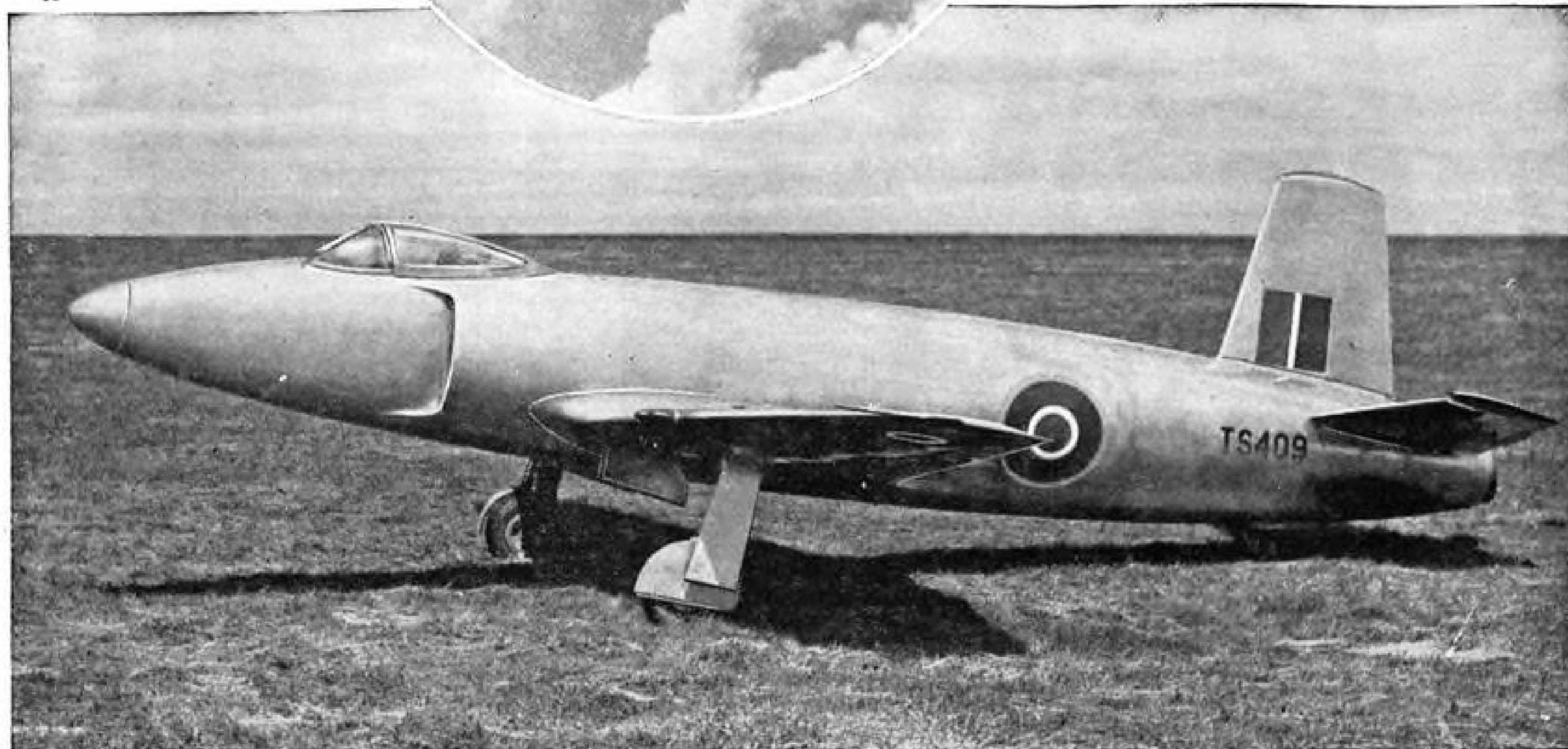
'LANDING ON'

The proved flying characteristics of the Vickers Supermarine 'Attacker' jet fighter enable this famous 'plane to take-off from a carrier and 'land-on' in perfect safety. With good control at a speed near stalling-point and with excellent visibility from the cockpit, the 'Attacker' is ideally suited to naval requirements.

RECORD-BREAKER

On 27th February an 'Attacker' jet fighter set up a new record for the closed circuit at 564.8 m.p.h. —fully loaded. This was one more convincing argument to support the Vickers-Armstrongs claims for this outstanding jet fighter.

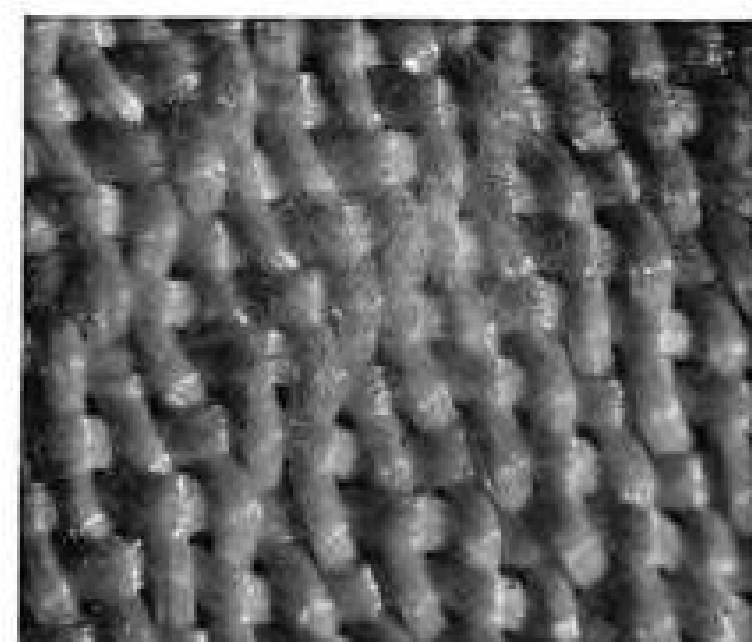
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Throughout work areas where New Departure micro-instrument ball bearings are produced, you'll see operators clothed in smocks and caps of a smooth, specially selected fabric. This synthetic textile is important because it greatly reduces the possibility of lint or fibre particles getting into and in any way affecting the functioning of these precise, highly sensitive instrument bearings. Such attention to detail is characteristic of the way things are done at New Departure.



Specially selected synthetic fabric under the microscope. Note the smooth, non-dirt trapping finish of the material and absence of lint or loosened fibres.

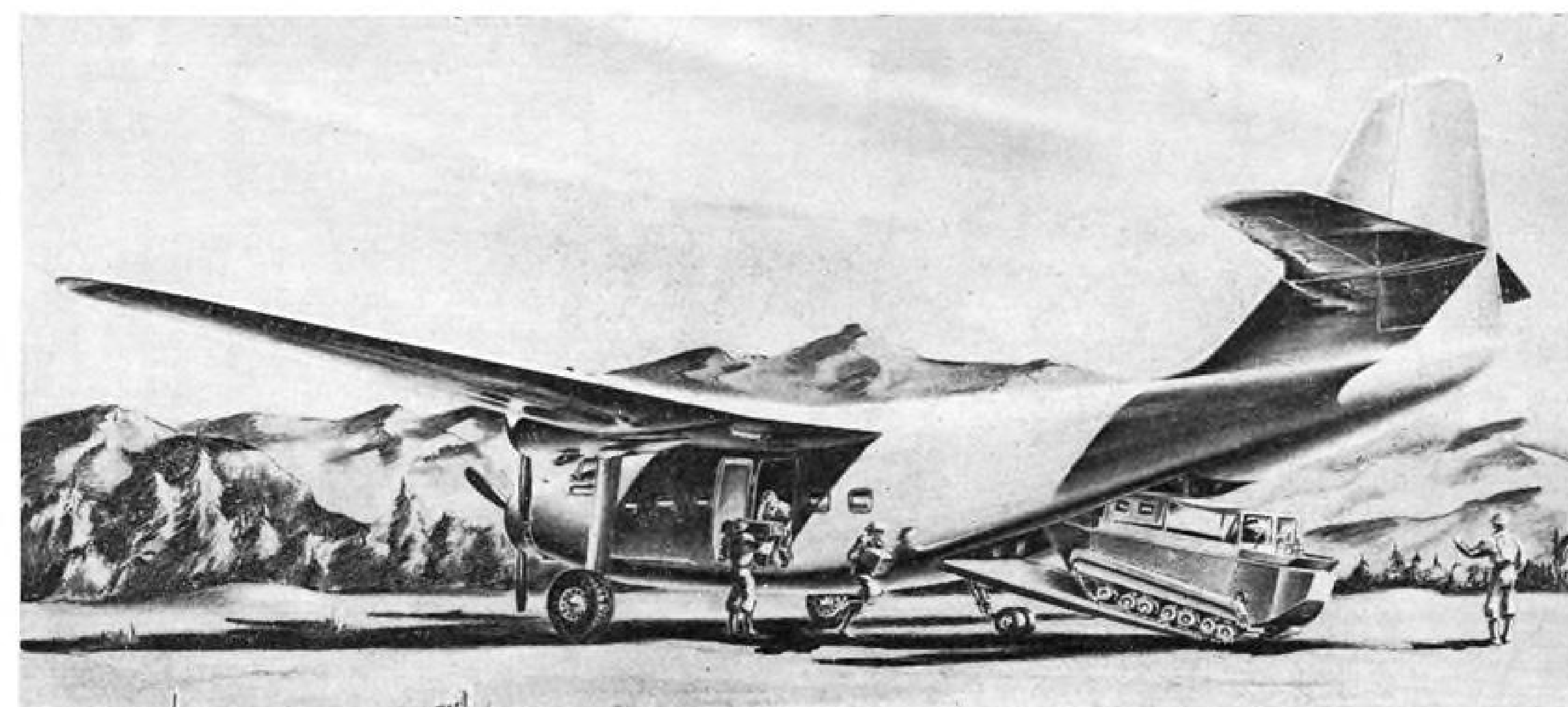


Ordinary cloth commonly used for operator's smocks. See the coarse structure with countless wisps of fibre ready to separate and become a potential source of trouble.

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ENGINEERING



Design Analysis

Northrop C-125 Based on Pioneer

In contrast to usual practice, this multi-purpose military transport originally was conceived to meet commercial cargo plane needs.

By Robert McLaren

The Pioneer transport has been thoroughly redesigned by Northrop Aircraft, Inc., Hawthorne, Calif., in the evolution of its Raider military version.

Larger, heavier, and with greatly improved performance, the new transport version features special facilities for the handling of many types of military loads from a variety of landing surfaces.

The Raider will be virtually a new airplane and preserves only the simplicity and economy of its prototype together with its astonishing takeoff and landing characteristics.

► **Commercial Background**—Northrop began design studies of a postwar civil aircraft during the closing days of World War II when no airframe manufacturer faced the future with any degree of certainty. Without exception, all of the major military aircraft producers of World War II set their postwar sights on commercial aircraft designs following the first drastic cutbacks in 1944 and even more severe reductions in the Spring of 1945.

Despite Northrop's switch to a commercial aircraft as a postwar project, the

ensuing design has wound up as a military plane.

The original Pioneer was laid down as a "bush freighter" with specifications selected on the basis of requirements for operations from small, rugged areas in Central and South America.

From the start, short takeoff and landing characteristics were stressed and Northrop engineers met with phenomenal success in this objective. After these characteristics, simplicity in design and construction, low production costs, simplicity of maintenance and reliability were demanded.

► **Hurdles Encountered**—Result of these rigorous design specifications was not a pretty airplane nor one with exceptional flight performance, but it did possess the unseen features, mentioned previously, to an admirable degree. But from the start the Pioneer program met with wholly unpredictable difficulties that prevented even a substantial exploitation of the craft's merits.

The Wright R-1300 engines specified for the plane were not available at the time of its completion in Fall, 1946. This engine had originally been developed prior to the war but further

work was dropped in the face of demands for the R-2600 and R-3350 power plants.

The R-1300 was again made an active Wright project in 1945 to meet the demands for the Lockheed, Boeing and Northrop "feeder" class aircraft then in design.

Initially, Northrop was forced to install three Pratt & Whitney R-1340-S3H1 engines with a takeoff power of 600 hp. and a rated power of 550 hp. This 25 percent reduction in design power available handicapped the performance of the Pioneer from the start but it was decided to go ahead with the flight test program in the interest of speeding up the project as much as possible.

► **Test Program**—First flight test was made from Northrop Field in December, 1946, with Max Stanley at the controls. The craft was airborne in 1000 ft., although neither full takeoff power nor flap deflection was used. The test program got under way immediately and continued throughout 1947.

During the fall of that year the new Wright engine became available and was installed. The additional power bore



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hinge line and is extensible by hydraulic power while the airplane is on the ground. This dual-wheel unit can be rotated forward until the airplane is in a level position. After loading or unloading is complete, the tail wheel lowers the aft fuselage to its normal 6½-deg. angle for takeoff.

The fuselage is built in four major assemblies—nose power plant section, flight deck, main fuselage, and tail cone. The interior can be altered quickly to create a wide variety of accommodations such as for carrying troops, litters, and cargo.

► **Empennage**—The Raider tail group has been completely redesigned from that used on the Pioneer.

Lower portion of the fin is now an integral part of the aft-fuselage and is faired into its general contours.

The stabilizer has been raised to a point midway up the fin, and the rudder is divided into upper and lower segments to clear the elevator travel.

The tail surfaces have been increased greatly in span, chord and area to accommodate the increased nose length, wing span and fuselage length of the new model.

All controls are cable-operated, the cables running the length of the fuselage along the ceiling.

The new elevator incorporates aerodynamic balance through area overhang in contrast to the original configuration.

► **Landing Gear**—Although this remains unchanged in layout, provisions have been incorporated for a variety of units. Dual wheel gear may be fitted to the main gear struts to permit the Raider to operate from muddy or sandy fields. This consists of an axle and wheel assembly added to the installed wheel, a change which may be made with ordinary wrenches and without jacking the airplane.

Wheel-skis may be fitted to lugs provided on the gear, and twin floats can be attached using the existing main struts.

Since the basic landing gear is of fixed design, there is no loss of performance with the use of the ski gear and only a slight impairment when floats are attached.

► **Power Plants**—The craft is powered by three Wright Cyclone engines, mounted one in the nose and two in the wing center section leading edge. Provisions have been made for installation of either the R-1820-76 engine of 1425 hp. or the R-1820-97 engine of 1200 hp. takeoff rating.

All power units are interchangeable forward of the firewall, and each engine is readily accessible through large, hinged access doors in the accessory compartment and removable cowl segments in which the nose ring and skirt section are an integral unit.

Maintenance on the wing engines is



Raider's fuselage in plaster. Mockup facilitates fabrication of dies, jigs and tools.

facilitated by hinged, reinforced segments of the leading edge which fold forward and down to form convenient work stands.

Fuel—1800 gal.—is carried in eight Mareng fuel cells forward of the wing main spar. These are mounted in pairs with one cell comprising a main tank with filler neck and the adjacent cell an auxiliary tank with interconnected bypass.

The fuel may be fed to the nose engine from any of the fuel cells.

Ability of the Raider to operate safely on any combination of two engines is a vital safety factor for aircraft designed

for operation in rugged terrain and climatic conditions.

► **Operational Equipment**—Both versions of the Raider carry standard command and liaison radio sets together with radio compass equipment. In addition, the Arctic rescue version will carry special radar navigational equipment.

Glide path and localizer receiving equipment for ILS are connected to the electronic automatic pilot to permit automatic landing approaches under poor visibility.

Provisions have been incorporated for the installation of two 1000-lb.-thrust

NORTHROP TRI-MOTOR TRANSPORT

Air Force C-125A Arctic Rescue
Air Force C-125B Assault Transport

| | Raider | Pioneer |
|-----------------------------------|------------------|---------------------|
| Span | 87 ft. 0 in. | 85 ft. 0 in. |
| Length | 67 ft. 1 in. | 60 ft. 7 in. |
| Height | 21 ft. 9½ in. | 17 ft. 10 in. |
| Weight (empty) | 19,662 lb. | 14,400 lb. |
| Weight (design gross) | 32,500 lb. | 25,500 lb. |
| Power Plants | Wright R-1820-76 | Wright R-1300-C7BA1 |
| Power (takeoff) | 1425 hp. | 800 hp. |
| Power (normal rated) | 1275 hp. | 700 hp. |
| Speed (maximum) | 232 mph. | 200 mph. |
| Speed (cruise) | 201 mph. | 185 mph. |
| Ceiling (service) | 23,400 ft. | 21,000 ft. |
| Ceiling (service, two engines) .. | 16,000 ft. | 15,000 ft. |
| Takeoff Run (full load) | 1150 ft. | 700 ft. |
| Landing Run | 900 ft. | 750 ft. |
| Wing Area | 1131 sq. ft. | 1100 sq. ft. |
| Wing Loading | 28.7 lb./sq. ft. | 22.72 lb./sq. ft. |
| Range (maximum) | 2620 mi. | 1750 mi. |

Northrop Project Engineer: Fred J. Baum
Engineering Test Pilot: Max Stanley

JATO units for emergency takeoff from confined areas with heavy load.

An unusual feature is the provision for attachment of a towline to a fitting mounted in the fuselage, which permits the use of both outboard engines to assist the tow plane during takeoff and climb. This towing provision permits extremely long-range operation for the Raider.

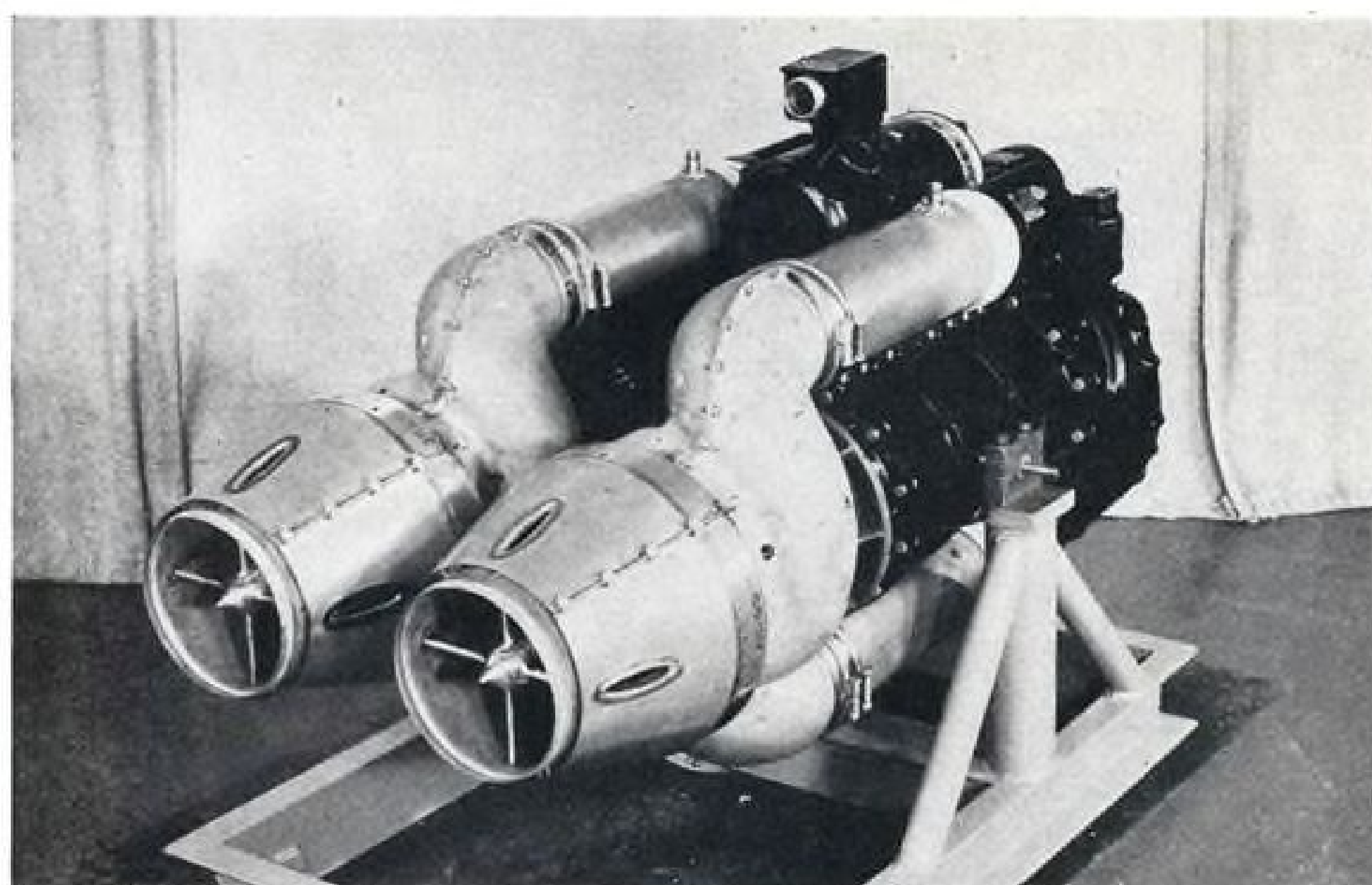
► **Service Features**—Throughout the redesign of the Raider, the simplicity of the prototype Pioneer has been preserved.

Accessibility for maintenance has been stressed throughout the design with doors and panels provided adjacent to installations requiring routine inspection.

Safety has been stressed through crew-escape provisions either through a door in the flight deck floor or through a panel beside each pilot. And a large escape door is provided in the cargo hold. All doors are jettisonable in emergency.

Vision has been improved by the addition of cockpit windows below the main windows, which permit vision almost vertically downward.

Throughout the structural design of the airplane, subassemblies have been made self-contained units with simple attachments, insofar as possible, to facilitate field replacement.



Auxiliary-Power Turbine Readied

Solar Aircraft Co., San Diego, has produced a development model of a small, low-power gas turbine to provide auxiliary electric power in large planes.

Known as the Model 80, the unit is designed to operate at a normal maximum power rating of 50 kw. up to 40,000 ft. with a 5-min. overload rating of 75 kw.

The engine has been developed primarily to supply 400c. a.c. of 120/208v.

Overall weight of the power plant, complete with generating equipment, starter and accessories, is approximately 360 lb. Overall length is 52 in.

It incorporates several unique features, including an original reverse flow method of air handling.

Air is taken aboard through a peripheral air intake between compressor and turbine, and moves forward through the axial-flow, multi-stage compressor to a centrifugal impeller which directs it into two cylindrical combustion chambers in each of the dual units.

After passing through the combustion chambers, where fuel and heat are added, the hot gases move through the turbine and rearward through conventional nozzle assemblies, where it may be used for thrust augmentation if desired.

The dual units are mounted in a single assembly with each main shaft geared to drive the generator.

The high electrical loads specified for modern jet craft, plus the necessity for keeping power extracted from the main turbines to a minimum, is making auxiliary power increasingly important.

By utilizing a gas turbine-operated generator for this purpose, conventional jet fuel may be used and substantial amounts of thrust for the aircraft provided.

The Model 80 will not be ready for commercial availability until early next year. Solar has drawn on its extensive background as a producer of high-temperature turbine engine assemblies and heat-resistant exhaust manifolds in the design and fabrication of this new auxiliary power plant.

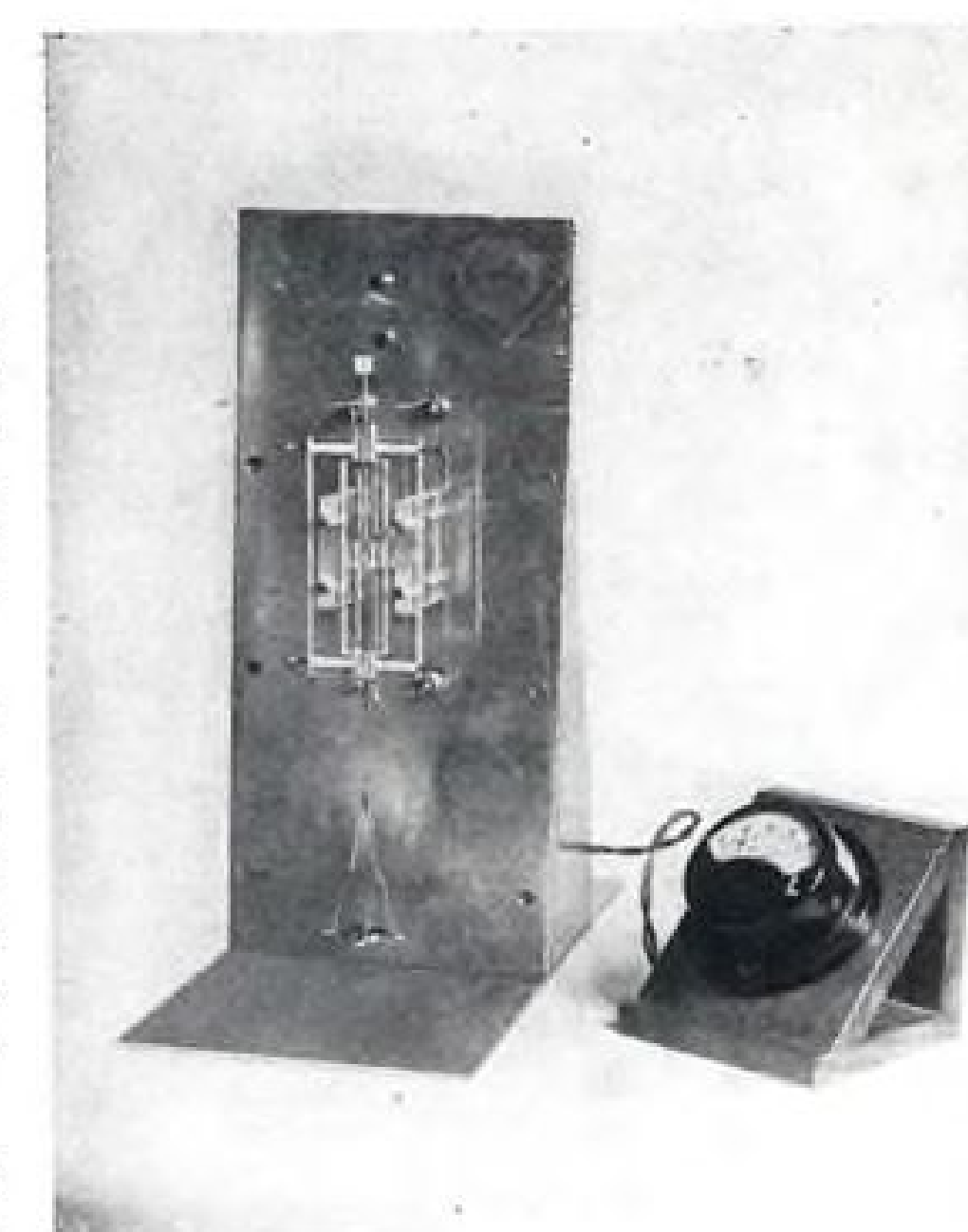
Spring Transducer Wide Application

Many important applications in the field of aeronautics and other industrial activities are seen for a highly sensitive mechano-electrical transducer being developed at the National Bureau of Standards by W. A. Wildhack and associated personnel.

This device transforms slight displacements into large changes in resistance, current or voltage. Active element is a helical or conical spring so wound that initial tension varies slightly along its length. Thus, when the spring ends are pulled apart, the turns separate one by one instead of simultaneously.

► **Resistance Varies**—When the spring is entirely closed, it has an electrical resistance approximately that of a cylindrical tube. When completely open, its resistance is equivalent to the total length of the coiled wire. Accordingly, resistance can be varied over a wide range by stretching the spring.

Since percentage change in resistance may be hundreds of times greater than percentage change in length, displacements as small as 1/100,000-in. can be measured easily without electrical amplifying equipment. The spring transducer thus provides a sensitive means



Experimental model of new transducer. Weight produces longitudinal displacement of rod, elongating one pair of springs and shortening other pair in Wheatstone bridge. The resultant unbalance of bridge gives measure of displacement.

for conversion of any mechanical displacement to a change in an electrical quantity that can be precisely determined.

► **Wide Application**—When connected to another transducer which gives a me-

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your engine, accessory, and propeller
overhaul problems
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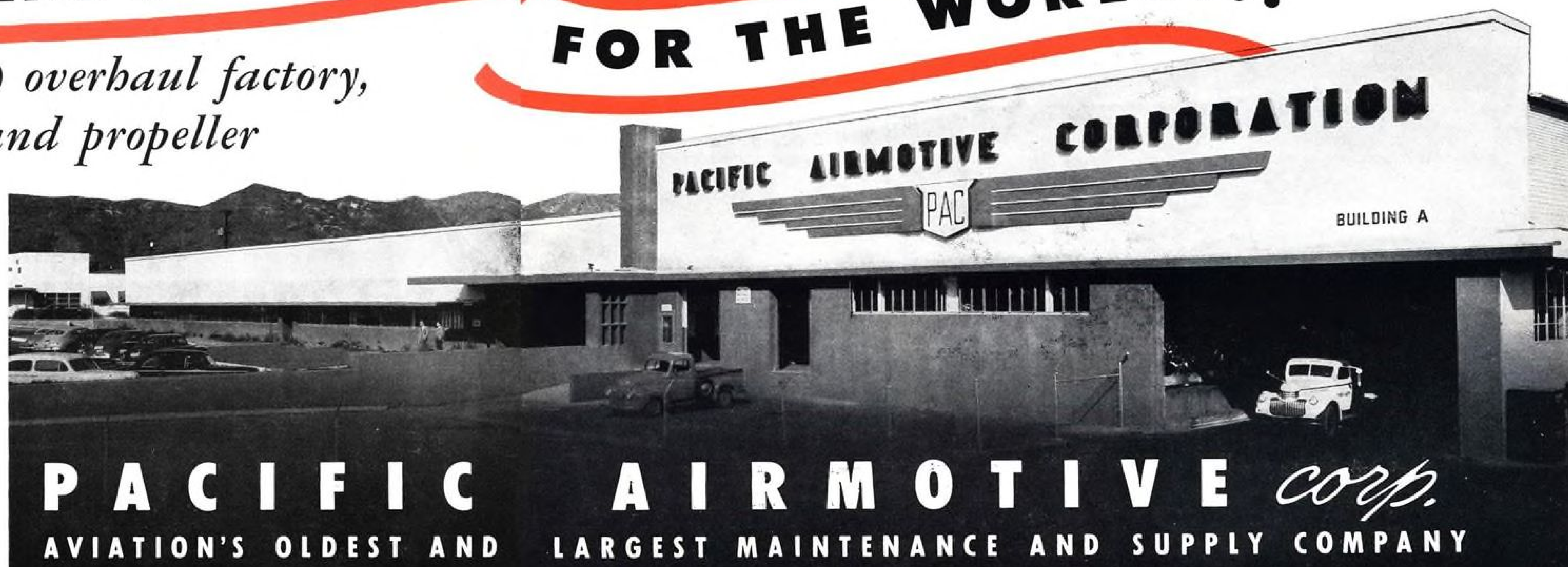
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chanical displacement output (for example, a bimetallic strip responding to temperature changes), the combination gives a readily measurable electrical output.

This type of use suggests numerous applications—strain gages, pressure elements, accelerometers, electrical weighing devices, automatic temperature controls, d.c.-a.c. inverters, and voltage regulators.

► **How It's Made**—Preferable construction for the transducer is a four-arm bridge, with each arm a variable-resistance spring. Increase in applied tension elongates one pair of springs and shortens the other pair. Resistive unbalance of the bridge, as indicated by a galvanometer, gives a measure of the displacement. With this arrangement, since the voltage can be nearly reversed through the bridge, output voltage can be theoretically twice the value of the input voltage.

Variation of initial tension of the spring along its length may be by conical winding, varying the angle of feed of the wire on a uniform mandrel, or by varying its tension as it is wound. For greatest sensitivity variation in initial tension is made quite small.

To decrease contact resistance between successive turns of the closed unit, a high average initial tension is built into the spring, and the turns are coated with .0001-in. gold. Generally, nickel-alloy wire has been used because of its high resistivity and small change of mechanical properties with temperature.

The new transducer is undergoing further development at the Bureau as part of a project on basic instrumentation for scientific research by the Office of Naval Research.

Roughness Comparator

To enable engineers and draftsmen to visualize, select, and specify surface characteristics for production work, and machine operators and inspectors to determine by sight and feel whether surfaces meet designated specifications, pocket-size roughness comparator with machined finishes is announced by Special Products Division, General Electric Company, Schenectady 5, New York.

Two rules, 6 in. long and 1½ wide, illustrate degrees of roughness ranging from smoothness of bearing surface to roughness of flame cut. One side of each scale is divided into 12 parts, for total of 24 different surfaces grouped into 10 degrees of roughness. Every degree is identified by a number which designates the nominal roughness in micro-inches (average).

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cient aircraft. OSTUCO, the aircraft industry's oldest supplier, produces tubing to meet all Army, Navy, and AMS specifications. You'll want to specify OSTUCO tubing because of its adaptability to forming and the accuracy with which it may be machined—and because of OSTUCO's fine reputation for low rejects and on-time delivery.



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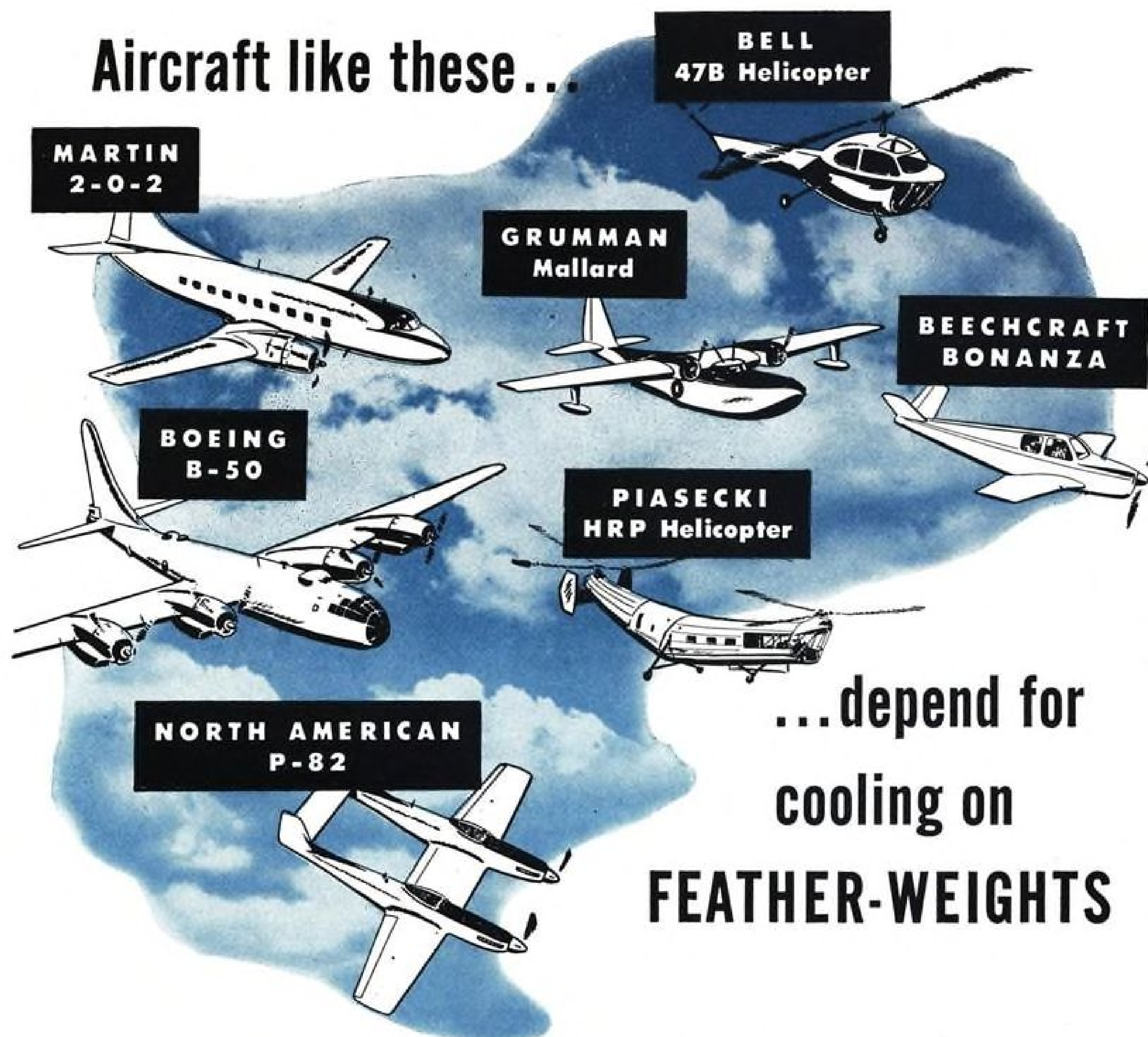
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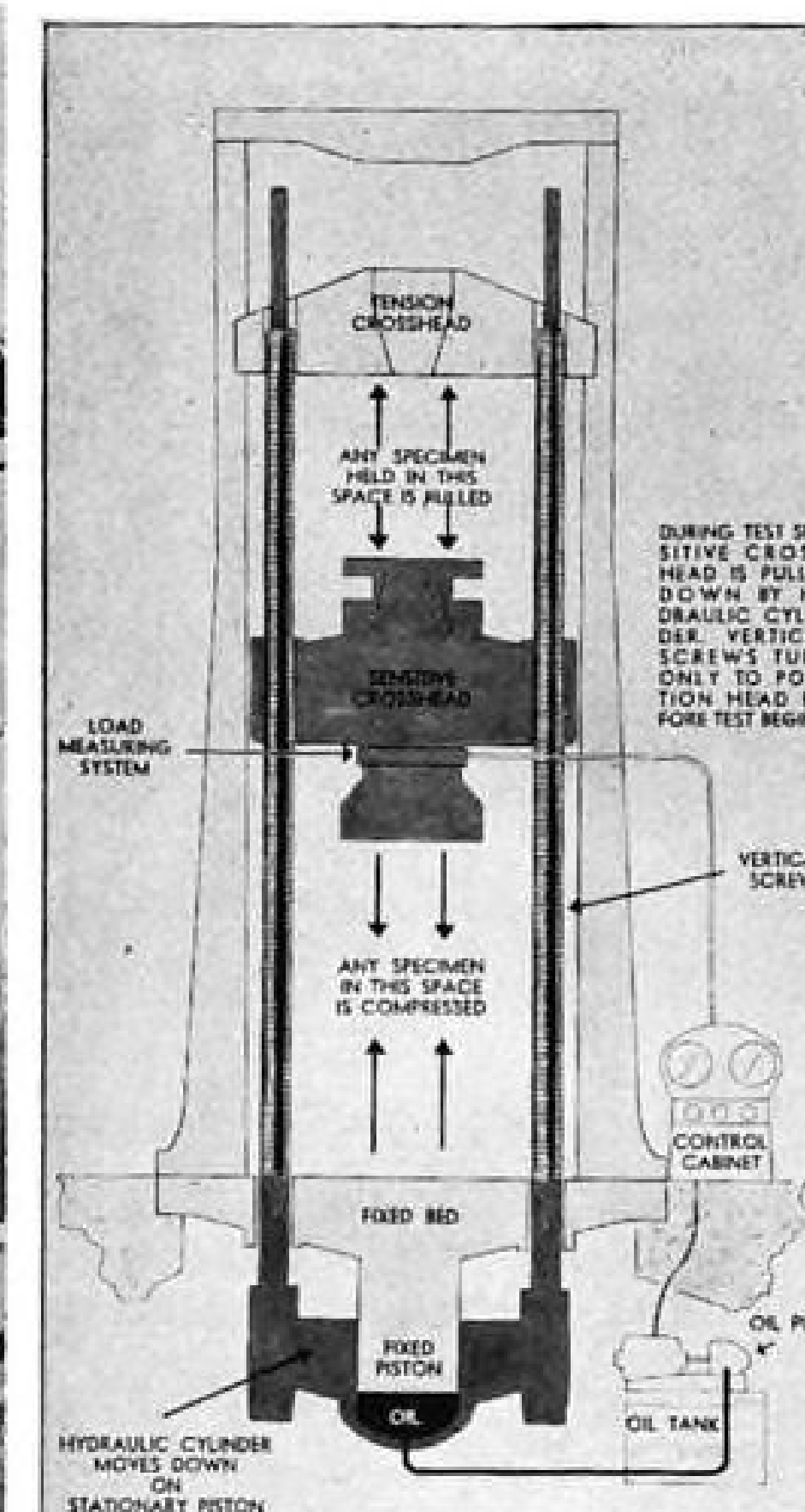
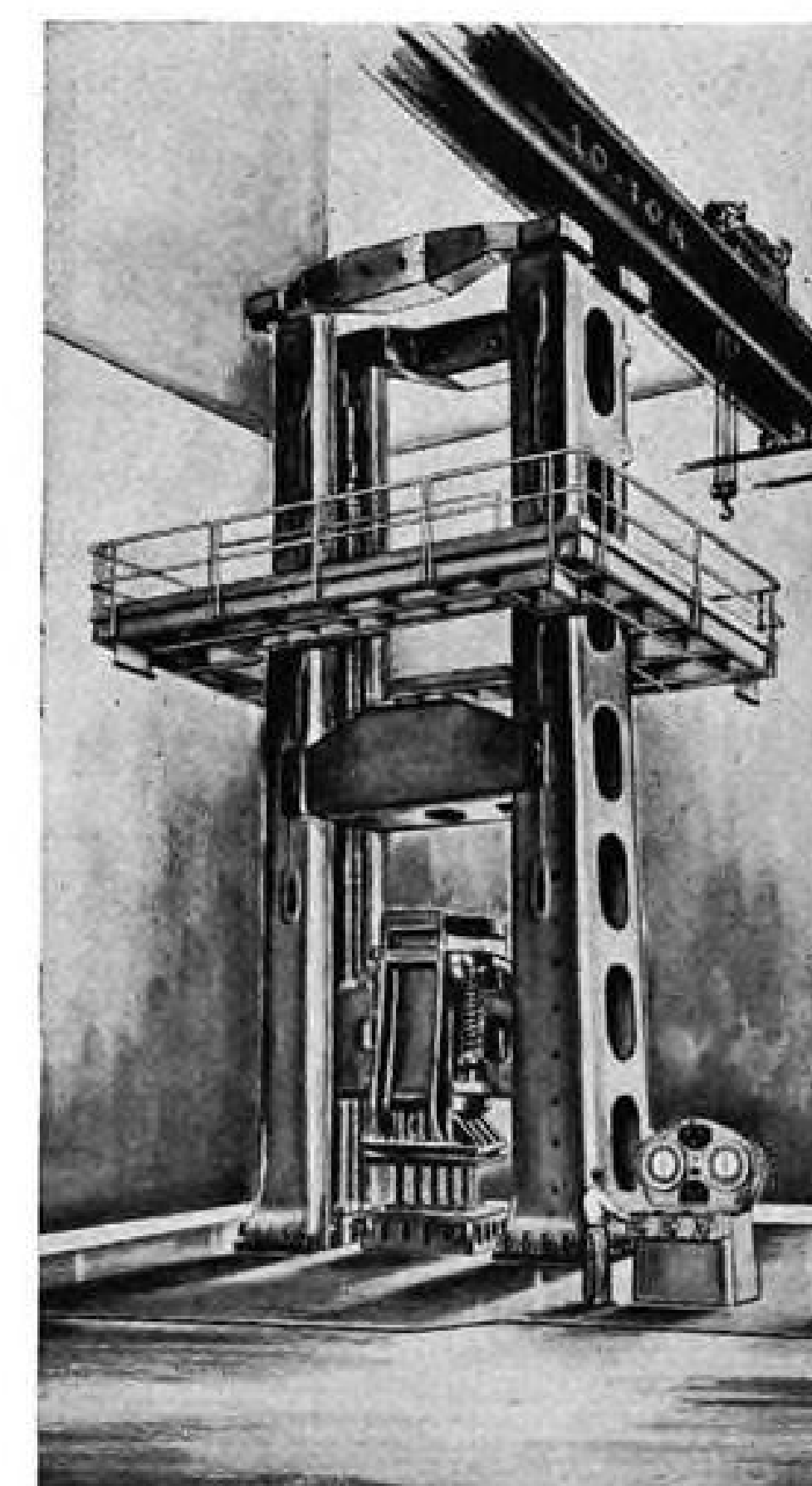
Inquiries concerning Feather-Weight All-Aluminum Oil Coolers are invited. Clifford Manufacturing Company, 561 E. First Street, Boston 27, Mass. Offices in New York, Chicago, Detroit and Los Angeles.

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Navy Using Largest Test Machine

New 5 million-lb.-capacity proving device made available to industry. Huge structures to be accommodated.

Navy has announced that the world's largest testing machine, the new 2500-ton-capacity Baldwin unit at Philadelphia Navy Yard, will be made available to airframe manufacturers for structural tests requiring this tremendous load. Most powerful such machine ever built, the unit will also be used for tests on automotive, ship and gun assemblies.

The huge device cost \$340,000 and required an additional \$360,000 for installation and accessories, including the cement foundation and an elevator to permit access to all sections. It took two years to build at the Baldwin Locomotive Works.

The 5,000,000-lb. maximum capacity of the machine, greater by 1,000,000 lb. than any previous unit, will provide the airframe industry with badly needed maximum applied load tests.

The machine can create tension, compression or bending loads as required in increments as low as 4 lb.

Navy has already laid out a testing program to include 75-80,000 psi. 75ST aluminum alloy materials, sandwich materials, complete wing panels, monocoque fuselage segments, etc.

► **Machine's Facilities**—The installation stands 47 ft. above the lab floor and extends 16 ft. below.

A catwalk elevator with 8000-lb. capacity surrounds the structure and aids in preparing test set-ups and observing results. Test personnel will be protected by a safety screen made of steel plate and bullet-resisting safety glass.

A transverse bending test platform, 50 ft. long with 7-ft.-deep girders is installed level with the lab floor for testing beams horizontally under transverse bending loads.

Total weight of the machine and the bending platform will be approximately 1,000,000 lb.

Test facilities will be for specimens up to 30 ft. long in tension or compression and up to 50 ft. in bending. Clear space between the screws is 10 ft., length of bed plate is 12 ft.

Loading will be via hydraulics. Four large springs on the loading head will eliminate the weight of any part of the machine from the indicated load on the specimen.

The weighing system, entirely separate from the loading function, is accurate to at least half of one percent. There are six loading ranges—5,000,000, 2,000,000, 1,000,000, 240,000, 120,000 and 24,000 lb.

► **How It Operates**—The machine con-

sists, essentially, of three distinct systems, for loading, weighing, control.

In the loading system, the pump delivers pressure-oil to the hydraulic cylinder, which is forced down, pulling with it the large screws and the sensitive crosshead.

Since the tension crosshead (at the top) and the bed (at the bottom) remain stationary, the downward movement of the sensitive crosshead applies either a compression or a tension load.

The weighing system, also hydraulic, is supplemented by an air system for extra sensitivity.

Control system includes both mechanical and electrical units connected with the loading and weighing systems.

Most important unit of the weighing system is the Emery cell, which transmits load pressures to the indicator. It is a shallow cylinder having a loose-fitting piston and a metal diaphragm so arranged that the load on the specimen produces change on a thin film of liquid trapped between the piston and the cylinder bottom. Relative movement of piston and cylinder is practically negligible.

► **How It's Regulated**—Controls are all housed in a single cabinet. Three large hand-wheels serve for application of the hydraulic load at any head speed between 0 and 3 in./min., for instantaneous release of the load on a specimen, and raising and lowering the loading head (for positioning purposes prior to testing) at 0 to 20-in./min. speeds.

Starter buttons above the hand wheels control the power for the various electric motors which raise or lower the elevator, actuate the hydraulic pump, and turn the screws for positioning the loading head.

Several knobs on the upper part of the cabinet permit control of loading rate, automatic maintaining of any predetermined constant load, and selection of any one of the six load ranges.

Large dials on the cabinet indicate the load exerted on a specimen. Smaller dials afford readings of air pressure in the line to the servo-bellows motor which is part of the weighing system; air pressure for the load maintainer system; oil pressure in the back-lash eliminators on the large screws; and position of the loading head in its 36-in. stroke.

In addition to its prime test functions, the machine will give results on full size structures for correlation with similar tests on scale models.

This will make model-testing a more accurate basis for design. Proportionate changes in size of structures usually do not produce proportionate changes in strength properties. Just what the relationships are, will be determined by comparison of test results and computation.

SPECIFY GENERAL CONTROLS hi-g* valves for aircraft

AUTOMATIC PRESSURE, TEMPERATURE AND FLOW CONTROLS

| | | |
|--|---|---|
|  <p>AV-16</p> <p>Electric motor valve, suitable for fuel, hydraulic fluid and lubricating oil shut-off. High flows at low pressure drop, explosion-proof motor and switch cover.</p> |  <p>AV-11</p> <p>3-way Electro-Magnetic valve used for distribution of fluid flow or for "feed in" and "exhausting" fluid from a cylinder, piston or vessel.</p> |  <p>AV-2</p> <p>Same as AV-1 except is normally open type. For control of various fluids, oil, water, gasoline, air, etc.</p> |
|  <p>AV-7</p> <p>Four-way selector type control—operating pressure up to 3000 P.S.I. for control of fluid pressure operated cylinders.</p> |  <p>AV-9</p> <p>Electro-Magnetic valve for medium and high pressure applications. Controls hydraulic oils, fuels, lubricating oils, water, etc. 50 P.S.I. to 3000 P.S.I. operating pressure.</p> |  <p>TM-11</p> <p>Temperature modulating control—providing fully automatic electro-hydraulic operation for control of engine coolant and lubricating oil.</p> |
|  <p>AV-1</p> <p>Normally closed type Electro-Magnetic valve—for control of all types of fluid, gasoline, air, water, hydraulic fluids or oils, anti-icing fluids, etc.</p> |  <p>AV-7</p> <p>Electro-Magnetic Double-Four Way selector type valve for control of fluid pressure operated cylinders.</p> |  <p>AV-1</p> <p>Electro-Magnetic type valves with various magnet sizes, full ported or restricted ports, for all types of fluid, gasoline, air, water, oils, etc.</p> |

For complete specifications and engineering data, request new Catalog.

*hi-g TRADEMARK

GENERAL CONTROLS

Manufacturers of Automatic Pressure, Temperature & Flow Controls

FACTORY BRANCHES: BIRMINGHAM (3), BOSTON (16), CHICAGO (5), CLEVELAND (15), DALLAS (2), DENVER (10), DETROIT (8), GLENDALE (1), HOUSTON (2), KANSAS CITY (2), NEW YORK (17), PHILADELPHIA (40), PITTSBURGH (22), SAN FRANCISCO (7), SEATTLE (1) - DISTRIBUTORS IN PRINCIPAL CITIES

New Anti-G Coverall Gives More Protection

An improved anti-G suit, which answers many of the shortcomings of the current service type, has been developed by Air Materiel Command.

The new coverall, Model G-4A, slated for standardization throughout the Air Force, is patterned after this service's summer flying suit.

► **Makeup Details**—Abdominal and leg sections contain a single-piece vinylite-coated Nylon cloth bladder system with a spring insert to prevent kinking.

Slide fasteners are used to open the suit, one set extending down the inside of each leg and another inserted diagonally from a point just above the right hip to the center of the garment at the neck. Fasteners are arranged to prevent interference with the bladder details.

► **Permanent Adjustment** — Inside of each leg is covered to prevent snagging of lacing adjustments. This cover hangs loosely to present the appearance of an ordinary flying suit. The lacing is "piano-hinge type" and once laced, the garment may be donned and removed without further adjustment.

Bladders, forming a single interconnected system extending across the abdomen, thighs and calf, are larger than in the currently-used Model G-3A suit.

► **Materials**—The garment is fabricated from two materials instead of the all-Nylon makeup previously used. Because of the inability of Nylon to absorb perspiration, the upper section has been made of absorbent Byrd cloth. Lower section is made of Nylon because of the greater stresses it must carry.

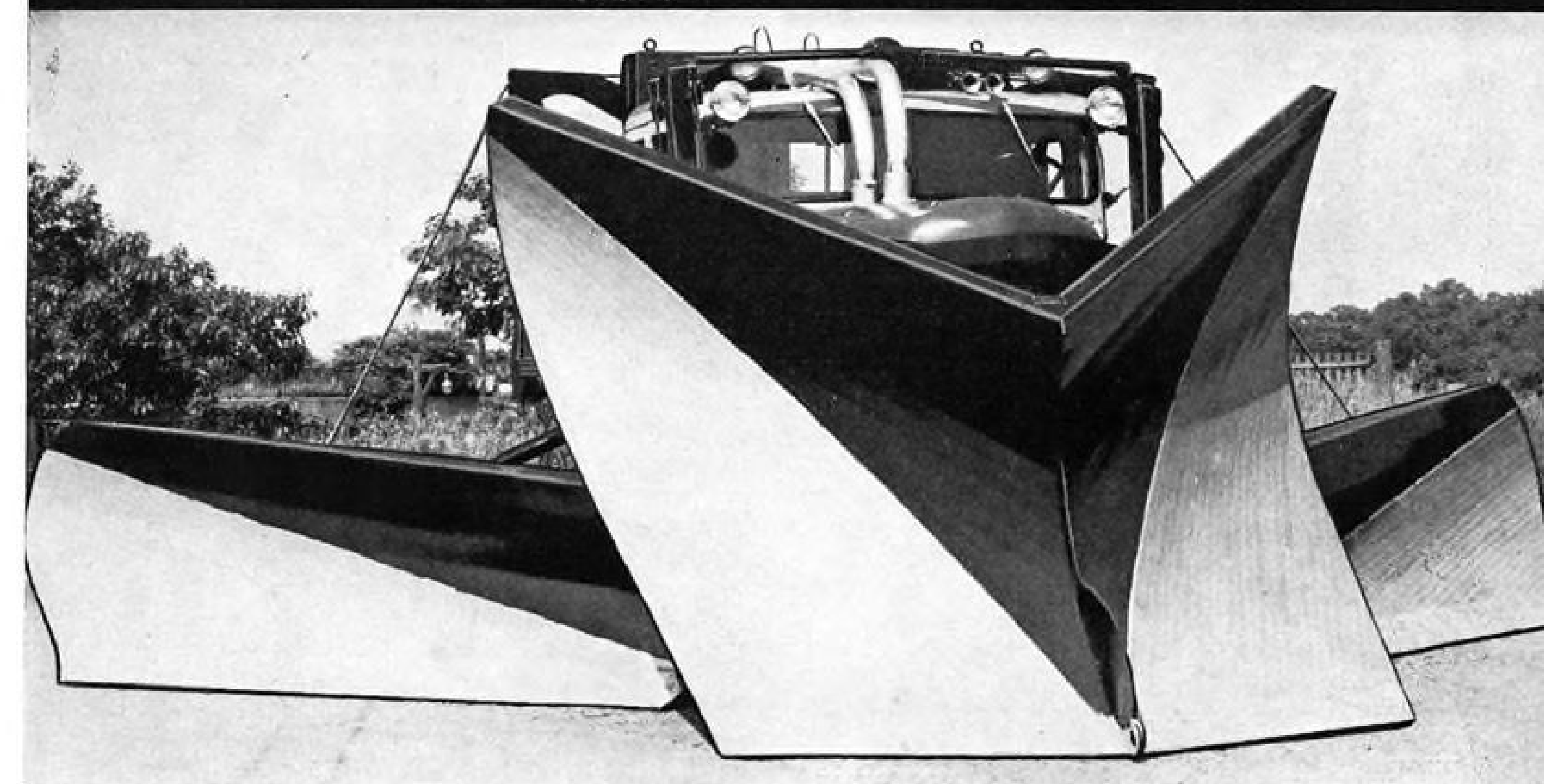
► **Additional Protection** — To compare the efficiency of the G-4A with the G-3A suit in reducing or postponing the symptoms resulting from exposure to radial acceleration, 13 subjects were exposed to trials in the "human centrifuge" at Wright Field, first with no suit, then with the garments. Value of average protection afforded by the G-4A suit is followed (in parenthesis) by that for the G-3A: Clear vision 1.4G (.76G), dim vision 1.67G (.8G), peripheral lights lost 1.9G (.81G), and blackout 2.3G (.74G).

Special-Metal Piston Ring

A new top compression ring for gas or Diesel engines, made from a special metal, K-spun, has been developed by Koppers Company, Inc.'s metal products division, Baltimore, Md.

Used in centrifugally cast rings, the metal is stated to "possess 50 percent more 'spring' quality and four times the resistance to combustion shock." It's reported that it won't break during installation or in service.

TRUCK and PLOWS designed as a TEAM!



— another reason why **WALTER SNOW FIGHTERS** clear snow faster!



Powerful Walter Snow Fighters permit mounting bigger plows, wings and blades of greater capacity and faster, more efficient clearing action than any other equipment.

Specially designed to take full advantage of the great traction of Walter Snow Fighters, the Walter V front plows, offset V plows and speed plows supply high arc and correct lifting and throwing action to hurl snow far off the runway, yet provide proper drivers' vision. Hydraulically controlled side wings fan out snow to give remarkable dispersion, eliminating dangerous snowbanks. A greater volume of snow is removed on each run and more miles cleared per hour.

Only Walter Snow Fighters, with the superior traction of the Four-Point Positive Drive, can provide the great pushing power and speed to effectively use these high-capacity plows, as well as the Walter pressure center scraper blade.

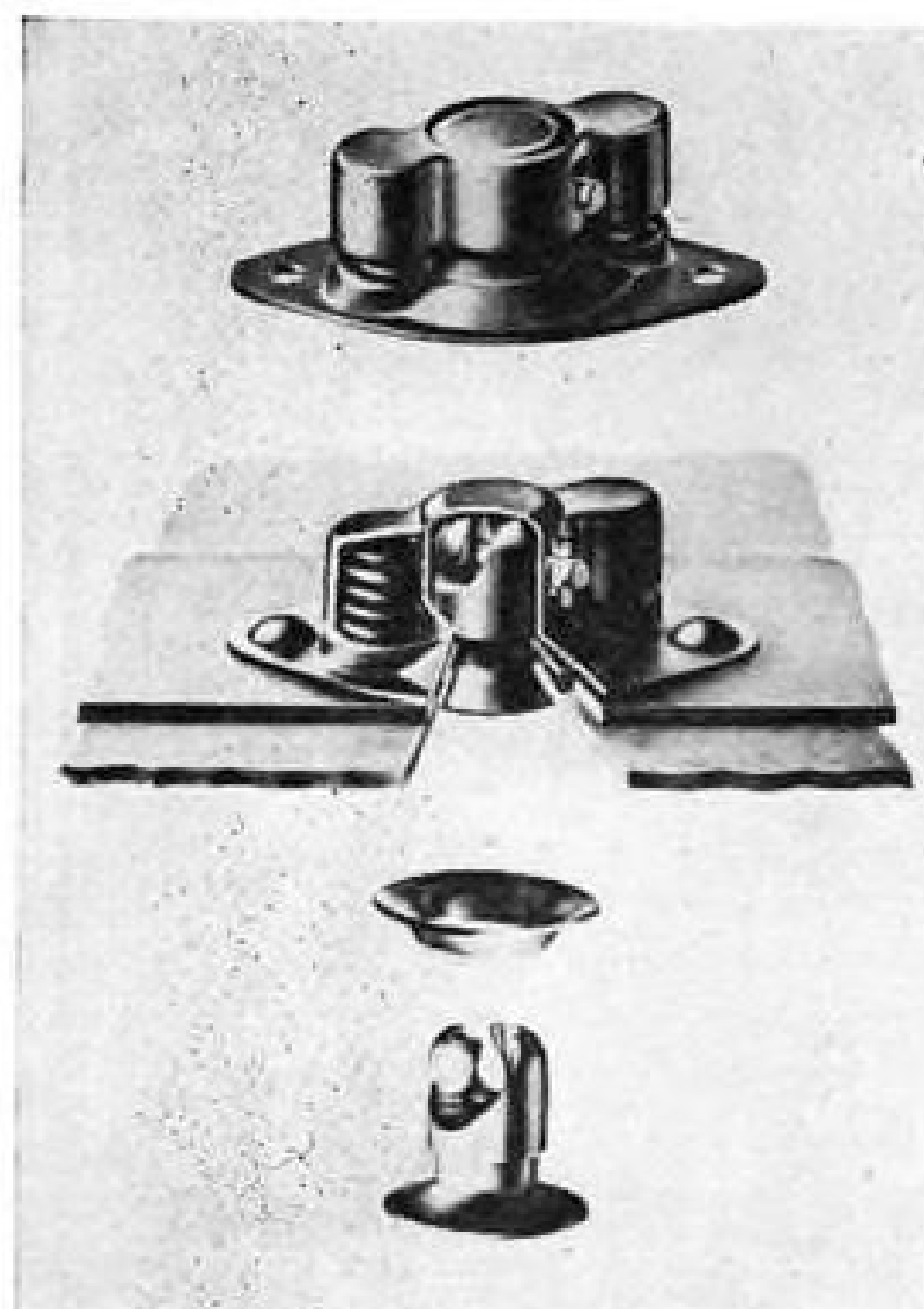
Have our representative call with full details on Walter Snow Fighters — or write for literature.

WALTER
SNOW FIGHTERS

WALTER MOTOR TRUCK CO.

1001-19 Irving Ave.
Ridgewood 27, Queens, L. I., N. Y.

NEW AVIATION PRODUCTS



For Tight Cowlings

Cowling fastener specifically designed to meet demands of high speed service is marketed by Dzus Fastener Co., Inc., Babylon, N. Y. Designated "Supersonic," unit consists of fully enclosed spring receptacle engaged by stud embodying spiral-cam principle, so that opening or closing is obtained by rotating stud $\frac{1}{4}$ turn. Device is available in all of sizes, styles, and increments of length specified in Specification AN-F-8b, and receptacle is made both in floating and stationary form.



Tests Pressurized cabins

Developed by Greer Hydraulics, Inc., Brooklyn, N. Y., Model CLP-1 pressurized cabin test machine is designed for checking on high altitude airliners such as Boeing Stratocruiser, Douglas DC-6 and Lockheed Constellation. Compact device is mounted on rubber-tired wheels for portability with tow-bar for hand or truck. Unit is powered by electric motor and incorporates an air compressor capable of delivering up to 400 cfm. of free air at 10 psi. to the cabin. Hose lines and couplings are provided. Pressure and temperature of air to plane are accurately controlled by relief valves. Flowmeter and pressure and temperature gages are provided to indicate exact cabin condition. Aircraft type rate of pressure change meter and mercury manometer are used to indicate rate of cabin pressurization.

For Control Engineer

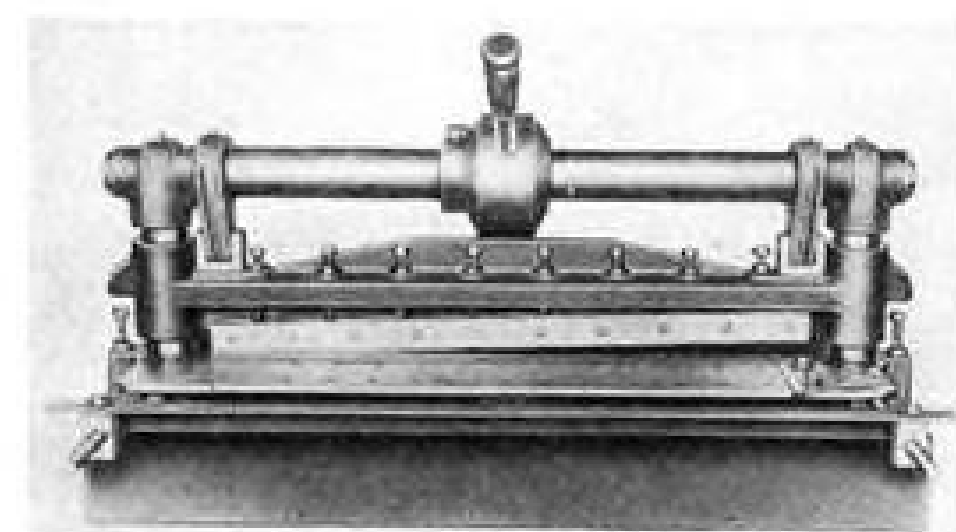
Precision electronic instrument, Servoscope, developed by Servo Corp., 2020 Jericho Turnpike, New Hyde Park, N. Y., is designed to furnish continuous performance data about servomechanism or process control and may be used to check complete servo loops or components, such as motors, syn-

chros, gyros, amplifiers, accelerometers, etc. Frequency response can be plotted quickly and transient characteristics deduced. Carrier (50 to 800 cps.) modulated test signal ($\frac{1}{4}$ to 16 cps.) is supplied. With scope's dials, rapid measurements may be made of frequency amplitude attenuation and phase shift. Corrective networks and adjustments on the servomechanism may be introduced without resorting to costly experimental revisions in system. Tedious mathematical design analysis is largely eliminated, and transfer functions are easily derived. Visual display of signal amplitude and phase on a scope screen gives quick comparative values. Device provides amplitude range from 0 to 20 v. rms; phase lead or lag accuracy to within 2 deg. (phase dial is calibrated from 0 to 360 deg. in 1 deg. divisions). Power consumption is held to 40w.



Emergency Light

Portable, emergency airport light offered by U-C Lite Mfg. Co., 1050 W. Hubbard St., Chicago 22, Ill., has weatherproof, baked enamel steel container for two standard dry-cell lantern batteries and connections. Double-throw, single-pole switch gives instant selection of either steady beam or flare with 100-112 flashes per min., and light is visible in all directions for over 600 ft. Ordinary burning life of batteries is said to give continuous flashing for 28 hr. or steady light for 20 hr. Two independent bulbs are used, so that if one burns out, other continues to operate. Third bulb in dummy socket serves as spare. Lens of molded plastic directs light in horizontal beams.



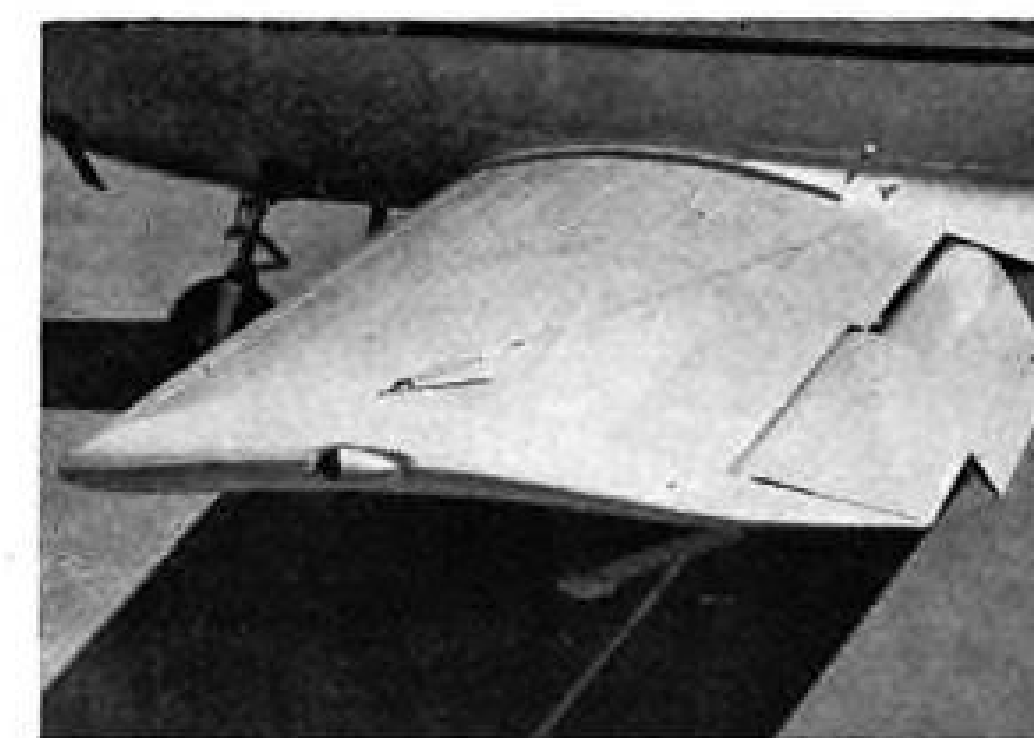
Precision Shear

For rapidly shearing wide variety of materials to extremely close tolerances, O'Neil-Irwin Mfg. Co., Lake City, Minnesota, offers tool with cutting range extending from light plastics, fiber, mica, leather and rubber to heavy gages of aluminum and steel. Shear is adaptable to model, research and experimental work and relieves power and foot operated units of a great variety of small precision work. Maximum shearing width is 24 in., maximum material capacity is 16 gage sheet steel (.062).

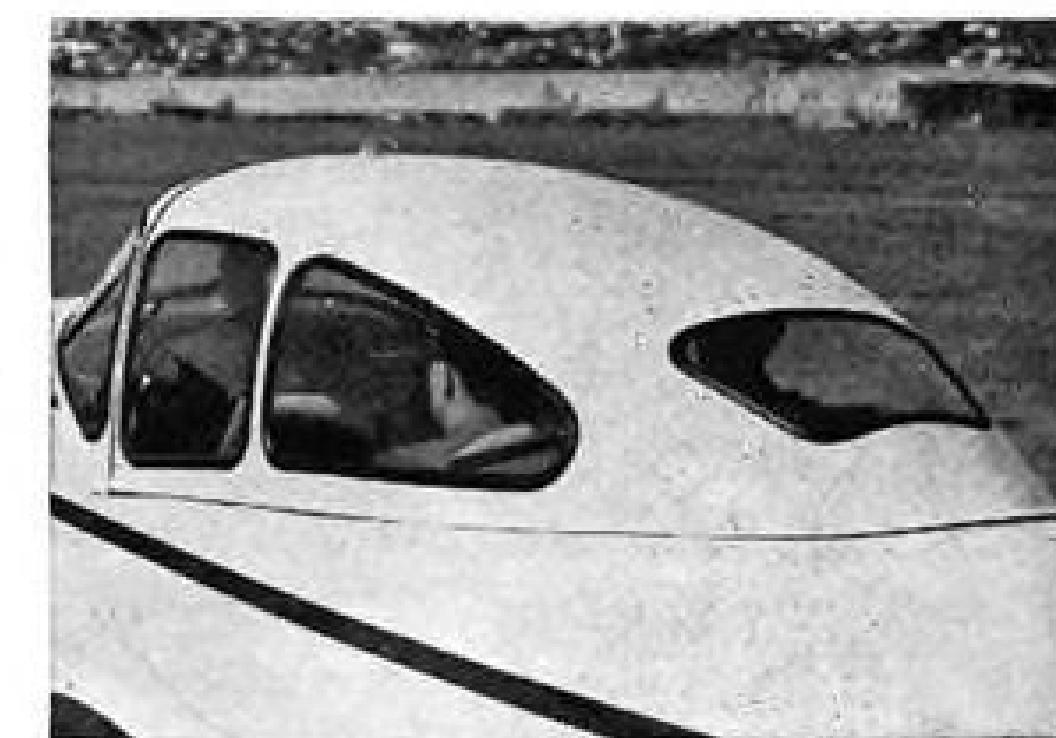
CHECK THESE NAVION FEATURES



1 SELECTIVE TWO-CONTROL gives automatic coordination. Patented inter-connected aileron and rudder control permits steering with wheel alone. But you have rudder when you want it. Navion flying is easier, safer...pleasantly relaxing.



2 HIGH-LIFT FLAPS. Large, slotted, full-deflection flaps give the Navion slowest, shortest landings of any plane in its class. Roll only 335 feet. Stall-resistant wing gives full aileron control for maximum safety in slow flight and landings.



3 FULL-VISION CABIN. Here's visibility designed for Sunday traffic. Seven large, clear windows let you see in every direction. No blind spots while flying or taxiing. You can even use a rear-view mirror...see 120° down over Navion nose.



4 THICK-SKINNED RUGGEDNESS. The all-metal Navion takes heavy duty assignments in stride. Sturdy construction and thick-skinned wings, fuselage and tail assure safety and low maintenance cost. For permanent beauty, durable enamel finishes now standard...choice of 4 striking colors.



5 LARGE, STEERABLE NOSEWHEEL. Easiest, safest ground handling under all conditions. Navion's over-size tires, sturdy tricycle landing gear, wide wheel tread and high speed ground clearance make rough fields and cross-wind landings a cinch. Extra powerful, equalized hydraulic brakes.



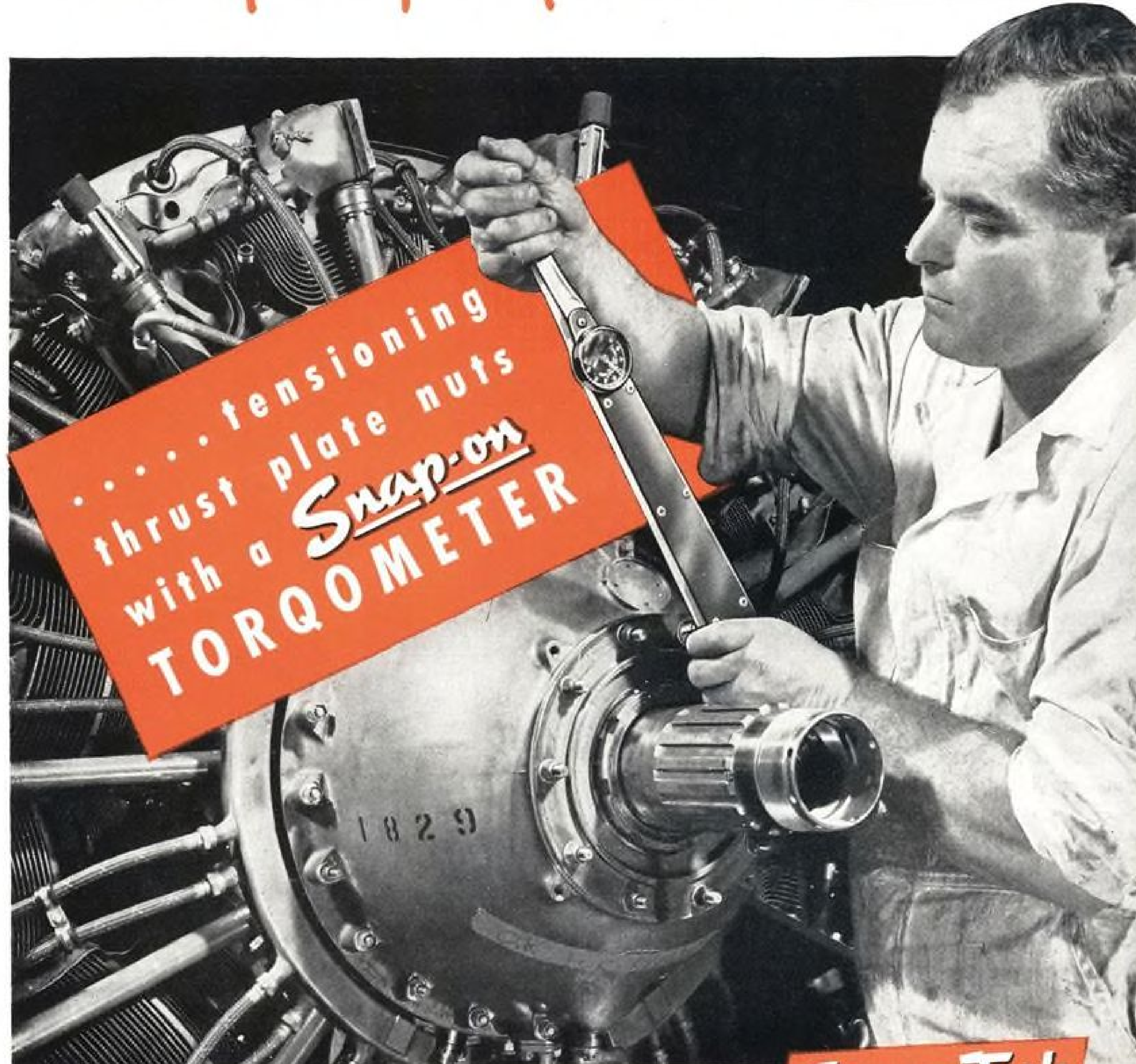
6 ROOMIEST CABIN. Quiet...well-ventilated...smartly styled. Elbow and leg room to spare for all four passengers. Adjustable front seats. Navion cabin, 42" wide; 94" long; 52" high. Canopy rolls open 2½ feet for more convenient entrance and exit. Baggage space up to 180 pounds.

7 FLEXIBILITY OF PERFORMANCE. 150 mph. cruising speed. 750 mile range with optional reserve tank. Easiest air ride. No tail wagging, even in rough air. No other plane offers such intelligently chosen and well engineered combination of features. For illustrated booklet, demonstration or free business trip, write us today, on your business letterhead!



The Thoroughly Proven Post-War Plane *Ryan Navion*
Rely on Ryan RYAN AERONAUTICAL COMPANY, 411 LINDBERGH FIELD, SAN DIEGO 12, CALIF.

When you're glad you have a **Snap-on**



Veteran aviation mechanics agree that the one best way to correctly tension a stud or bolt to an engineer's specifications is to standardize on Snap-on Torqometers. And the veterans also agree that with a Snap-on Torqometer, you can hit the specified pressure every time . . . right to the correct inch or foot pound. There is no guesswork . . . you can see the applied torque as the bolt is tightened.

Torqometer sizes range from zero to 30 in. lbs., up to 2,000 ft. lbs. capacity. Available through a nationwide, direct-to-user tool service. Write for the new complete catalog of 4,000 Snap-on tools.

SNAP-ON TOOLS CORPORATION
8020-K 28th AVENUE, KENOSHA, WISCONSIN



Illustrated above is one of Northwest Airline's skilled mechanics accurately tensioning thrust plate nuts with a Snap-on Torqometer No. TQ 150.

AVIATION SALES & SERVICE



Top personal aircraft engineers and technical experts attended the recent discussion of spin requirements for personal planes held under leadership of Prof. Fred E. Weick, director of Texas A & M College's Personal Aircraft Research Center, at the center. Left to right above: seated, H. A.

Sutton, Ryan Aeronautical Co.; J. M. Chamberlain, assistant CAB safety bureau director; Mrs. R. B. Harwood, secretary; Prof. Weick, J. E. Boudwin, CAA; M. J. Gordon, Beech Aircraft Corp.; D. C. McGary, Texas Engineering & Manufacturing Co.; standing, H. G. Erickson, Luscombe Air-

plane Corp.; J. H. Gerteis, Cessna Aircraft Co.; E. E. Brush, Texas A & M aeronautical engineering department; H. F. Kueck, Aeronca Aircraft Corp.; C. W. Von Rosenberg, CAA; Robert Sanders, Sanders Aviation (Ercoupe) and A. I. Neihouse, NACA.

Spin Tests May Be on Way Out

CAB and CAA expected to act soon to eliminate long-debated requirement from Civil Air Regulations.

Proposal to eliminate spin tests from Civil Air Regulation certification requirements for private pilots has been gathering momentum in industry and government quarters for the past several months and is likely to be approved by CAB and CAA in the near future.

John M. Chamberlain, CAB safety regulation director, last month began circulation of a draft of a proposed regulation eliminating the spin requirements. The draft was endorsed last week at Indianapolis at a meeting of the Non-scheduled Flying Advisory Committee for CAA.

Specifically the proposal would eliminate sub-section 20.36(A)4: "A two-turn spin in each direction starting the recovery with an error of not more than plus or minus 10 degrees" and would amend sub-section 43.51 to include: "(C) he has been given instruction in recovery from power-off and power-on stalls entered from straight flight and turns."

► **What Use?**—Behind the proposal is a

growing feeling among progressive aviation groups that the spin tests as now conducted are not much use, and tend to scare away the middle-aged customers who don't like to spin. They also put a penalty on any airplane that is spinproof or spin resistant, since every pilot who learns to fly must take at least part of his training in an airplane that will spin, unless he gets a limited spinproof plane license.

Significant in the total picture is the recent conference held under leadership of Prof. Fred E. Weick, designer of the spinproof two-control Ercoupe, at the new Personal Aircraft Research Center which he heads at Texas A & M College, College Station, Texas.

Majority of a group of personal plane company engineers represented personally or by letter expressing their views recommended a change in the present CAB spin requirement. They also urged that the new center give top priority to work on airplane control at the stall. Other projects recommended as im-

portant are free-control spin recovery, design of spinproof planes, development of a straight flight arrangement survey of design requirements for spinproof airplanes and means to achieve major increases in speed range. The center has already obtained an NACA contract to investigate high lift devices for personal aircraft.

Prof. Weick pointed out that there is little data on free control recovery available in the personal aircraft field. Most NACA spin research previously has been in the military field, and the military planes are permitted to recover from spins with full opposite controls. The statement was verified by A. I. Neihouse of NACA, one of the observers at the conference.

► **Others**—Others attending the meeting included M. J. Gordon, Beech; J. H. Gerteis, Cessna; H. A. Sutton, Ryan; H. G. Erickson, Luscombe; D. C. McGary, TEMCO; H. F. Kueck, Aeronca; Bob Sanders, Sanders Aviation (Ercoupe); J. E. Boudwin and C. W. Von Rosenberg for CAA, Chamberlain for CAB, and E. E. Brush, of Texas A & M aeronautical engineering department.

Effect of the removal of the requirement might be felt favorably by the Ryan Navion and the Stinson Voyager, two of the most spin-resistant designs now being marketed, and would prob-

ably mean more competition in the spinproof field, eventually for the single spinproof plane now in production, the Ercoupe. It would also probably develop an arrangement for quick checkout from the Ercoupe to the Navion which Ryan has been interested in for some time.

► **Opposition** — Main opposition to changing the spin requirement appears to lie principally in a group of CAA die-hards who oppose change chronically, and some state aviation officials. At least one state aviation director, Dexter Martin of South Carolina, has indicated he may invoke state regulation re-instituting the spin requirement if federal agencies knock the requirement out.

A publication by CAB's accident analysis division, released last month, considers spin crashes and points out that practically all of the fatal spin accidents are in spins which began at an altitude too low to affect recovery if immediate recovery had been made. The analysis reviewing figures for 1946, the biggest year in sales that private flying has ever had, showed a total of 335 fatal spin accidents. It called for improvement in design, similar to the projects which the Weick organization is undertaking in Texas, in order to design the airplane so that a pilot can "make a mistake without getting into serious difficulties." The summary showed that there were only three spin accidents in the entire 335 which were attributable to spin-resistant aircraft, and that obviously none of the spin facilities was found in spinproof planes.

Aircraft that are not spinproof or spin resistant could have their stall potential lowered by use of one of a number of stall-warning devices now being marketed, thus eliminating the origin of the spin, the CAB analysis recommends.

Weems Purchases Interest

Capt. P. V. H. Weems, (Ret.) president of Weems Systems of Navigation, Annapolis, has recently purchased a controlling interest in Aeronautical Services, Inc., 1336 Irving St. NW, Washington, and will continue to operate the new company in conjunction with his older firm. Thoburn C. Lyon, author of Practical Air Navigation (CAB No. 24) and of the new revised commercial edition of the same book, is associated with Capt. Weems in the new firm. Aeronautical Services handles charts and navigation equipment, and publishes pilot route manuals for the U. S. and for foreign airlines. It also conducts class and individual instruction in navigation, and handles new and surplus navigation equipment. Lyon was formerly chief cartographer, aeronautical chart branch, U. S. Coast and Geodetic Survey.

BRIEFING FOR DEALERS & DISTRIBUTORS

PRICE TREND CONTINUES UP—Cessna and Luscombe last week announced price increases on their largest airplanes. Cessna liked the price of its big 195 five-placer with 300 hp. Jacobs engine, up an even \$1000 to a new price of \$14,950 while the 190 series with Continental 240 hp. engine now sells for \$13,250. Increases are effective as of Dec. 1; firm orders received before that time will be delivered at present prices.

Luscombe has increased the price of the four-place all-metal Silhouette Sedan \$475 from \$6995 to \$7470. flyaway Dallas. This price increase, effective Nov. 15, includes addition of sensitive altimeter as standard equipment on the airplane. Large Cessna price increase on the Jacobs-powered 195 presumably reflects an engine price jump. The 190 and 195 are virtually identical except for engines.

STATE CRACKDOWN IN OKLAHOMA—Eldon Stout, Oklahoma aeronautics director, has written a letter to each county attorney in the state, asking cooperation in prosecuting any reckless flyers in the state when evidence is provided against them.

Stout has also obtained word from the state highway patrol that the entire department's personnel will be on the lookout for buzz pilots and other reckless flying. The Oklahoma aeronautics director said 75 percent of all fatal airplane accidents in the state are caused by careless, reckless and drunken flying.

REESE AND KLOTZ HEAD PAC—Election of C. J. (Jack) Reese, president of Continental Motors, as chairman of Personal Aircraft Council, and Leopold H. P. Klotz, president of Luscombe Airplane Corp., as vice chairman, was announced following the recent meeting of the light plane manufacturers in Detroit. Reese succeeds Dwane Wallace, president of Cessna, and Klotz succeeds William Klenke, Jr., Stinson sales manager.

As head of the company which makes approximately 90 percent of the engines used in small personal, business, and training planes, Reese has a big stake in the future of personal aircraft. The PAC, like several other aviation organizations recently, took its turn at a conference with new CAA administrator Del Rentzel, and made plans for another huddle with the administrator down in Washington soon.

Project is to examine existing regulations and development procedures with hope of getting a more realistic regulatory approach to improvements in personal aircraft. So far, Rentzel has passed his first round of industry meetings with a good record.

ATLANTIC AVIATION TRANSFER—Sales and service operations of Atlantic Aviation Service have been transferred from Dupont Airport, Wilmington, Del., to New Castle (Del.) County Airport, Stewart Ayton, manager, has announced. Transfer followed completion of a new hangar and shop facilities at the former ATC base, south of Wilmington. The move was planned as a consolidation of Atlantic's maintenance operation and to facilitate service to customers in the Wilmington area.

Atlantic Aviation Service will continue to keep Dupont Airport in operation, with hangars used for storage and with ramp service, gas and oil available to transients. The tower is closed, however, and all training operations are being transferred to the New Castle base.

TAYLORCRAFT MOVE—Expanded service and supply facilities for the 16,000 Taylorcraft airplanes now flying, as well as additional production facilities for new airplanes, are to be provided in the new location of Taylorcraft Inc., at Conway-Pittsburgh Airport, Conway, Pa., according to C. G. Taylor, president.

The move takes Taylorcraft back to near its original home. President Taylor says that reception of the three 1949 Taylorcraft two-placers has been good enough to require increased production schedules, and that plans are under development for a four-place Taylorcraft. Company is also seeking contracts for military aviation components and equipment.

Ben J. Mauro, chairman of Taylorcraft board of directors, is operator of the Conway Airport where the new plant for Taylorcraft is now under construction. Plans call for long one-story straight-line assembly structure with two bays initially, and designed for additional expansion as needed.

—ALEXANDER MCSURELY

The Birdmen's Perch

By Major Al Williams, ALIAS, "TATTERED WING TIPS,"

Gulf Aviation Products Manager, Gulf Bldg., Pittsburgh 30, Pa.



Ocala, Florida, is one of the most progressive communities in the country, that's what!

Down there the Marion County Public School System gives regular graduation credits to high school students for aviation mechanic and flight courses. The CAA approved mechanics school gives three credits a year to students . . . the flight school grants one credit to solo students, two to students who take their commercial certificates before graduation!

And get this, time buyers: The students get their time (in two J-3's and a PT 19) for \$2.50 an hour!

We're mighty pleased to hear that this gang uses Gulf Aviation Products exclusively. But we'd be mighty pleased even if they didn't, because this is one of the soundest, smartest pieces of aviation education that we've ever heard of.

Flutter! Make out a special certificate suitable for hanging up in a school.

Say on it that because of the splendid program of aviation education instituted

and supported by the members of the Marion County Public School System, we hereby designate all such schools as Branch Birdmen's Perches!

Be sure it's a super-engraved-type document with curlicues on the letters, etc.

And when you send it down to Ocala, Florida, mention that the Perch will be proud to send a certificate each year to the outstanding aviation student as selected by the school board. Ask 'em to let us know.

HERE IT IS!

Close your eyes and imagine driving the family buggy into your Good Gulf Station.



Think of how the attendants whisk out and clean your windshield . . . check your tires . . . go clucking over your car like mother hens . . .

Okay, so now we're going to give you that same service on your private plane!

We're working on a super service station for the private pilot at the Allegheny County Municipal Airport, near Pittsburgh. We'll have a building with a pilot's lounge, a chart room with plenty of table area for plotting, and telephones!

Even a separate lounge for the gals!

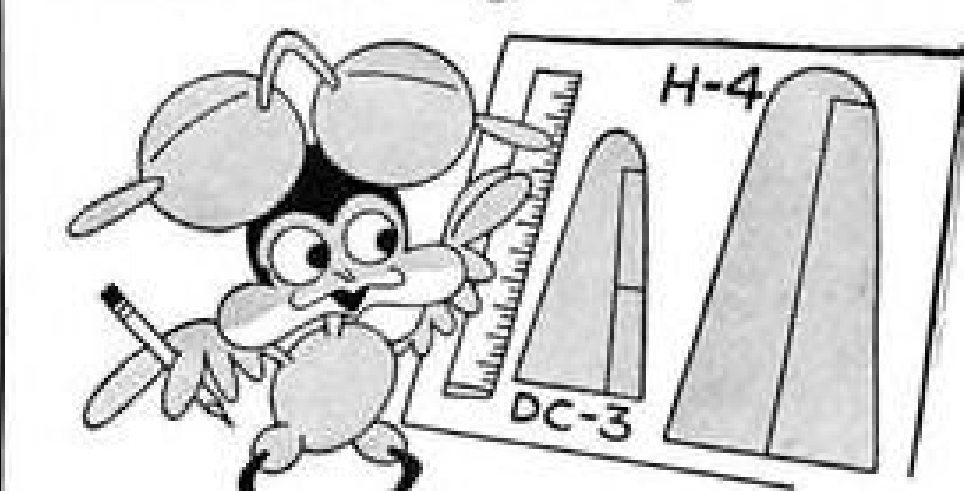
On the ramp, we'll have a service island, with cabinet-type gas pumps and 80-, 91-, and 100-octane Gulf Aviation Gasoline. And the Gulf Servicemen won't be in the middle of a top overhaul when you want them, either. Their *only* duties

will be to look after *your* service needs! Sound interesting?

We'll keep you posted as the work progresses.

LITTLE KNOWN FACTS DEPT.

C'mon kiddies . . . get rolling!



We haven't gotten enough Facts lately to stick in our eye! If we don't get Facts, we can't print 'em. If we can't print 'em, we can't hand out our handsome, durable Commissions as Perch Pilot (bottom rung).

Thank goodness for people like F. F. Torreyson, a TWA Librarian in Washington, D. C., who points out:

"The span of the horizontal stabilizer on the huge H-4 flying boat is 18½' greater than the span of a DC-3 wing!"

Send him a Commission, Flutter!

Then go out and look in the mailbox and see if anyone else has sent in some hot Little Known Facts On Well Known Planes.

Even on post cards!

Gulf Oil Corporation and Gulf Refining Company...makers of



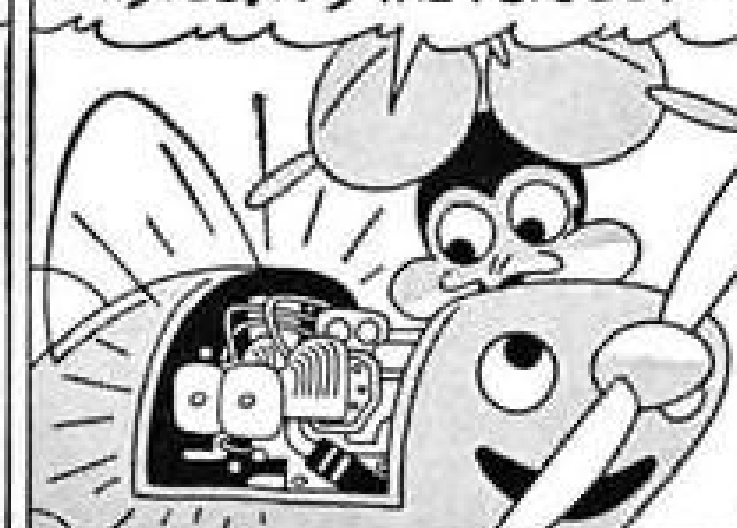
REMEMBER THAT THE BRAND-NEW GULFPRIDE-SERIES D- IS MADE EXPRESSLY...



FOR HORIZONTALLY OPPOSED ENGINES, AND THAT IT HELPS KEEP VALVES FROM...



STICKING AND KEEPS ENGINE SURFACES CLEAN AS A WHISTLE! IT'S THE PERFECT...



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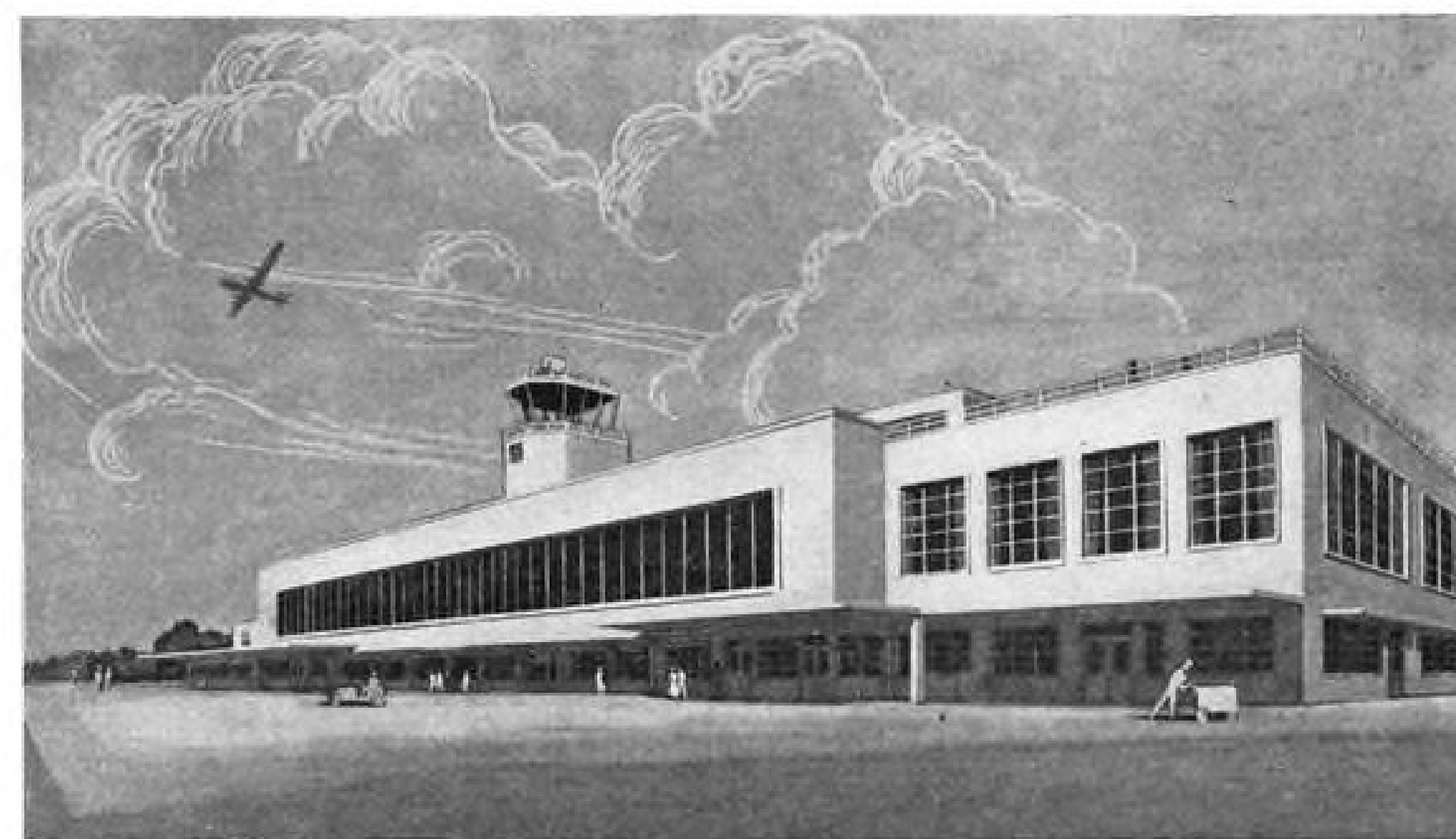
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AVIATION WEEK, November 8, 1948

AIR TRANSPORT



W. A. Patterson



Joseph O'Connell, Jr.

Who's to Blame in Airline Crisis?

UAL's Patterson accuses Civil Aeronautics Board; Chairman O'Connell replies in Board's defense.

By Charles Adams

The continuing financial crisis faced by a large part of the air transport industry has brought the chairman of the Civil Aeronautics Board and top airline officials to verbal sword's points over who is to blame.

Most recent public criticism of the Board has come from W. A. Patterson, president of United Air Lines, who together with Northwest Airlines' President, Croil Hunter, last summer assailed CAB's failure to carry out its duties properly under the Civil Aeronautics Act (AVIATION WEEK, Aug. 9). Patterson told the Iowa Bankers Association that CAB "is principally responsible for airline difficulties today."

► **Favors Investigation**—The current problem, Patterson declared, is not what is wrong with the airlines but what is wrong with the Civil Aeronautics Board. "I would like to see two or three of the outstanding transportation economists of the United States appointed to investigate the stewardship of CAB over the airlines. I am confident that an objective appraisal would show outstanding failure—failure to understand and evaluate the basic problems of air transportation, and failure to carry out the Board's stated responsibility to foster sound economic conditions within the industry."

Patterson said that in contrast to the Interstate Commerce Commission,

which regulates the railroads and has realistically provided financial relief in the form of higher rates, CAB has appeared to be confused and vacillating. The UAL president added that the Board's failure to provide adequate mail pay in accordance with its obligations under the Civil Aeronautics Act had left the public with the impression that airlines are inefficient and irresponsible.

► **Losses Cited**—"During the past 18 months the domestic air transport industry has lost \$36,000,000," Patterson stated. "Yet the Civil Aeronautics Act requires CAB to foster sound economic conditions." These losses, he said, in themselves reflect against the Board. Patterson also accused CAB of creating excessive competition.

A day later, Chairman Joseph J. O'Connell, Jr., in a speech before the aviation law clinic of the Chicago Bar Association, defended CAB and indicated the carriers were not blameless for their predicament. He denied industry intimations that the Board has been "grinding the faces of the poor."

► **O'Connell Sees Good Progress**—It is true, O'Connell said, that CAB has been behind schedule in setting permanent mail rates—partly because of an insufficient staff. But, he continued, we are making good progress, "and I refuse to take seriously the charges brought by some carriers that the permanent rates we have set are unfair or inadequate. We have no intention of dispensing

government funds with an open hand and an uncritical eye."

O'Connell admitted that the airline financial situation is serious if not critical. He quoted forecasts that the 16 domestic trunklines will lose around \$16,000,000 this year after a \$20,000,000 deficit in 1947 (AVIATION WEEK, Oct. 25).

► **No Panacea in Mail Pay**—The chairman emphasized, however, that the airlines' financial problems arise from a variety of causes. "No single panacea will solve them—not even unlimited mail pay."

O'Connell denied emphatically that CAB had blundered badly by authorizing excessive competition during recent years. "On an overall basis," he declared, "I do not believe the Board can be seriously criticized for its basic approach to the expansion of the air route network in the postwar period."

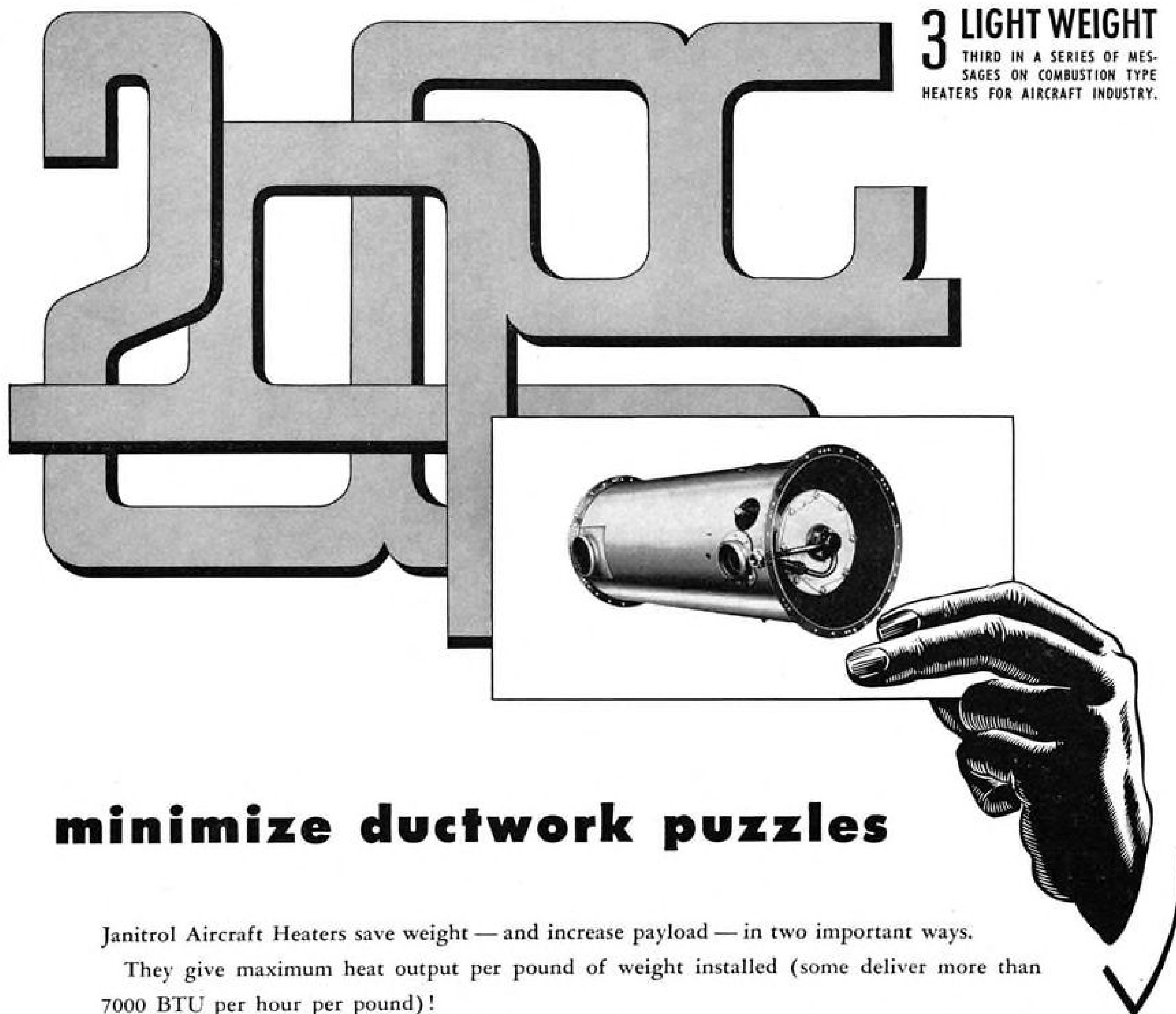
In view of the unlimited optimism of the carriers themselves and the public generally, it is not surprising that CAB in the postwar period found full justification in the record of new route cases for the institution of additional competition and service, the chairman asserted. "On hindsight, and remembering the atmosphere of postwar days, it seems to me that in general the Board handled its route cases with commendable restraint."

► **Over-Optimism Recalled**—Illustrating the postwar optimism of the air transport industry, which foresaw almost unlimited traffic expansion, O'Connell said one carrier told its employees that if any of them doubted their company would soon be operating 1000 large planes they had better resign because they did not have the vision necessary for the airline business. The company today has only a small fraction of 1000 aircraft.

"To be sure the Board did institute competition or additional competition over route segments which before the war had been served by only one or two carriers," the chairman declared. "Many of these route awards were made to carriers which now complain most vociferously about excessive competition."

"I believe that a grossly restrictive policy by the Board would have been a serious error during the postwar period. It would certainly have called down on the Board the wrath and invective of the carriers, communities desiring improved service and, very probably, the Congress."

► **On Monopoly Issue**—"We frequently hear nowadays an airline attorney say the Board has created too much competition, but I will be happy to show you speeches and articles to the effect that CAB has been, and now is, an iniquitous champion of monopoly and restraint of free entry into the airline business. On occasion, even lawyers for



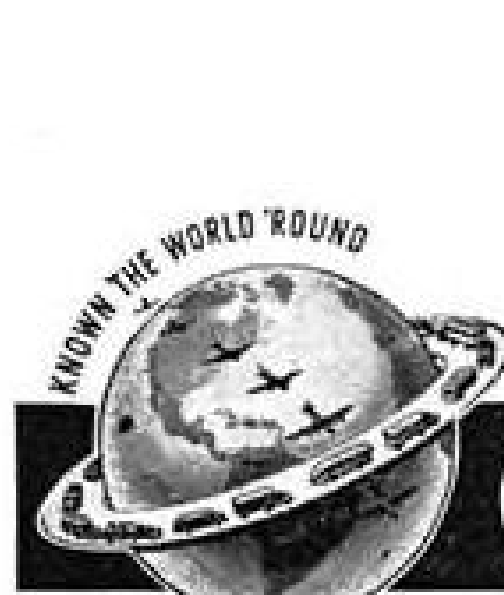
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the certificated carriers make this plea when they are trying to get a new route."

(Thurman Arnold, former chief of the Justice Department's Anti-trust Division, and now a Washington lawyer, said last month CAB should be stripped of its power to determine who shall carry airline passengers. He described CAB members as "unconscious Socialists" who are encouraging monopolies by refusing to certificate new and competing airlines.)

O'Connell declared that if traffic were to catch up with existing capacity many of the "so-called mistakes" of CAB would again become merely segments over which there was a desirable and healthy degree of competition. "I am confident that with increased regularity and safety, and with the offering by the carriers of a wider range of service at a broader spread of fares, traffic may well start to grow again in the next twelve to 24 months. If this occurs, many of the route patterns and competitive problems which now are apparent will disappear."

► **Pressure for Service**—The chairman admitted there are some points on the existing air map which probably should not be served by trunk carriers, at least to the same extent as at present. In many cases, the cities are large enough but generate little traffic because the airport is too far from town or superior surface transportation exists. Despite this situation, the communities bring strong pressure for service on the carrier which in turn presses its application before CAB.

There are, O'Connell conceded, a very limited number of segments over which there are just too many carriers for the available traffic. But he said he could think of only about three instances where the basic troubles of the carriers can be traced to this cause.

CAB is now making a comprehensive analysis of the domestic route pattern. When it is completed, the Board hopes to be able to have a better classification of the trouble spots. In the interim, O'Connell emphasized, it would be a grave mistake for the Board to be panicked into a complete reversal of its competitive policy and adoption of a rigid monopoly policy.

► **Industry Cooperation Sought**—Without the active cooperation of the industry, CAB can do very little immediately to better the route pattern, but these tools take a long time to use because of the requirements of "due process." If the Board is balked at every point by obstructionist tactics by one or more carriers, it will be three or four years before any progress can be made toward realigning routes.

"Consequences of such long delays will result in heavy cost to the industry

and the government. There is some danger that the cost to the government might grow so large that Congress would be compelled to change drastically the basic method of supporting airline operations. While the Board looks to the industry for a full measure of cooperation, I am personally inclined to believe CAB has a responsibility for taking the initiative in situations which are obviously uneconomic."

► **Mergers Possible**—O'Connell declared the industry must give serious consideration to desirable mergers and consolidations. "And some personal and corporate ambitions will have to be relinquished." He noted that despite the many merger rumors, actual consolidations have been conspicuous by their absence.

The chairman pointed out that the Civil Aeronautics Act provides that CAB may alter, amend, modify or suspend a carrier's routes if the public convenience and necessity so require. "There may be some doubt as to the limits the Board can go in exercising this authority, but there is no doubt that the authority exists and can be utilized—more so than hitherto."

► **Revocation Powers**—"The Board also has the clear legal authority to revoke the certificate of a carrier which deliberately and repeatedly violates the law or the Board's regulations. Thus far this section has never been utilized. Until we have found that the other tools we possess are inadequate to do the kind of route realignment which must be done I personally am not disposed to request Congress for power to revoke a certificate for other than cause. But I would not be bashful about requesting the

power because of any theories which may exist with respect to the sanctity in perpetuity of a certificate of public convenience and necessity."

As a temporary expedient in meeting the present situation, O'Connell suggested two alternatives. One would be negotiation of equipment interchange agreements similar to those presently in effect between Pan American Airways and Panagra from South America to Miami and between Delta Air Lines and TWA at Cincinnati. A National Airlines-Capital Airlines interchange at Washington, D. C., is pending before the Board, and CAB is looking into the need for interchange in the St. Louis-Memphis area and along the southern transcontinental run.

► **Pooling Suggested**—The other alternative is a system of temporary schedule control of pooling. O'Connell said he had not studied this plan in detail and had no preconceived notions for or against it.

Two carriers certificated between the same pair of points might, hypothetically, carry an average of 1000 passengers daily over the route. Together they offer 2500 seats and have a combined load factor of 40 percent.

By a schedule control or pooling arrangement, made subject to CAB approval, the carriers might agree to reduce their combined seats to 1700 daily, each company operating a number of seats which is in direct proportion to its existing share of the traffic. The combined load factors of the two carriers would thereby be raised to roughly 60 percent, although there still would be competition between them as to available traffic.

Alaska Exemption Extended by CAB

The Civil Aeronautics Board has extended until Nov. 30 its previous exemption orders authorizing emergency air transportation between Alaska and the United States during the West Coast maritime strike (AVIATION WEEK, Oct. 4). Pan American Airways, Northwest Airlines and certificated Alaskan air carriers are included under the exemption, but nonscheduled companies have obtained no liberalization of their operating rules.

Meanwhile, Pan American Airways has complained that Alaska Airlines, Anchorage, has taken advantage of the exemption to promote tourist and other traffic not connected with the emergency.

Certificated within Alaska but not to the U. S., Alaska Airlines expected to fly at least 600,000 lb. of cargo northbound during October under the exemption. The maritime strike entered its third month last week.



JEeps TAKE OFF

The peacetime jeep, like its wartime brothers, is well traveled, as illustrated by this loading scene at Pan American Airways' Miami base. One of a three-vehicle shipment, the jeep was bound for Bogota, Colombia, where it will be used in the construction of power dams.

American Reports '48 Loss Reduction

Third-quarter earnings of \$1,069,086 have reduced American Airlines' net loss for the first nine months of 1948 to \$3,998,593. Last year, the carrier reported a \$1,272,514 net profit for the summer quarter, and federal tax carry-back refunds aggregating \$884,434 reduced the nine months' loss to \$1,014,779.

Final quarter of 1948 should be better profitwise than the same period last year, when American had a domestic operating loss of around \$3,000,000—partly because of the DC-6 grounding. Use of DC-6s and Convair-Liners instead of less efficient equipment helped bring American's break-even passenger load factor down to 55.4 percent in September.

AA continues to report good results from its first-of-the-week family fare plan. Latest estimates are that the plan accounts for about 10 percent of American's passenger business.

Other financial results:

► **Continental**—Net income through September totaled \$136,889 against an adjusted profit of \$77,189 in the same 1947 period. Although revenue passenger mileage dropped slightly from 45,447,733 in the first three quarters of 1947 to 44,915,255 this year, passenger revenue gained about 7 percent with the help of fare hikes. Freight ton miles increased 114 percent over the first nine months of 1947, express volume was up 17 percent and mail volume 6 percent.

► **Mid-Continent**—Net loss for the first nine months of 1948 was \$4289, compared to a \$47,966 profit in the same 1947 period. Operating revenues were up 20 percent over the first three quarters of last year, but expenses rose 26 percent. Revenue passenger mileage increased nearly 13 percent and cargo ton miles 115 percent compared to 1947.

Northwest Sets Date For Hawaii Service

Northwest Airlines has announced plans to inaugurate its new route between the Pacific Northwest and Hawaii on Dec. 1 and has told the Civil Aeronautics Board it will need \$1,272,664 in mail pay during the first year of the link's operation to break even.

Three DC-4 roundtrips weekly from Seattle/Tacoma, Wash., and Portland, Ore., to Honolulu will be made at the outset. Boeing Stratocruisers may be put on the run next year.

► **Break-Even Rate**—The \$1,272,664 which NWA states it will need to break even during the first year is equal to about \$1.57 a plane mile. The carrier

has suggested that its temporary mail payment be \$1.65 a plane mile. Non-mail revenue during the first twelve months is estimated at \$462,216, while total operating expenses will be about \$1,734,880. Average passenger load for the first year was placed at ten and the average passenger load factor at 41.66 percent.

Meanwhile, President Truman's recent action in directing CAB to certify Pan American Airways for a parallel Pacific Northwest-Hawaii route (AVIATION WEEK, Oct. 11) has stirred charges of "politics." NWA was certificated for its link in July, and both authorizations were made despite a CAB examiner's report that there was insufficient traffic potential to support even one operator without high subsidies.

Television for Viking

Following the lead of Capital Airlines (PCA), Viking Airlines, transcontinental nonscheduled operator, has announced plans to test airborne television on its eight DC-3s. Sets to be used in Viking planes weigh slightly over 50 lb. and will provide a 15-inch direct-view screen mounted at the front of the passenger cabin. A rotating dipole antenna will be mounted between the wheels on the belly of the aircraft.

Australian Air Traffic Up

About one in six Australians used commercial air transportation in the year ended June 30, when the nation's airlines carried 1,217,178 passengers, a 39 percent increase over the previous year. Freight volume rose 110 percent. Because of restrictions on aviation gasoline imports, further passenger and freight gains will have to come out of unused load margins.



PIN FOR C. R.

C. R. Smith, left, American Airlines board chairman, received his 20-year airline pin from AA President Ralph S. Damon last month. Smith's airline career began in 1928 when he became treasurer of Texas Air Transport, a predecessor company of American Airlines. He became American's president in 1934 and board chairman in 1945.

Airlines Appoint New Officials

Appointment of Stanley G. King as central regional vice president of American Airlines and of Harry B. Fleming, Jr., as operations manager of Pan American Airways' Atlantic division has been announced by the two carriers.

King replaces Lewis W. King, central regional vice president since 1944, who resigned to organize his own business. Stanley King has been president



H. B. Fleming, Jr. Stanley G. King

of American Airlines of Mexico since August, 1947. For five years prior to that he held the posts of general traffic manager and vice president and managing director of American Airlines of Mexico.

Fleming has been in Brownsville, Tex., for the past three years as sector chief pilot for PAA's Latin American Division. His new duties bring him back to LaGuardia Field, where in 1941 he won his Master Pilot rating flying Boeing 314s.

Argentine Airline Orders Sandringhams

(McGraw-Hill World News)

LONDON—The Argentine airline company, A.L.F.A., which already has three Short Sandringham flying boats in service on the route from Buenos Aires to Asunicon, has just ordered an additional two of the same type, each seating 51 passengers.

The new planes will come out of the few remaining ones of this type still under production at Short Bros. & Harland, Belfast. They are being adapted, in point of fact, from the military version, the Sunderland, which was developed toward the end of the late war as an anti-submarine patrol plane for the RAF's Coastal Command.

The Sandringham 7, the latest version of this type, has four Pratt & Whitney Twin Wasp R-1380-90D radial piston engines, developing 4800 hp., a gross payload of 6212 lb. and a range of 1786 mi. on 1539 gal. of fuel at a cruising speed of 176 mph. Short Bros. has now developed an improved flying boat trans-

port, the Solent (adapted, similarly, from the RAF Seaford), which has four Hercules 753 engines developing 8000 hp. and a gross payload of 12,150 lb. The Solent has a range of 2440 miles on 2420 gal. of fuel at a cruising speed of 200 mph. BOAC is using Solents on its London-South Africa service.

The two additional Argentine Sandringhams are expected to be delivered by the end of 1948.

Post Office Asks for Halt In New Feeder Certificates

The deficit-ridden Post Office Department has again called on the Civil Aeronautics Board to adopt an ultra-conservative approach toward the feederline experiment.

Approximately \$312,000,000 in the red during fiscal 1948 and expecting a \$550,000,000 deficit in fiscal 1949, the Post Office wants CAB to declare "as a matter of policy" that no new local service certificates will be issued "pending full evaluation by the Board of the results of the 19 presently-authorized feeder experiments." The Department made its request in a brief opposing a CAB examiner's recommendation that Southwest Airways' present system be doubled and that Bonanza Air Lines be given a new operation in the California-Nevada area (AVIATION WEEK, Sept. 27).

► **Mail Pay Burden**—Six feeders which operated during all of fiscal 1948 received a total of \$5,199,333 in adjusted mail pay, and this amount is subject to further upward revision by CAB, the brief noted. "Projecting the sum cited to cover 19 feederlines in operation, it appears that the government is committed to a local service experiment on a national scale which may cost at least \$16,000,000 in mail pay per fiscal year." (By comparison, the 16 domestic trunklines received about \$23,350,000 in mail pay in calendar 1947.)

In view of the number of feederline experiments presently authorized by CAB, what new knowledge will be obtained from certification of Bonanza over a 550 mile route, the Post Office inquired. "And is the knowledge expected to be gained worth the approximately \$1000 a day the government would be called upon to pay in mail support?"

► **Board Opinions Quoted**—The brief quoted extensively from CAB opinions which emphasized the strictly experimental nature of feeder operations. As early as July, 1944, the Board recognized the necessity of keeping total government outlay for strictly local services "within reasonable bounds."

Of the 19 feeders selected by CAB, temporary certificates have actually

been issued to 17. Eleven are now in active operation.

► **Helicopter Service**—In opposing certification of Southwest Airways for new points near Los Angeles, the Post Office referred to its previous request that CAB reserve an area extending beyond 50 miles from the downtown metropolitan area for potential service development by Los Angeles Airways, the nation's only active certificated helicopter operator. The Department said its stand is based on the concept that LAA may ultimately be certificated to carry passengers and that this will lessen the government's mail pay burden.

Growing importance of the helicopter mail service is demonstrated by the fact that in August, 1948, LAA carried 5,993,354 pieces of mail. By comparison, the Post Office pointed out that All American Aviation's pickup service never exceeded an average of 3,000,000 pieces monthly.

New Canada-BWI Link

Canada will strengthen its economic and social ties with the British West Indies on Dec. 2 when Trans-Canada Air Lines is slated to inaugurate service from Montreal and Toronto to Nassau, Jamaica and Trinidad. Twice-weekly flights will be made to Nassau and Kingston, Jamaica, and weekly trips to Port of Spain, Trinidad.



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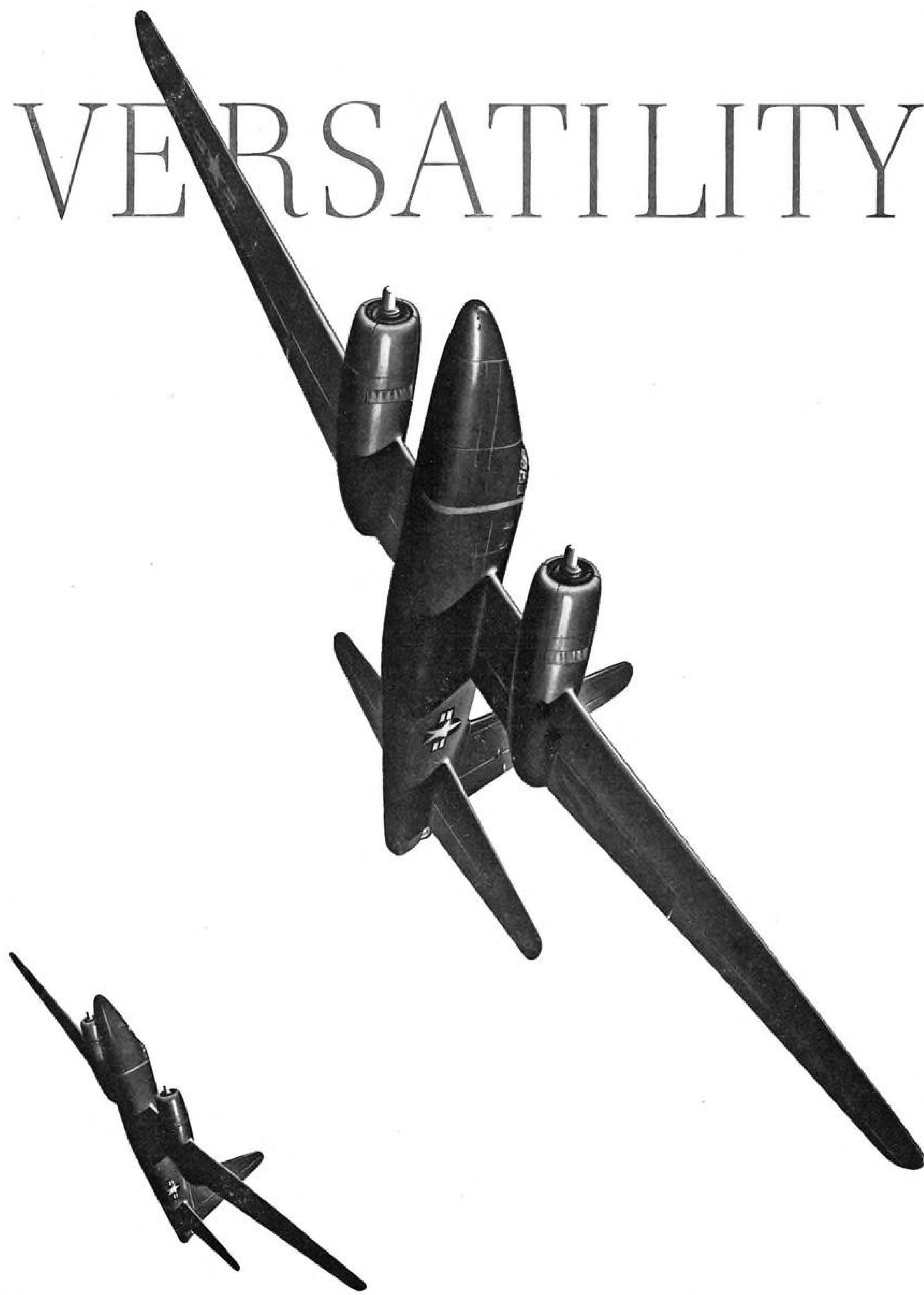


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CAB Revokes Pilot's License

Charles R. Sisto, captain of the American Airlines DC-4 which executed half of an outside loop near Mt. Riley, New Mex., on Oct. 8, 1947, has had his pilot's certificate revoked for operating the plane in a careless and reckless manner.

Upholding the initial decision of its safety examiner (AVIATION WEEK, Mar. 8), the Civil Aeronautics Board found that Sisto had engaged the gust lock mechanism, thereby causing the violent maneuver which endangered the lives of 49 passengers and five crew members. The plane dived several thousand feet to within 400-500 ft. of the ground before being brought under control by the copilot.

► **Penalty Required**—CAB said the public interest requires that Sisto should never again be issued a pilot's certificate or rating which would permit him to carry passengers for hire. It added that Sisto had demonstrated a disregard for the principles of safety and a flagrant disregard of the discretion and good judgment necessary in the holder of an airman's certificate with airline transport pilot's rating.

"That one trained by years of experience at the controls of aircraft carrying passengers in public service should have been so insensible of his duty toward those whose safety had been entrusted to him is a shocking revelation of human failure which fortunately is rare among the airline pilots of this country," the Board declared.

► **Purpose of Lock**—The gust lock was not designed to be used under any circumstances while the plane was in flight, according to CAB. The lock is applied from a lever in the pilot's compartment which mechanically pulls the control surfaces and locks them in place in a neutral position. Its purpose is to hold the control surfaces fixed while the plane is on the ground to prevent the surfaces from sliding back and forth and to prevent damage to the surfaces by the elements.

Northeast-Wiggins Agreement Ended

Termination of the agreement whereby portions of Northeast Airlines' routes were to have been taken over and operated by Wiggins Airways has been announced by Joseph Garside, Wiggins Airways president.

► **Contingencies**—The agreement, signed by the two companies last May, was contingent on approval by the Civil Aeronautics Board. It was contemplated that the transfer of routes would create two

regional air transportation systems in New England, one of local and feeder character to be operated by Wiggins, and the other of long haul or trunk character, to be operated by Northeast. (Wiggins was certificated for about 657 miles of feeder routes in June, 1946, but has not yet activated its system.)

Garside explained that developments in the aviation industry and in governmental thinking, combined with the fact that CAB has not taken final action on the proposed plan, make the agreement unworkable. "The agreement was a short-term affair, drawn with the expectation of speedy action and completion before now. But in view of the pace established by CAB, it appears that 18 months to two years must pass before final action could be expected."

Landing Instructions Jammed by Russians

A Russian radio station in the nearby Komandorski Islands has been interfering with airline radio communications in the Aleutian Islands, according to R. C. Reeve, owner of Reeve Aleutian Airways, Anchorage, Alaska. The Soviet transmitter reportedly has jammed radio conversations which pilots were holding with ground bases on routine commercial flights and has garbled instructions to pilots making GCA landings.

The jamming is done both mechanically and by voice, says Reeve, who operates twin and single-engine planes on regular schedule from Anchorage as far west as Attu (AVIATION WEEK, Apr. 26). Special steps have been taken to enable pilots to recognize attempted jamming and to provide them with adequate means of checking their positions despite jamming attempts.

TWA to Buy Connies

TWA has asked Civil Aeronautics Board permission to buy two model 049 Constellations from Hughes Tool Co. for use in domestic operations.

Hughes Tool, which has financial control of TWA, will sell the planes to the carrier at cost—which will be not more than \$1,090,000 for both. One plane has been converted and the other is in the process of conversion from military to commercial type. The ships will be used by TWA on a no-charge basis pending action by CAB.

TWA said it recently purchased twelve model 749 Constellations at about \$910,000 each. It also noted that the price to be paid Hughes Tool for the model 049s is substantially below the \$718,000 per plane paid Lockheed Aircraft Corp. for the same models in May, 1947.

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SHORTLINES

► **American Overseas**—Late last month marked the third anniversary of the first scheduled commercial landplane service to Europe. During the past three years AOA has carried 179,670 passengers, 7,232,490 lb. of freight and 2,050,800 lb. of mail. Carrier is currently operating 15 roundtrips weekly between the U. S. and Europe using Constellations and DC-4s.

► **Atlantic**—Has petitioned the U. S. Court of Appeals for the District of Columbia to review CAB's Middle Atlantic area decision of last February which denied the company's application for a certificate to operate second-class coach service between Washington, Newark, Pittsburgh and other points.

► **BOAC**—Recently flew over 9000 lb. of food from Montreal to Gander airport to relieve a shortage caused by a Newfoundland railroad strike.

► **Colonial**—Last week planned to institute 20 percent reductions on roundtrip tickets between U. S. and Canadian points. The 30-day excursion fares will be available to passengers who can arrange departures for Tuesdays or Wednesdays with returns on any days except Fridays or Sundays.

► **Eastern**—Earnings for the first nine months of 1948 were well ahead of the same period last year, and fourth-quarter profits are anticipated. Company says it has not had unfavorable public reaction to the continued premium fare on its Constellations despite the elimination of extra charges on DC-6s by other carriers. . . . Agreements are being signed with international freight forwarders and travel agents whereby five percent commission will be paid for handling shipments which originate over the company's system and are destined for foreign points. . . . Freight rates to San Juan, Puerto Rico, have been cut around 30 percent.

► **National**—Walter F. Johnston has become assistant treasurer.

► **Pan American**—Passenger and cargo volume to Alaska hit new all-time peaks during September. Company flew 318 tons of cargo north and southbound in the 30-day period, compared to 42 tons in September, 1947. About 35 percent of the business was attributed to the West Coast maritime strike.

► **Swedish Air Lines (ABA)**—Has appointed the Babb Co. exclusive sales agent to dispose of its surplus DC-3s and C-47s. The American planes are being replaced with Swedish Scandias.



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► **Scandinavian Airlines System**—Introduced DC-6s on its South Atlantic run to Buenos Aires recently.

► **Transocean**—Reports it has a \$6,000,000 annual payroll and close to 1500 employees in global air activities including overhaul and maintenance. A year ago TAL had around 600 employees. Orvis M. Nelson, president, says 300 employees are at Oakland, Calif., for Pacific division flight operations; 760 at Oakland for operation of the subsidiary Aircraft Engineering and Maintenance Co.; 100 at Arcata, Calif., with the Landing Aids Experiment Station; 170 at the Atlantic-European division base at Hartford, Conn.; and 150 are assigned to intermediate bases of the Atlantic and Pacific divisions. . . . Company has decided not to affiliate with the Independent Air Carrier Association because TAL operations are primarily international.

► **TWA**—Passenger loads originating overseas hit an all-time high in September. Company officials say the rush season for trans-Atlantic air travel will be longer this year than in 1947.

► **United**—Has authorized payment of the regular quarterly dividend of \$1.25 a share on the corporation's 44 percent cumulative preferred stock. Dividend will be paid from capital surplus.

► **Western**—Freight handled in the first nine months of 1948 was 48 percent above the same period last year.

► **West Coast**—Carried 55,581 passengers in the first nine months of 1948—14,000 more than in all of 1947. By year end, passenger traffic is expected to be 75 percent above 1947.

CAB SCHEDULE

Nov. 29—Hearing in airfreight tariff investigation case. (Docket 1705 et al.)

Dec. 8—Hearing on Pan American Airways' Guatemala City-Los Angeles/San Francisco route case. (Docket 3277.)

Dec. 13—Hearing in TWA route consolidation case. (Docket 2581 et al.)

Dec. 15—Hearing on Board's enforcement proceeding against Transocean Air Lines. (Docket 3244.)

Jan. 3—Hearing in New England States service case. Postponed from Nov. 29. (Docket 2196 et al.)

Jan. 5—Hearing on additional service to Puerto Rico. (Docket 2123 et al.)

Jan. 10—Hearing on TWA's complaint against Seaboard & Western Airlines. (Docket 3346.)

Jan. 15—Hearing on Board's investigation of through service and interchange requirements at St. Louis and Memphis. (Docket 3426.)

Feb. 16—Hearing in reopened Mississippi Valley and Southeastern States cases. (Dockets 548 and 501 et al.)

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new exchange policy:

The Steward-Davis R-1830-92 Conversion is now available for \$1695
with the return to Steward-Davis of a crated run-out R-1830-92, complete
with carburetor, magnetoes and ignition harnesses. Freight charges
for the return of this engine will be paid by Steward-Davis.

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STRICTLY PERSONAL

BITS ABOUT PEOPLE—George Saunders, formerly director of public relations for Western Air Lines, is an executive of Carl Byoir & Associates, New York City . . . Jack Bailhe, the wartime Washington public relations representative for Consolidated-Vultee Aircraft Corp., in the office of Hill & Knowlton, has joined American Home Magazine as assistant to the advertising director, in New York . . . Mark Nevils, Curtiss-Wright public relations chief, is recovering from an appendix operation . . . Dick Kirschbaum, aviation editor of the Newark Evening News, remains in serious condition at Doctors Hospital in Newark. He became ill while covering the National Aviation Clinic at Detroit.

* * *

2 BELLY LANDINGS; PIGEON LOSES—McDonnell's public relations chief, George Bounds, tells of two flyers who made belly landings. Man survived the bird. Says George:

"Edwin F. Schoch, experimental test pilot for McDonnell, came back to the plant last week after three successful hook-ons of the XF-85 on the modified B-29. As you know, the first flight resulted in Schoch's landing on Muroc Dry Lake on a belly skid, part of the equipment of the XF-85. He crawled out of the cockpit of the parasite fighter and was walking around the aircraft awaiting the trucks to pick him up.

"Schoch suddenly noticed a pigeon lying on the ground a hundred feet from the plane. He picked up the pigeon, discovered the bird had also made a belly landing on the hard surface of Muroc Dry Lake, suffering slight injuries. He took the bird back to the Air Force base where the medics tried to fix it up, but it died several days later."

* * *

HOW SCHAEFER GOT INTO WEST POINT—Did you ever hear how J. Earl Schaefer, Boeing's vice president at Wichita, got into West Point? He took the entrance exams in his Kansas hometown, with 12 other young men. He was the only one to answer correctly how many men signed the Declaration of Independence. At first he wrote 112. Then he trimmed it a bit. As he was handing the paper in he had a hunch and made another change by cutting the first figure in half, to 56, which is the right answer. He came out second but the winner flunked the rigid physical so Earl won his chance, and went through to graduation.

* * *

LOTS OF PAN AMS—It sounds like a press agent's story but Pan American's John Creedy insists it happened. New York newspaper readers have seen pictures of a couple of explorers, Hassolt Davis and the missus, just back from the wilds of French Guiana where white men had never been seen before, etc. When they started, Pan American (advt.) flew them to Cayenne. Davis (says Creedy), frequently on the 500-mile seven-months trip, was faced with mutiny by his native carriers. Soooo, he hatched up this trick. Each time a plane would fly over he would tell his runners, "That is Pan American Airways checking up to see if I'm all right." Creedy swears that the mention of Pan Am was all that was needed to quiet incipient mutiny. Davis was so grateful (Creedy avows) that in friendlier territory when he was asked to name seven little black children, he named them all Pan Am. Now, Creedy says, "if ever these godchildren grow up and come to Cayenne we will have to buy them a drink."

* * *

PATRIOTISM IN JOLLY ENGLAND—We recommend this news item to Secretary Symington for consideration. It should go over big in the U. S. It seems patriotism has taken an intimate turn in jolly England. AVIATION WEEK's thorough bureau manager in London, Fred Brewster, reports that the Women's Volunteer Services has launched a national campaign to mend airmen's socks, underwear, undershirts and shirts.

"In the north, Acklington and Harrowgate are operating this eight-day service, and four other centers are ready to start. RAF Stanmore is already being serviced . . . In the West, RAF Charlton Horethorne has been adopted by Mere. Cheltenham and Stonehouse centers are ready to provide a service."

We hope this inspires some of our own patriotic women. They could take over a few laundries we know, too.

* * *

CONTRIBUTIONS WELCOMED—This column welcomes personal items and whimsy from you readers. This marvelous offer to publish your anecdotes is free. Act now.

R. H. W.

WHAT'S NEW

New Address

National Air Council has moved to 280 Madison Ave., New York 16, N. Y., which is at 50th St. The new telephone is Murray Hill 6-3950.

New Books

"Practical Considerations in Die Casting Design," distributed by the New Jersey Zinc Co., 160 Front St., New York 7, N. Y. 246 pages, hard cover, priced at \$3.00.

"The Analytical Development of Curves and Streamline Shapes," by Harry H. Haase, development engineer, Republic Aviation Corp. A guide to designers of high-speed aircraft. Paper cover, 151 pages, published by Deemar Co., Amityville, L. I., N. Y. \$4.00.

"Aircraft Materials and Processes," by George F. Titterton, assistant chief engineer, Grumman Aircraft Engineering Corp. Illustrated, 357 pages. \$4.75 from Pitman Publishing Corp., 2 West 45 St., New York 19, N. Y.

"Aircraft Mechanic," by Philip Siegel, air carrier inspector, American Overseas Airlines. A manual with problems, review questions and discussion topics. \$4.00 from Pitman Publishing Corp., 2 West 45 St., New York 19, N. Y.

"Aircraft Weight Balancing & Loading," by Charles Edward Chapel, simulated leather binding, sketches and drawings in color. \$3.25 from Aero Publishers Inc., 2162 Sunset Blvd., Los Angeles 26, Calif.

Trade Literature

"Electronic Controls," bulletin containing listings of standard models manufactured by the Wheelco Instruments Co., 847 W. Harrison St., Chicago. No. Z6500.

"Micro Lathes," catalog P17/CA8 on equipment of Pultra Ltd., Manchester, England. Available upon request from Lorber Export Import and Purchasing Co., 31 South St., New York 4, N. Y.

New Films

"Air Transportation," 11-minute 16-mm. sound motion picture, of air transport occupations from flight and mechanical jobs to clerical jobs. Inquiries to Vocational Guide Films, 2708 Beaver Ave., Des Moines 10, Ia.

"The Airplane Mechanic," 9-minute 16-mm. sound motion picture designed as orientation for beginning airplane mechanics. Inquiries to Castle Films, 30 Rockefeller Plaza, New York 20, N. Y.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—NOVEMBER 8, 1948

| | |
|---|--|
| Aircraft Radio Corp. 52 | Mercer-Robinson Co., Inc. 52 |
| Agency—Burke Dowling Adams Adv. | Agency—Walter J. Gallagher Adv. |
| Ambrose Aviation Co., Frank. 57 | Newark Electric Co. 50 |
| Agency—Steedle, Rankin & Boyle, Inc. | Agency—The Chernow Co., Inc. |
| Auburn Spark Plug Co., Inc. 4 | New Departure Div. C.M.C. 20 |
| Agency—Spitz & Webb Adv. | Agency—J. M. Hickerson, Inc. |
| Canadair Limited 9 | Ohio Seamless Tube Co., The. 29 |
| Agency—Cockfield Brown & Co., Ltd. | Agency—Howard Swink Adv. Agency, Inc. |
| Chase Aircraft Co., Inc. 28 | Pacific Airmotive Corp. 26, 27 |
| Clifford Manufacturing Co. 32 | Agency—West-Marquis, Inc. |
| Agency—James Thomas Chirurg Co. | Ryan Aeronautical Co. 37 |
| Continental Motors Corp. 50 | Agency—Batten, Barton, Durstine & Osborn, Inc. |
| Agency—Wallace Lindeman, Inc. | Searchlight Section 53, 54, 55 |
| Danly Machine Specialties, Inc. 50 | Sinclair Refining Co. 30, 31 |
| Agency—The Cramer-Krasselt Co. | Agency—Hixson-O'Donnell Adv., Inc. |
| Du Pont de Nemours & Co., Inc., E. I. Third Cover | Snap-On Tools Corp. 38 |
| Agency—Batten, Barton, Durstine & Osborn, Inc. | Agency—Scott, Incorporated |
| Fafnir Bearing Co., The 5 | Standard Pressed Steel Co. 10 |
| Agency—Horton-Noyes Co. | Agency—R. E. Lovekin Corp. |
| Federal Aircraft Works. 57 | Surface Combustion Corp. 44 |
| Agency—Dwyer & Devoy Advertising | Agency—Bramble & Odiorne Adv. |
| General Controls Co. 34 | United Aircraft Corp. Front Cover |
| Agency—The McCarty Co. | Agency—Platt-Forbes, Inc. |
| General Electric Co. Fourth Cover | Vickers-Armstrong Ltd. 19 |
| Agency—G. M. Basford Co. | Agency—Intam, Ltd. |
| Gulf Oil Corporation. 41 | Walter Motor Truck Co. 35 |
| Agency—Young & Rubicam, Inc. | Agency—Thoma & Gill Adv. |
| Hebard & Co., W. F. 47 | Western Gear Works. 8 |
| Agency—Burton Browne Advertising | Agency—West-Marquis, Inc. |
| Hotel Lexington, Inc. 47 | Westinghouse Electric Corp. Second Cover |
| Agency—Elmo Ecker Advertising | Agency—Fuller & Smith & Ross, Inc. |
| Hydro-Aire, Inc. 23 | Wyman Gordon Co. 6 |
| Agency—John H. Riordan Co. | Agency—John W. Odlin Co., Inc. |
| Kohler Co. 51 | PROFESSIONAL SERVICES— |
| Agency—Roche, Williams & Cleary, Inc. | See First Issue of Month |
| Lockheed Aircraft Corp. 48, 49 | SEARCHLIGHT SECTION |
| Agency—Foote, Cone & Belding, Adv. | (Classified Advertising) |
| Luria Engineering Corp. 42 | EMPLOYMENT |
| Agency—Richard & Co., Inc. | Positions Vacant. 53 |
| Macwhyte Company 3 | Positions Wanted. 53 |
| Agency—Needham, Louis & Brorby, Inc. | EDUCATIONAL |
| Marquette Metal Products Co. 24 | Schools 53 |
| Agency—Belden & Hickox Adv. | PLANES—EQUIPMENT |
| | (Used or Surplus New) |
| | For Sale. 53, 54, 55 |

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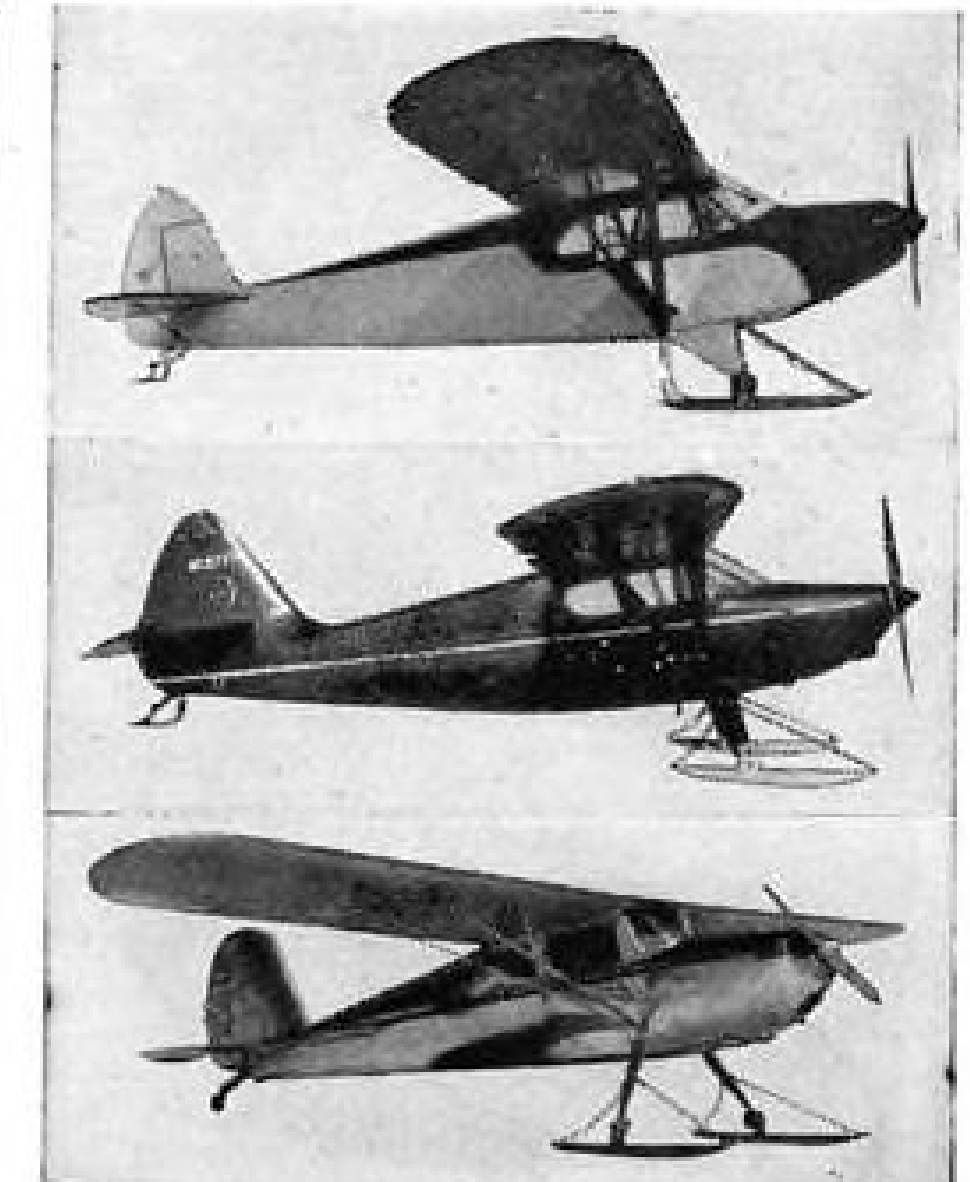


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Increase Airplane Revenue

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Business concerns, farmers and ranchers can be interested in airplane ownership as a business necessity when shown that it is practical, economical, and safe summer and WINTER.

Go to businessmen in your community. Analyze their personnel travel requirements. Tell them how an airplane will economically, safely and conveniently handle transportation of personnel at low cost and minimum travel time.

Increase Airplane Rentals

Don't let snow stop winter flying operations. Equip your planes with skis and make winter flying hours turn in a profit.

Stimulate winter flying interest among students, pilots, sportsmen, businessmen, salesmen, field servicemen, etc. who do not own their airplane. Encourage, more charter trips for sales, service, emergency deliveries.

When heavy snowfalls stop other means of transportation, you can get there with airplanes equipped with Federal skis.

Increase Student Training

There are more good flying hours in winter, for airplanes equipped with skis than in summer for airplanes equipped with wheels. Encourage and promote student flying through the winter months, when other outdoor activities are minimized. Organize social groups among high schools, colleges and business concerns. Have them meet socially at the airport. By providing entertainment facilities, you can stimulate interest in winter flying. A few meetings and demonstrations of the fun of flying in the winter on skis will keep your planes flying profitably throughout the winter.

Increase Flying Safety

Federal Skis are low cost insurance. Almost any area large enough to land an airplane is a safe and satisfactory landing field in winter for ski equipped aircraft.

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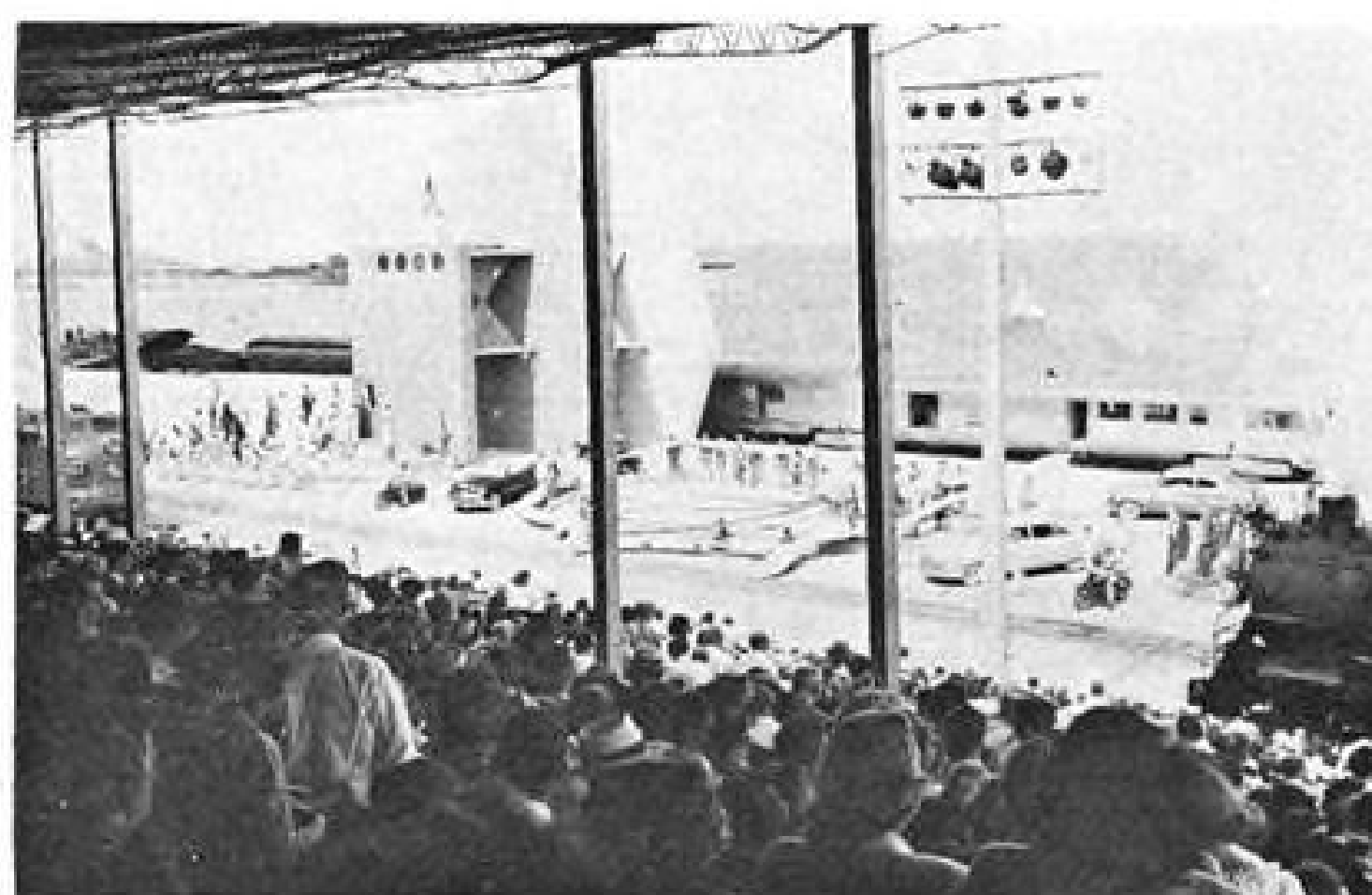
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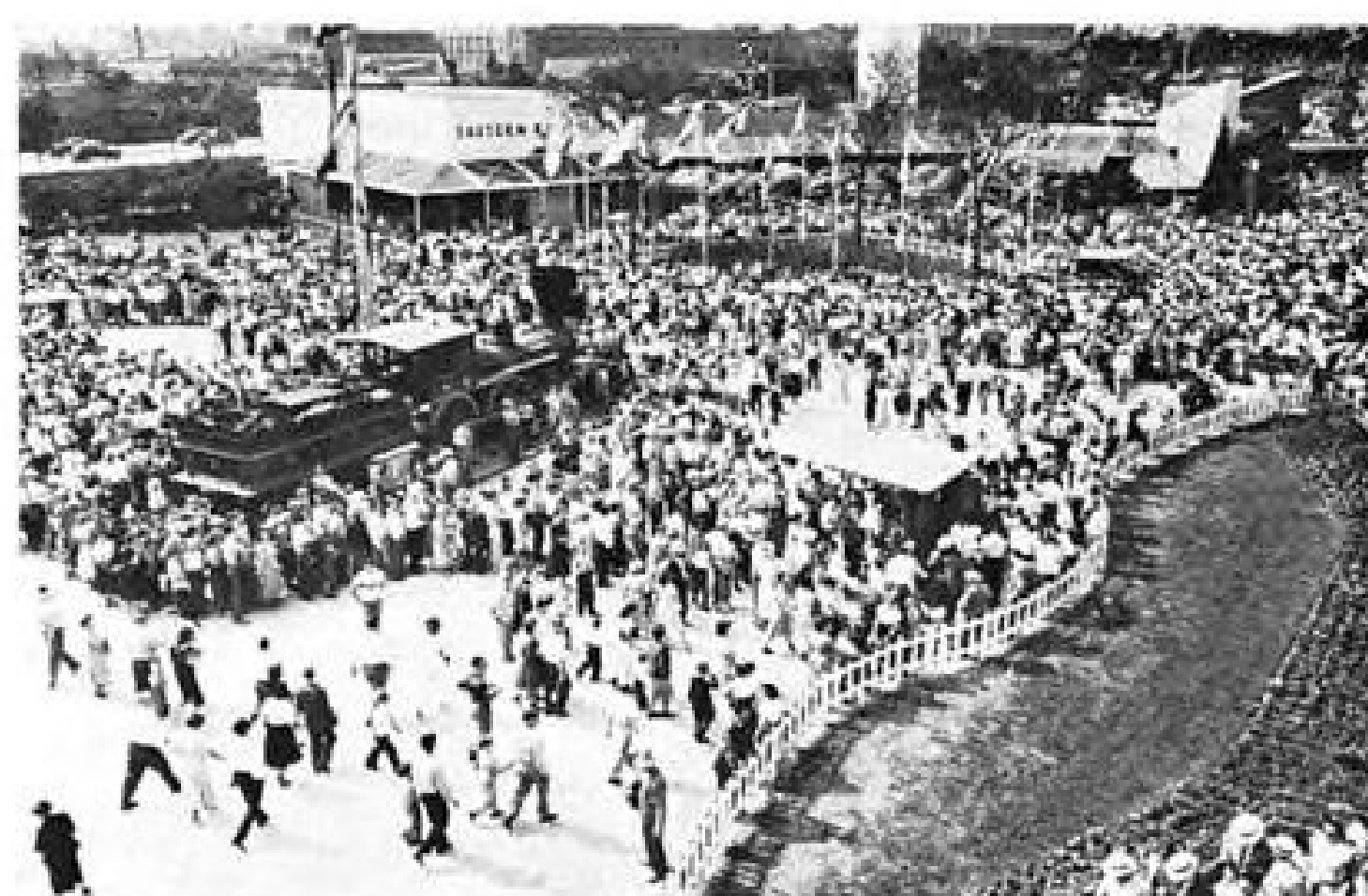
They Stood in Line for Train of Tomorrow



Most Prosperous Line Had Indian Village



Pageant Drew 1,167,867 Paid Customers



Eastern Roads' Exhibits Drew Thousands

Railroads Sell the Public

THEY will re-open the Railroad Fair next June in Chicago, "bigger and better than ever." This year it drew 2,500,813 persons in 76 days. The "Wheels-a-Rolling Pageant" alone attracted 1,167,867 paid customers.

It was a brilliant public relations achievement, and the most spectacular public exposition any transportation industry ever sponsored.

Actually, because our railroads already carry more domestic passengers than any other transport means, they had fewer new customers to win over than their competitors. But they are investing in the future.

We are not advocating that the hard-pressed air transport industry should match the \$12-million Railroad

Fair, which is limited to citizens in only one of America's population centers.

But we are convinced that next spring or summer a modest, but nationally planned, cooperative airline program to let Mr. Average Citizen look over and fly briefly in our finest transports, near his home town, would pay rich dividends.

Millions more would fly if they were offered a free closeup first, to build confidence. Most of aviation's present customers are sold already. If our service keeps them sold, the future is in the first riders of tomorrow.

ROBERT H. WOOD



DU PONT "LUCITE" ENCLOSURES MADE OF CRYSTAL-CLEAR DU PONT PLASTIC FILTER OUT ULTRA-VIOLET RAYS (HC-211)

"Lucite" prevents sunburn! Aircraft enclosures made of Du Pont "Lucite" HC-211 have all the outstanding qualities of regular "Lucite" acrylic resin. And in addition it protects pilots and passengers by absorbing the ultra-violet rays that cause sunburn.

WHY THE AVIATION INDUSTRY SPECIFIES "LUCITE" FOR SO MANY PURPOSES

"Lucite" transmits over 90% of visible light rays. It combines light weight with high tensile and impact strength. Stands up to weather, hot or cold. Does not warp. "Lucite" is easy to machine and install. Large

parts formed in one piece eliminate ribs and blind spots. "Lucite" has the unique ability to pipe light around curves. Shatter-resistant laminated "Lucite"-Butacite has the strength required for high altitude aircraft with pressurized cabins and cockpits.

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Skyhook

These two General Electric technicians are preparing the "Skyhook" for a whirl. The Skyhook is a jet-propelled helicopter blade—a project for the U.S. Air Force that has been underway for more than a year at the G-E Flight Test Center in Schenectady, in co-operation with our Aircraft Gas Turbine Divisions in Lynn, Mass. The all-steel blade is located, for testing purposes, in the center of a bowl-pit, 150 feet in diameter and 13 feet deep.

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