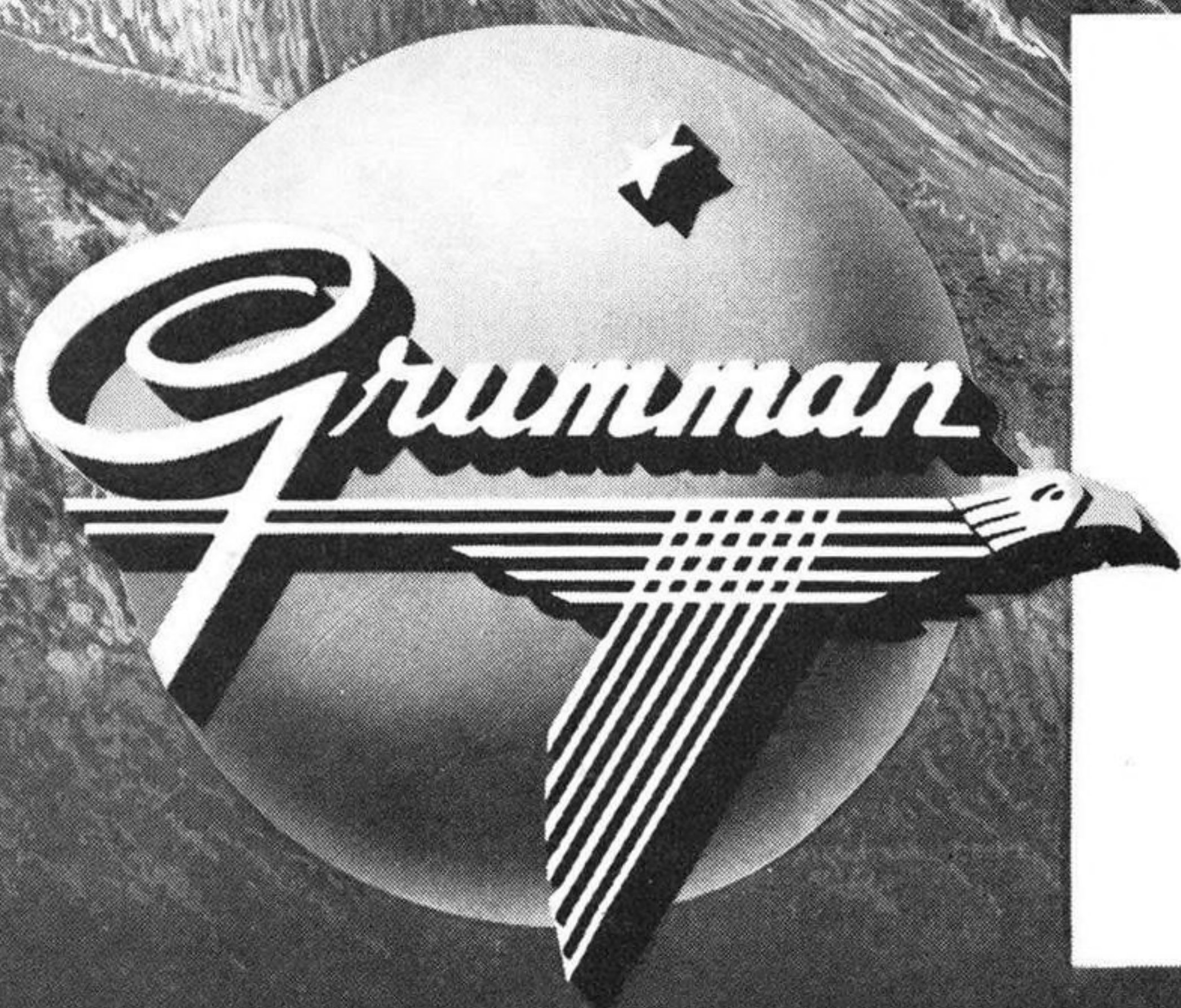
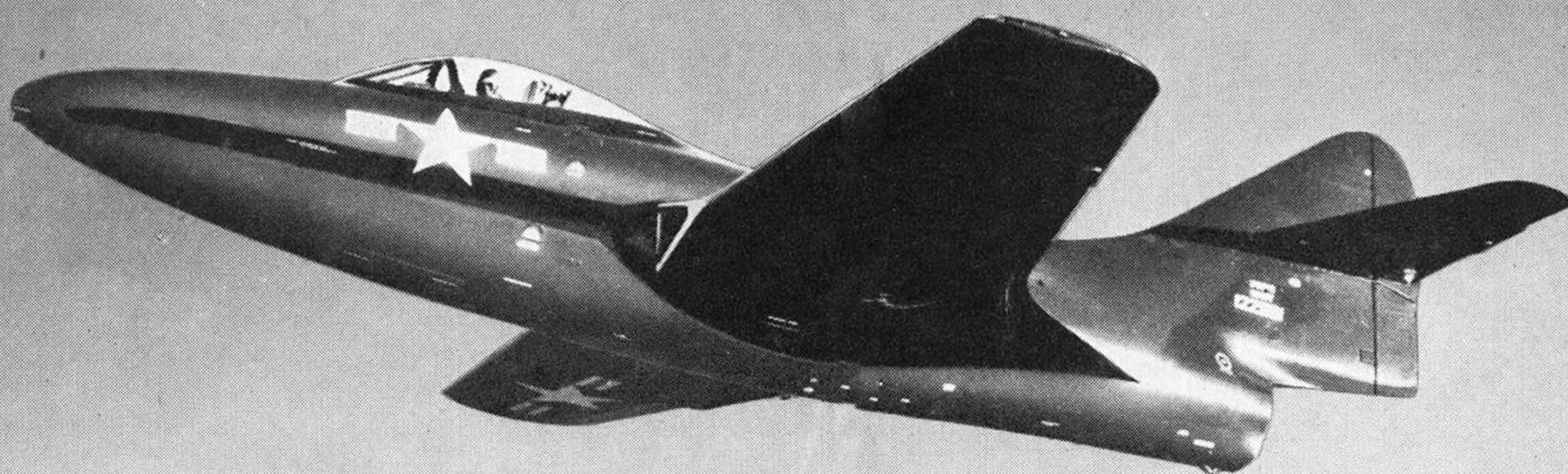


AVIATION WEEK

A MCGRAW-HILL PUBLICATION

SEPT. 12, 1949



Designers and builders of AIRCRAFT

U. S. Navy's PANTHER

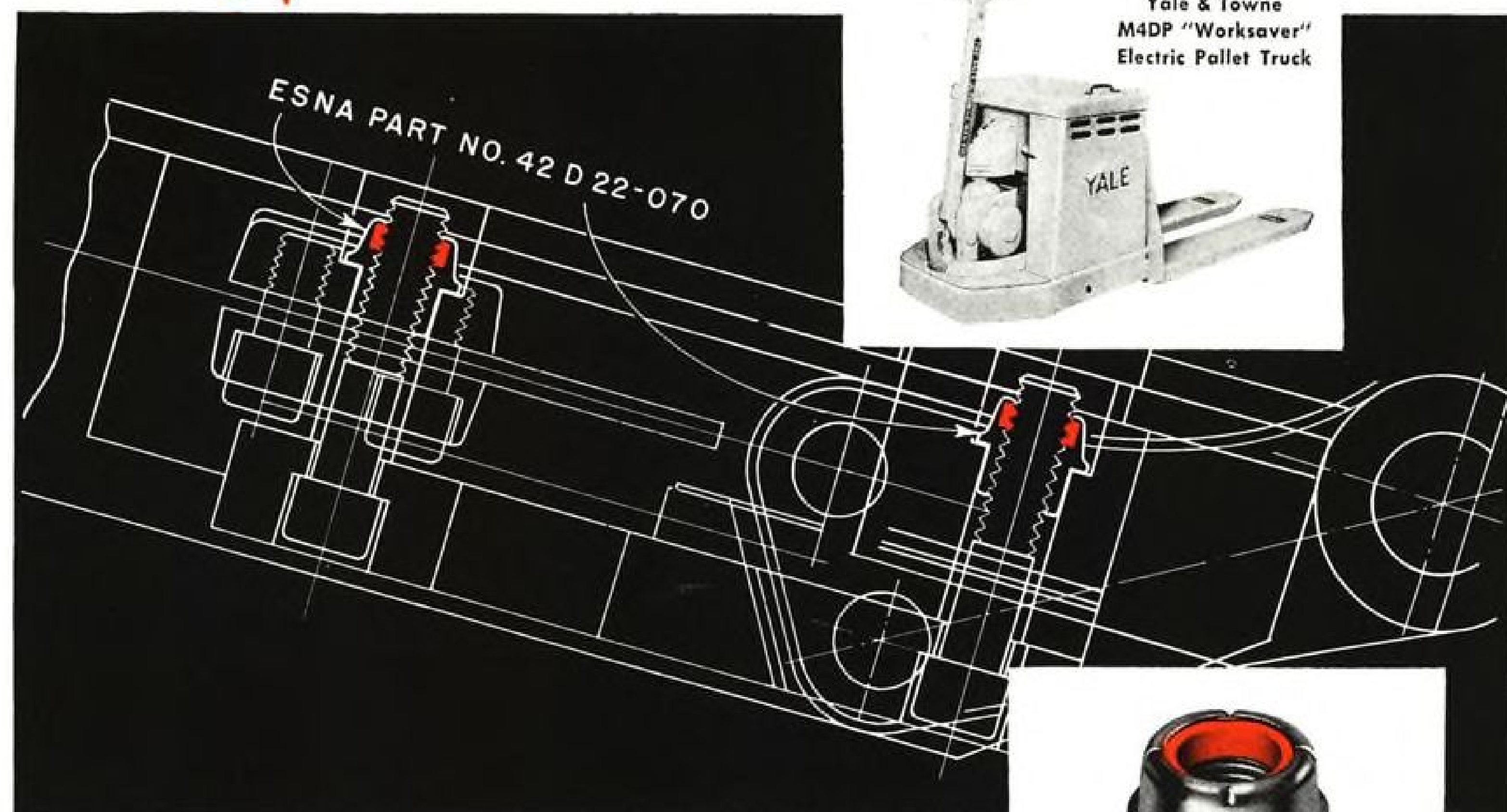
The Grumman Panther, the U. S. Navy's new carrier based Fighter, is equipped with one of the most powerful production jet-engines in the world. A worthy successor to the Navy's illustrious Grumman Fighters, the Wildcat and the Hellcat, this new, rugged Panther is superbly qualified to strike fast and hard wherever our fleets may be called upon to control the air.

GRUMMAN AIRCRAFT ENGINEERING CORPORATION, BETHPAGE

Contractors to the Armed Services

Self Locking Spline Nuts

FOR COST-CUTTING PRE-ASSEMBLY METHODS



Yale & Towne
M4DP "Worksaver"
Electric Pallet Truck

—The Red Elastic Collar protects inaccessible bolted fastenings from failures due to VIBRATION!

After testing many types of fastenings Yale & Towne selected ESNA spline nuts as the solution for the blind mountings on the front and rear assemblies of the M4DP "Worksaver" Electric Pallet Truck featured in this ad. Loose bolts at these inaccessible locations meant loss of adjustment and mechanical wear. Their research proved that self-locking connections at these application points provided protection against unnecessary down time . . . added assurance against service calls and repairs.

This is a typical example of the growing industrial acceptance gained by ESNA spline nuts . . . especially designed for easy driving into soft gray iron, magnesium or aluminum castings. By means of this simple installation the casting is given a threaded member; a tough drilling operation is speeded up because the drill is allowed to run through

the casting . . . costly tapping operations are eliminated. The self-locking collar does away with expensive cap screw lock wiring and fully protects inaccessible or blind mountings from operating failures.

In addition, if dis-assembly is required, ESNA spline nuts remain securely positioned for quick reinstallation and the famous Red Elastic Collar provides adequate locking torque for repeated re-use.

This is only one of many types of standard Elastic Stop Nuts available for special industrial fastening problems.

HERE'S A CHALLENGE: Send us complete details of your toughest bolted trouble spot. We'll supply test nuts—FREE, in experimental quantities. Write: Elastic Stop Nut Corporation of America, Union, N. J. Representatives and Agents are located in many principal cities.



ELASTIC STOP NUTS



OVER 450 TYPES AND SIZES IMMEDIATELY AVAILABLE FROM STOCK

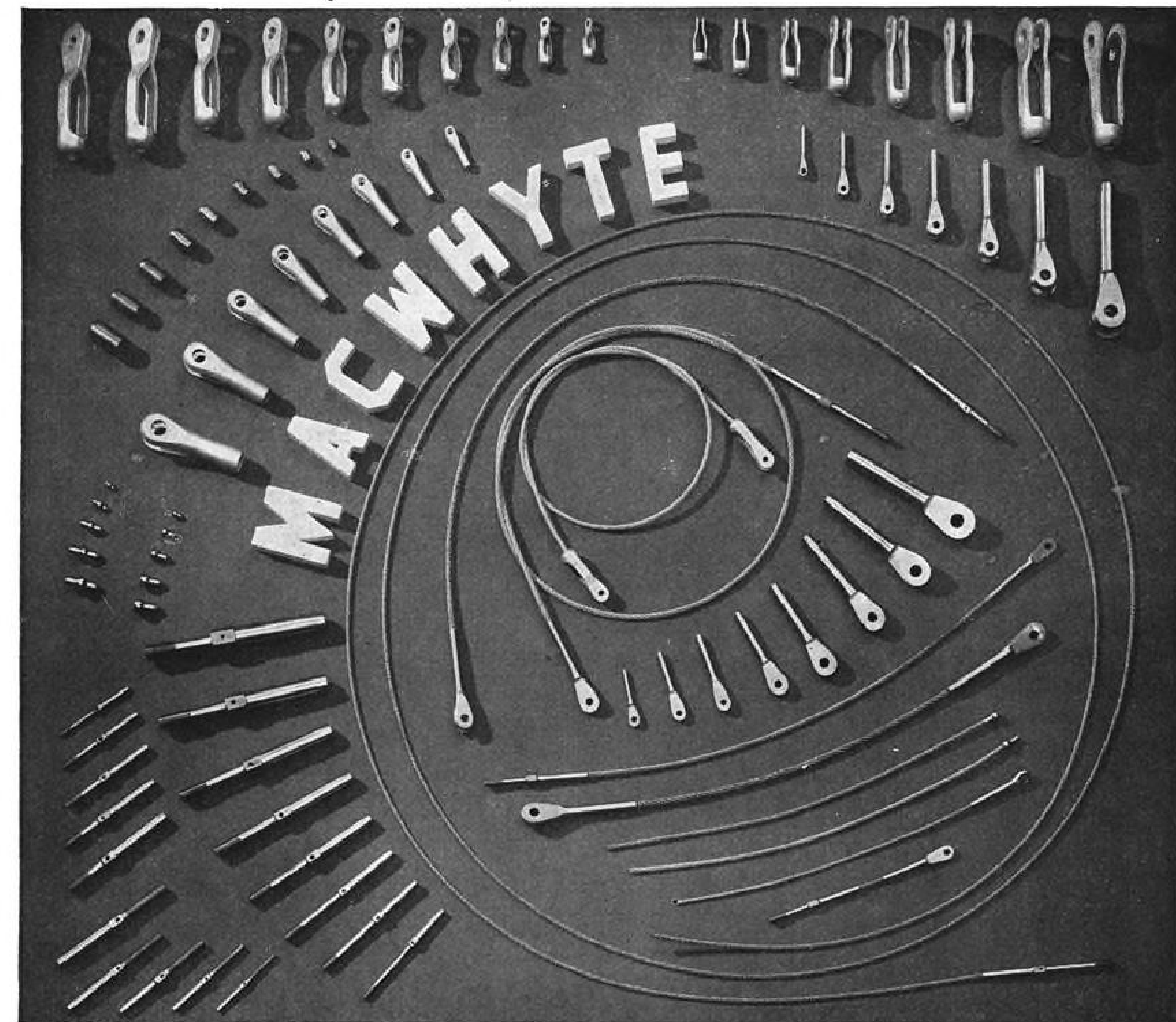


THE FAMOUS RED ELASTIC COLLAR IS VISIBLE EVIDENCE OF LOCKING SECURITY

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3. Provides for accurate BOLT LOADING
4. Seals against LIQUID LEAKAGE along the bolt threads

...for all your aircraft control needs



...cables...terminals...assemblies

This photograph suggests the wide variety in Macwhyte's comprehensive line of "Safe-Lock," "Sockettype" and "Rigid" terminals, "Hi-Fatigue"

Cable and Assemblies.

Commonly used sizes and types are regularly stocked, other "standards" and "specials" are made to order.

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inquiries direct to Macwhyte Company. Catalog A-1 listing complete specifications is available on request.

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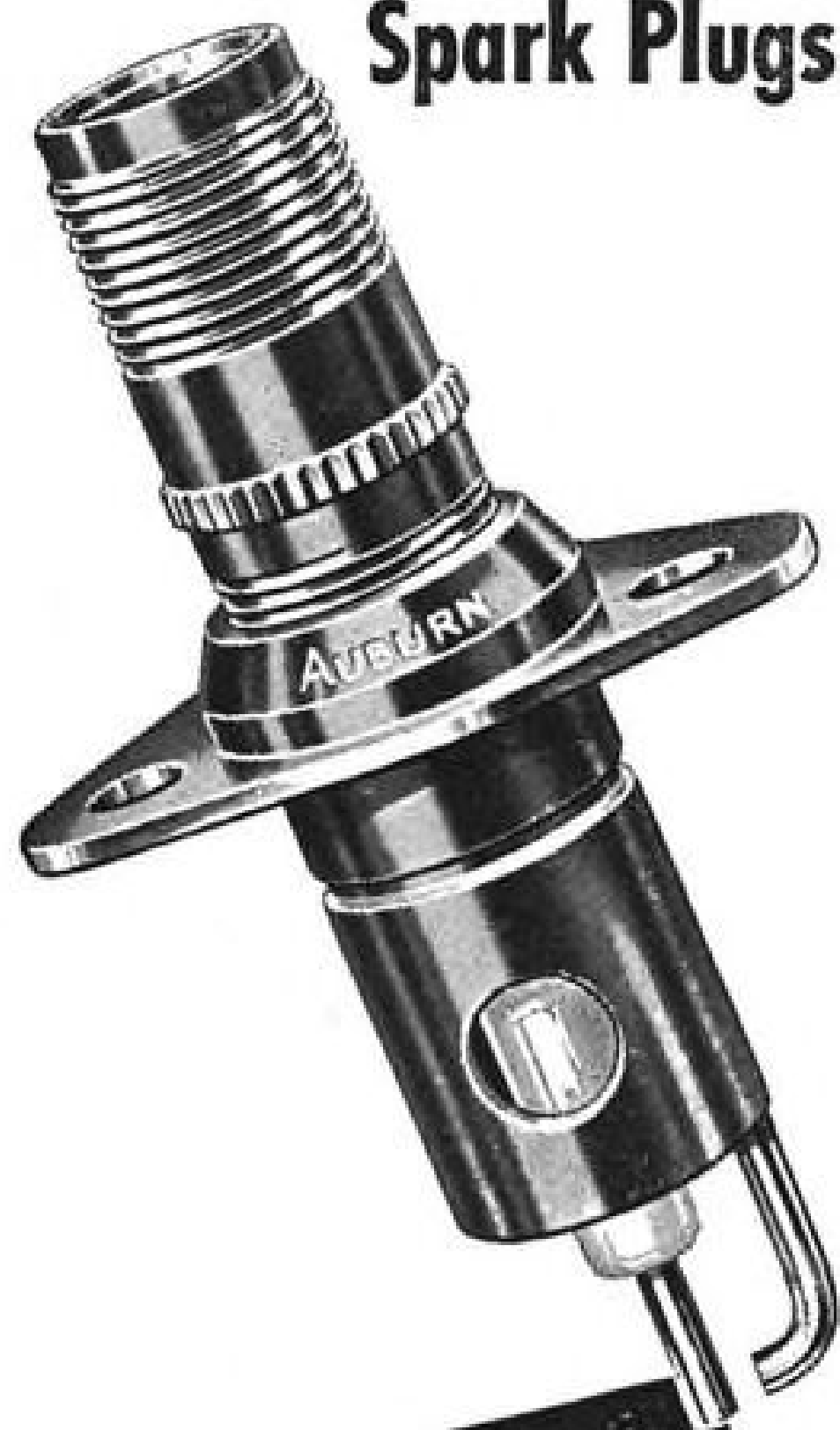


"Hi-Fatigue" is a registered trademark

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- Aircraft Spark Plug Connectors
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AVIATION WEEK

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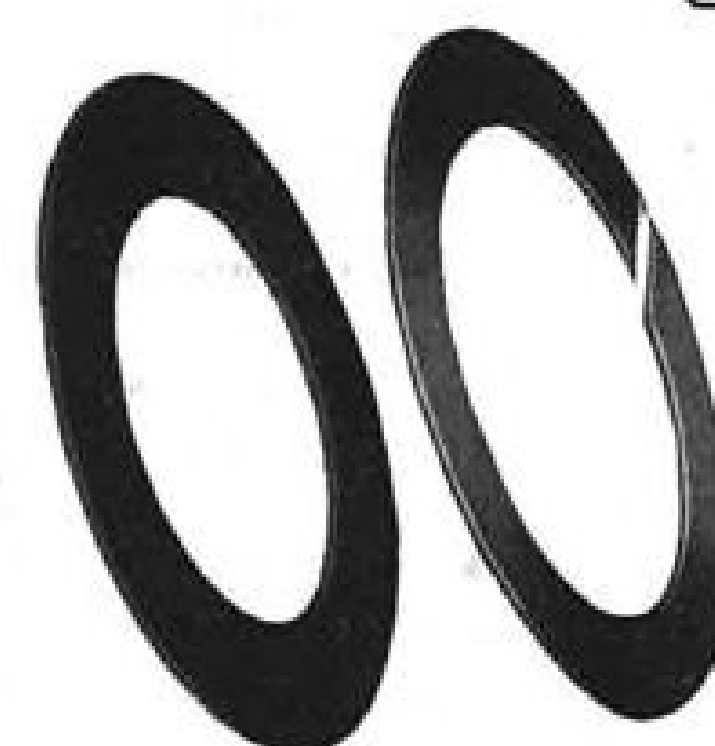
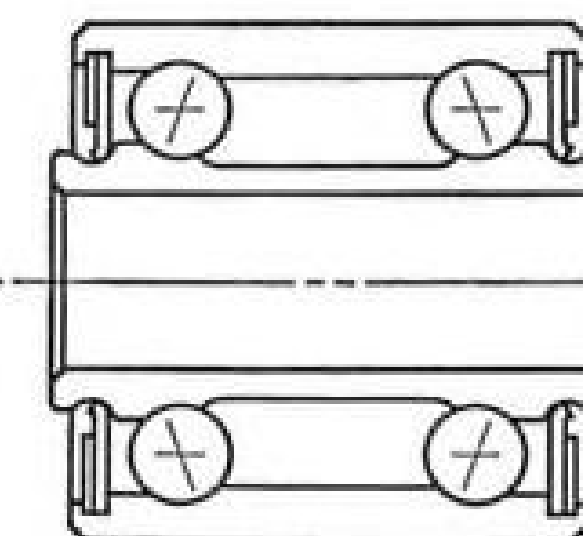


What good is load capacity without adequate protection?



• No matter how big and tough your bearing, if the grease goes out and dirt or salt spray gets in, the capacity and, eventually, the whole bearing goes. That's why Fafnir Plya-Seals were born... the contact seal that takes nothing away from bearing capacity. Nothing can get in, lubricant can't get out and yet these seals can be easily removed and replaced for inspection. Plya-Seals fully meet Air Force and Navy Anti-Friction Control Bearings Specifications AN-B-4b... and specifications for NAS pulleys. Fafnir is ready with ample stocks of these and other aircraft ball bearings in designs to meet the latest requirements. Write now for the new "red" catalog of Fafnir Aircraft Ball Bearings. The Fafnir Bearing Company, New Britain, Conn.

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a double-row design with
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provides capacity plus full
protection.

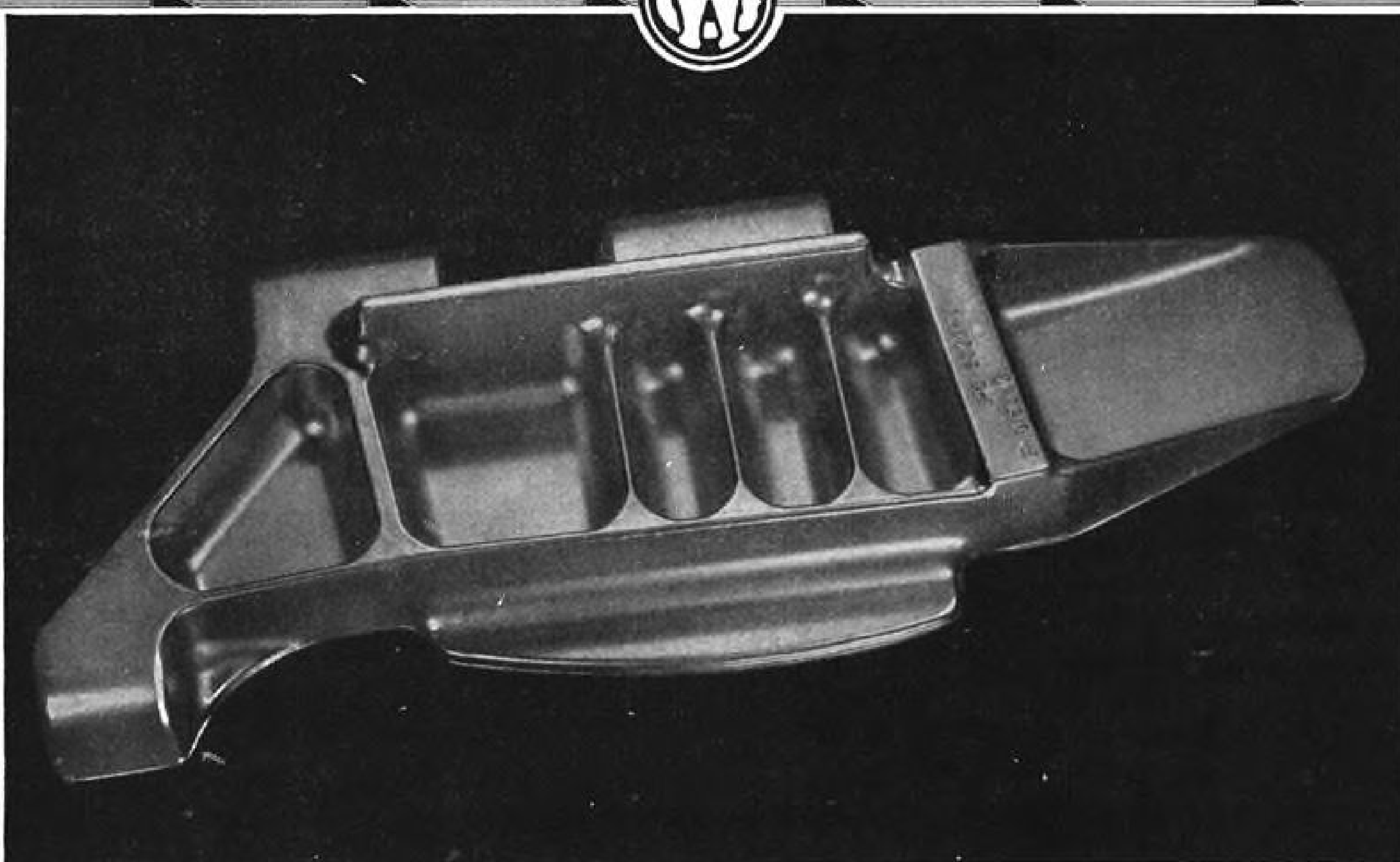


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Typical of many Wyman-Gordon developments is this complicated light alloy forging used in the wing structure of one of Uncle Sam's latest fighting planes.

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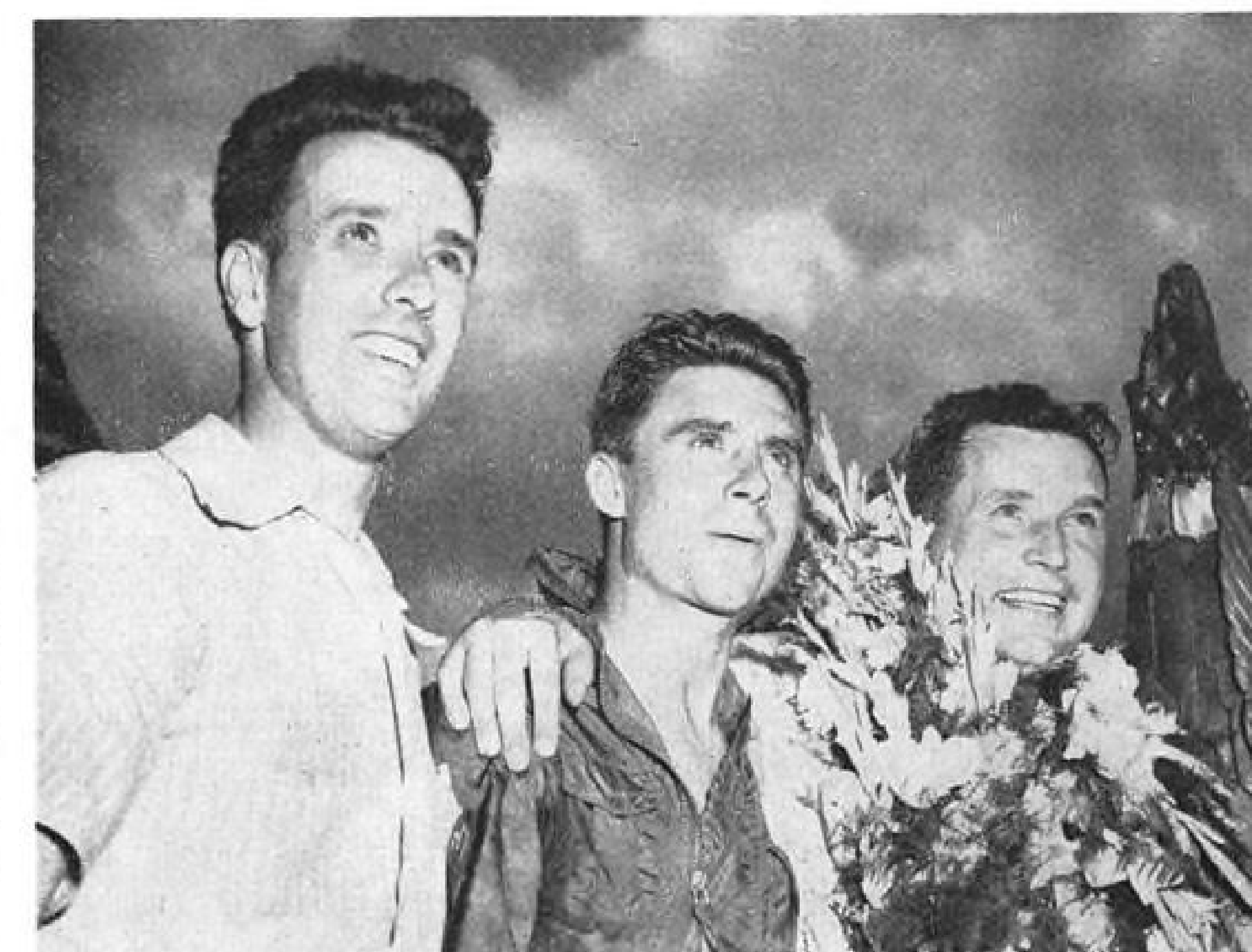
HARVEY, ILLINOIS

DETROIT, MICHIGAN



Planes and Pilots

ABOVE: The Goodyear Trophy racers are shown grouped outside the hangar, waiting for the elimination heats which stretched over the three-day period at the National Air Races. RIGHT: Thompson Trophy winner Cook Cleland (extreme right) is joined by runners-up Puckett and McKillen at the judge's stand, after the race which cost the life of Bill Odom. BELOW: McKillen's happy ground crew prepare to tow the Goodyear F2G back to the hangar after it placed second in the Thompson. One blade of the propeller was painted white, which gave spectators the erroneous impression that the prop was "geared down" or the engine was not operating at full speed. All three Thompson winners piloted Goodyear F2Gs, only 14 of which were ordered by the Navy but later sold as surplus.





Selection of the "Trim Trol" for Aileron and Rudder Tab Actuation on the XF2H-1, F2H-1 and F2H-2 McDonnell "BANSHEE" was based upon the compactness and simplicity of installation combined with the inherent weight saving obtained by using the actuator for a portion of the mass balance

We suggest you investigate the advantages of the "Trim Trol" principle for your current designs.



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AVIATION CALENDAR

- Sept. 12-16—13th anniversary meeting, International Air Transport Assn. The Hague, Holland.
- Sept. 12-16—Fourth national instrument conference and exhibit, sponsored by The Instrument Society of America, Kiel Auditorium, St. Louis.
- Sept. 14-15—82nd eastern division meeting of NASC, New York City.
- Sept. 17-18—Aircraft Owners and Pilots Assn. annual summer round-up flight and tenth anniversary celebration, Rehoboth Beach, Del.
- Sept. 18-20—International Northwest Aviation Council convention, Spokane, Wash.
- Sept. 22-23—ARC-CAA-CAB transport meeting on CAR 4b policies and interpretations, Hotel Statler, Washington, D. C.
- Sept. 26-28—National Electronics Conference, Edgewater Beach Hotel, Chicago.
- Sept. 27-30—1949 fall meeting, American Society of Mechanical Engineers, Hotel Lawrence, Erie, Pa.
- Oct. 3-8—Twentieth anniversary meeting, Ninety-Nines, Waldorf-Astoria, New York.
- Oct. 5-8—SAE national aeronautic meeting and aircraft engineering display, Biltmore Hotel, Los Angeles.
- Oct. 7-8—American Air Mail Society, exhibition and convention, Edgewater Beach Hotel, Chicago.
- Oct. 12-15—Air Reserve Assn. convention, Long Beach, Calif.
- Oct. 13-15—1949 conference on airport management and operations, sponsored by University of Oklahoma and Southern Flight magazine, Norman, Okla.
- Oct. 17—36th NASC steering committee meeting, Dayton, O.
- Oct. 18-19—6th NAS council meeting, Wright-Patterson AFB, Dayton, O.
- Oct. 30—Third annual San Francisco Air Fair, sponsored by Junior Chamber of Commerce, San Francisco Airport.
- Oct. 30-Nov. 2—Annual convention, National Assn. of State Aviation Officials, New Orleans.
- Nov. 9-11—Seventh annual meeting Aviation Distributors and Manufacturers Assn., French Lick Springs Hotel, French Lick, Ind.
- Nov. 30-Dec. 2—Annual meeting, Society for Experimental Stress Analysis, Hotel New Yorker, New York.
- Jan. 13-15, 1950—All-American Air Maneuvers, Miami.
- Mar. 6-9, 1950—47th annual meeting, American Road Builders' Assn., Netherlands Plaza Hotel, Cincinnati.
- Mar. 28-31, 1950—National Plastics Exposition, sponsored by Society of the Plastics Industry, Navy Pier, Chicago.

PICTURE CREDITS

7, 12, 13, 14—Robert E. Burke; 16—Wide World; 17, 43—Robert E. Burke; 45—McGraw-Hill World News.

NEWS DIGEST

Aircoach Policy

Limits within which the certificated domestic airlines may offer air coach, first-of-the-week family fares and other promotional tariffs during the coming year were outlined last week by the Civil Aeronautics Board:

- **First-of-the-week family fares** should be extended to June 30, 1950.

- **Four-cents-a-mile coach service** conducted with 21- to 24-passenger DC-3s probably cannot be successful unless it shows a load factor in excess of 85 percent—a figure unlikely to be attained over an extended period. Accordingly, the Board said it would not grant approval beyond Sept. 30 to TWA's DC-3 coach service between Kansas City and Los Angeles or Continental Air Lines' cut-rate DC-3 operation between Kansas City and Denver.

- **Capital Airlines' "Nighthawk" flights** from Washington and New York to Chicago and Minneapolis/St. Paul should be extended to June 30, 1950. Capital's request to extend "Nighthawk" flights to the New York-New Orleans run with 50-passenger DC-4s and National Airlines' proposed New York-Miami coach service with 46-passenger DC-4s will be rejected.

- **TWA's New York-Chicago coach flights** with 38-passenger Boeing Stratoliners and Northwest Airlines' New York-Seattle and proposed Chicago-Portland, Ore., coach flights with 55-passenger DC-4s will be approved for a nine-month extension.

- **Western Air Lines' proposed 60-passenger DC-4 coach service** between San Diego and Seattle will be approved if departure times are limited to between 10 pm. and 1 am.

DOMESTIC

Erco Coupe Club-Air price has been reduced from \$4090 to \$3995, Sanders Aviation, Inc., announces. The Erco Coupe Standard is being discontinued for lack of interest in this model. There will be no change in equipment furnished with the Club-Air, despite the price cut.

Transocean Air Lines' contract to manage, maintain and operate the Landing Aids Experiment Station at Arcata, Calif., has been extended to June 30, 1950. TAL has held the contract for the past two years.

Two Navy squadrons of the Military Air Transport Service topped all Air Force units on the Berlin airlift, according to efficiency ratings just released, during the five months the Navy planes and crews participated.

The two squadrons were VR-8 and VR-6. Navy says its maintenance is better; AF says the Navy just had more maintenance men per plane.

Seattle Chamber of Commerce is raising a fund of \$75,000-\$100,000 to fight any proposal that Boeing Airplane Co. be moved from the city. Air Force has suggested that all future bomber work (which eventually will mean just about all Boeing production) be moved to Wichita on the grounds that the Seattle site is "vulnerable" to air attack. So is the whole Pacific Coast, says the chamber.

Military Air Transport Service is resuming normal schedules, which were curtailed to make more planes and men available for the Berlin airlift. Pre-airlift service will be attained before the end of the year. Redeployment of airlift forces began Aug. 1 and will end Oct. 31. Normal schedules of medical air evacuation flights were resumed Sept. 1. MATS' Great Falls, Mont., Airlift Replacement Training Center now will become a transport training unit.

Claims arising from Jan. 2 crash of a DC-3 owned by Seattle Air Charter have been settled by Lloyds of London for \$115,000. Accident took the lives of 11 Yale University students and injured 16 others.

INTERNATIONAL

Society of British Aircraft Constructors opened its annual show at Farnborough, England, with display of latest jet civil and military types. Three new jet fighters were disclosed: Avro 707, an all-wing type which flew for the first time just before the show opened and which is believed to be capable of supersonic speed; de Havilland 112 Venom, a revamped Vampire, but with a Ghost engine replacing the Goblin unit; and de Havilland 113, a night fighter also based on the Vampire.

Australian National Airways is considering an order for ten Vickers Viscount turboprop transports. Delivery would be in about 30 months. Trans-Australian Airlines, the government company, has sent technical missions to both Canada (to see the Avro Jetliner) and to England. Whether Jetliners or Viscounts will be ordered will depend greatly upon financial arrangement that can be worked out. Meanwhile, Qantas Empire Airways, an affiliate of British Overseas Airways Corp., has indicated interest in the de Havilland all-jet Comet.



**solves
high-temperature
problems**

**because it's built
to beat the heat**



Here's one sure answer to the problems encountered when aircraft wiring must withstand high ambient temperatures: wire with triple-silicone-treated General Electric aircraft wire.

Here's what triple-silicone treating means in G-E aircraft wire construction: (1) two layers of silicone-impregnated felted-asbestos insulation; (2) silicone-impregnated glass braid; and (3) over-all silicone-varnish finish.

Here's what triple-silicone treating means in G-E aircraft wire performance: (1) remarkably high immunity to effects of flame and heat; (2) high moisture resistance, because the silicone acts as a binder on the asbestos fibers; and (3) unusual abrasion resistance, because the glass braid has the extra protection of silicone varnish.

The famous heat-beating Deltabeston line includes wires and cables designed for power, lighting, and communication systems, and for instrument wiring. If you'd like to know more about this famous, high-quality line just address Section W53-992, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

GENERAL ELECTRIC



As simply as this

they lick a high-temperature problem

FINDING a packing to seal the exhaust manifolds of aircraft engines used to be quite a problem.

Corrosive, flaming gases quickly charred ordinary substances. While materials that could endure the heat, soon disintegrated under the incessant vibration.

But . . . Johns-Manville engineers found a material (and a method of using it) to tame this triple threat of heat, corrosion and vibration.

Logically enough, they chose a material known for its great thermal endurance . . . Inconel.

They had thin strands of this INCO Nickel Alloy knit into mesh and then tightly braided around an asbestos coil. Result: a J-M pack-

ing that stubbornly resists the searing attack of hot, corrosive gases.

Packings are but one of the many ways Inconel can help safeguard air travel. Containing 80 per cent nickel and 14 per cent chromium, Inconel gives you superior resistance to heat . . . corrosion . . . oxidation . . . stress.

Inconel is readily available in all standard mill forms—plate, strip, rod, tubing, wire, screening—to be fabricated into your design. (Frequently, a switch to longer-lasting Inconel means a simpler, lighter design.)

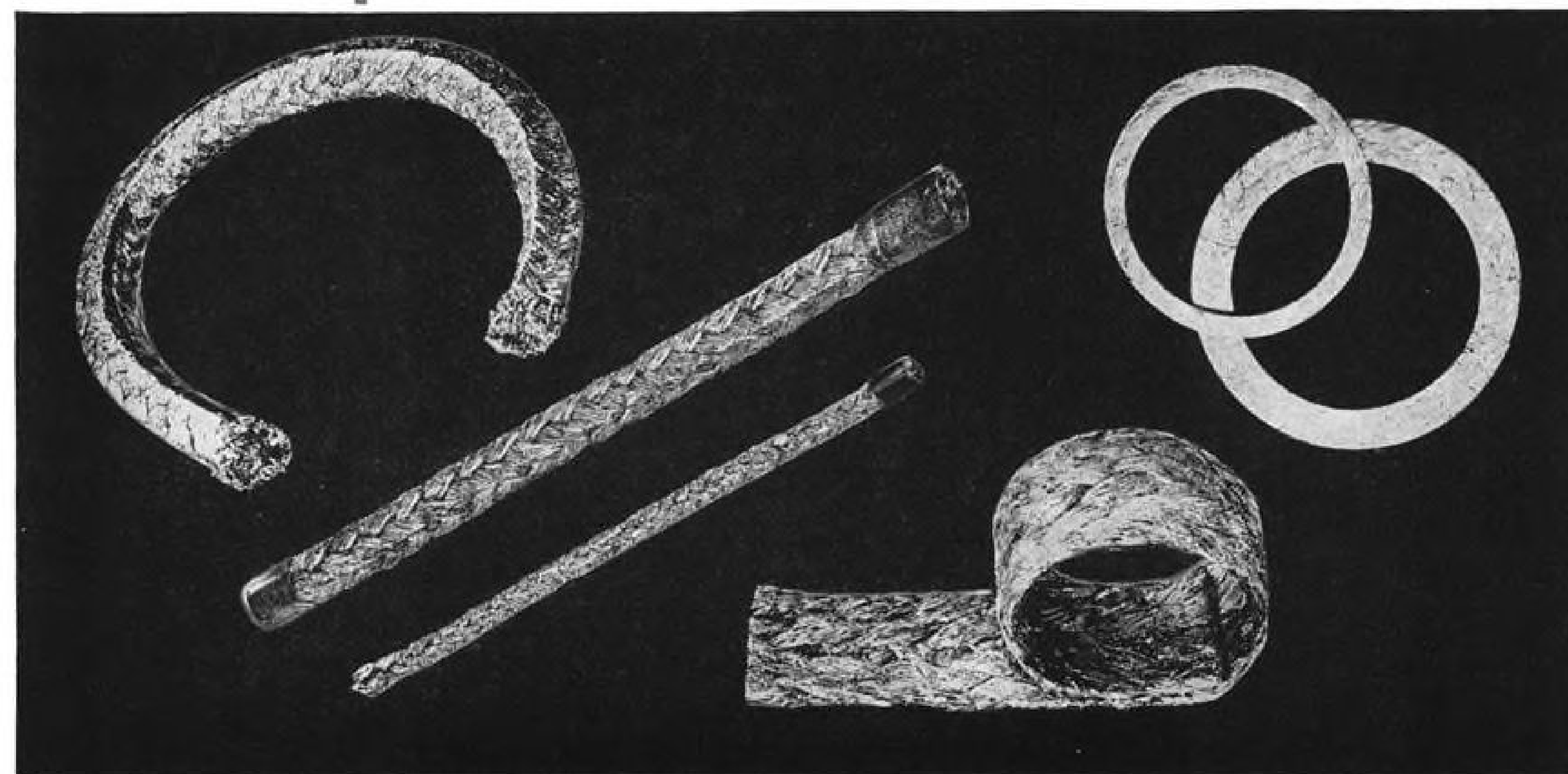
Remember, if your problem is high temperatures . . . your best bet probably is use of Inconel. Make it "first" in any investigation!

Send for your copy of "ENGINEERING PROPERTIES OF INCONEL."

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK 5, N. Y.

NICKEL  ALLOYS

MONEL® • "K" MONEL® • "R" MONEL® • "KR" MONEL® • "S" MONEL® • INCONEL® • NICKEL • "L" NICKEL® • "Z" NICKEL®
*Reg. U. S. Pat. Off.



INCONEL MESH and INCONEL MESH-ASBESTOS PACKINGS, as illustrated above, are available from JOHNS-MANVILLE, 22 East 40th St., N. Y. C., in coil and tape form in various sizes.

WHO'S WHERE

Changes at C-W

Curtiss-Wright Corp. has filled an existing job and created a new one. George R. Hill, formerly of the accounting firm of Lybrand, Ross Bros. and Montgomery, has been named controller, succeeding the late Raymond L. Ward who died suddenly July 21.

The new job is assistant to Robert L. Earle, who is senior vice president. Appointed to it is Leslie Neville, former editor of AVIATION MAGAZINE, and lately director of the Standard Aeronautical Index, administered by the Institute of the Aeronautical Sciences. Another C-W personnel development is the resignation of Mark Nevils as public relations manager.

Promotions

Cliff Barron has been elected a vice president of Boeing Airplane Co. and assistant general manager of the Wichita division. He has been assistant secretary-treasurer and director of the Wichita treasury division. Clyde Skeen, chief accountant at Wichita, takes over Barron's old job.

Edwin MacDonald, a director, was elected president of MacDonald Bros. Aircraft, Ltd., Winnipeg, succeeding the late Grant MacDonald.

Thompson Products, Inc., boosted Stanley P. Bayless from sales manager of the aviation division to director of staff sales. With Thompson since 1929, Bayless has spent several years in aviation sales work and in his new post will maintain his contacts with Thompson's aviation customers.

New Jobs

Edward G. Bern has joined Pan American-Grace Airways as sales manager. He formerly was general manager of Hughes Aircraft Co., and a vice president of American Airlines. He succeeds Nicholas Craig, who resigned as sales manager. Christopher De Groot, general traffic manager of Panagra, also resigned.

D. B. Hawkins has been named to the newly-created post of supervisor of international communications for Northwest Airlines. He joined NWA as a radio operator in 1937 and recently has been supervisor of communications for the Eastern Region.

Clifford Guest has resigned as managing editor of American Aviation Daily and now is with Hill & Knowlton, Inc., as editor of Planes, publication of the Aircraft Industries Assn. . . . Neil Silsbee has resigned as managing editor of Aero Digest and now is executive secretary of the Corporation Aircraft Owners Assn., succeeding C. B. Colby. . . . John W. Moore, formerly with the Port of New York Authority, has joined the New York sales staff of Slick Airways. . . . Frank X. Banko is the new assistant sales manager of Radio Frequency Laboratories, Boonton, N. J.

INDUSTRY OBSERVER

► Cook Cleland, 199 Thompson Trophy winner, claims 4000 hp. from his Pratt & Whitney R-4360 Wasp Major engine. This power is developed at 65 in. Hg. at 2800 rpm. using hydrogen peroxide injection. This latter fluid is claimed to be a "stabilized" form of peroxide which, upon decomposition, becomes water.

► Attention focused on Cleland's end plates, fitted to his prize-winning Goodyear F2G Corsair, was largely misplaced. The installation was efficacious not in added speed (he averaged only 1 mph. faster this year than previously) but in stability of the airplane. The plane's wingtips, after being clipped 18 in. previously, were cut an additional 29 in. for this year's races, resulting in greatly reduced rate-of-roll. The end plates, by providing an increased effective aspect ratio, gave the plane good handling characteristics, with the slightly reduced drag of lowered tip losses.

► Bill Odom's fabulous North American A-36 "Beguine," on which amounts varying from \$50-110,000 are rumored to have been spent, had tips and ailerons clipped 25 percent to make room for the wingtip coolant-tank installations. This raised his stick forces to critical values. Odom flew the trim, green speedster in the manner of pylon racers of 10 years ago, with snap vertical banks and snap leveling-out techniques. The combination of the two, together with gustiness and prop wash of preceding pilots, created an overwhelming piloting job which few could have mastered. The tip-radiator installation was professionally accomplished by North American engineers and not only did not cost the airplane any drag at all but actually added a slight amount of thrust.

► North American has adopted Republic's droppable fuel tank fin idea by the use of horizontal fins on the two 206-gal. tanks. Republic F-84E tiptank fins reduce the pitching moment of the tanks below the loads required to twist the wing but the F-86 installation is basically a device to hold the tanks in steady flight upon release.

► North American F-86 fighters flew the jet division of the Thompson Trophy Race in a steady bank which held a constant 6-7 G on its pilots, an acceleration once considered the maximum even for test pilots, but now a standard, sustained load for a closed-course race. Highly turbulent air gave sharp edge gust loads producing 8-9 G loads. The race could not have been flown without anti-G suits.

► Both the military and civilian pilots used oxygen during the closed course races of the 1949 classic, even though they flew only a few feet off the ground. All pilots confided that oxygen gave them the "lift" necessary to overcome fatigue on the gruelling course. Some used as high as 150 lb. from their demand-type systems.

► Pilots of the F-86s, while convinced that the airplane is capable of reaching a ceiling of 70,000 ft., are not anxious to take it up to that altitude due to the personal dangers involved. Since the human blood boils at 63,000 ft., this is an extreme upper limit for pilot safety (plus the addition of cabin pressure). Explosive decompression is an obvious hazard at such altitudes. Since F-86 pilots normally wear lightweight summer flying suits, a jump into ambient temperatures at these altitudes would render freezing a near certainty.

► Only mechanical failure of the punishing Thompson Trophy race was that of Alvin Johnson, last year's winner, in his stripped-down North American Mustang fighter. Johnson left the race, after losing several exhaust stacks and substantial quantities of oil. He noticed the oil streaming from the engine and, despite the fact that the oil pressure and temperature gages indicated satisfactory conditions, he decided to risk his equipment no further. Johnson had removed the radiator installation of his Mustang from the belly and created an internal wing installation, which worked perfectly as long as high speed was maintained.

► One fully-equipped military aircraft competed in the Tinnerman Trophy Race: a Supermarine Spitfire Mk 14 powered by a 2300-hp. Rolls-Royce Griffon engine. Flown by J. H. G. MacArthur, RCAF pilot, the airplane was untouched from its factory-delivered configuration for the race, including installation of VHF radio equipment. The airplane qualified at about 370 mph., which its pilot claims to be about its limit under the conditions existing at the time. Earlier quotation of 525 mph. top speed were termed by the pilot "an exaggeration."

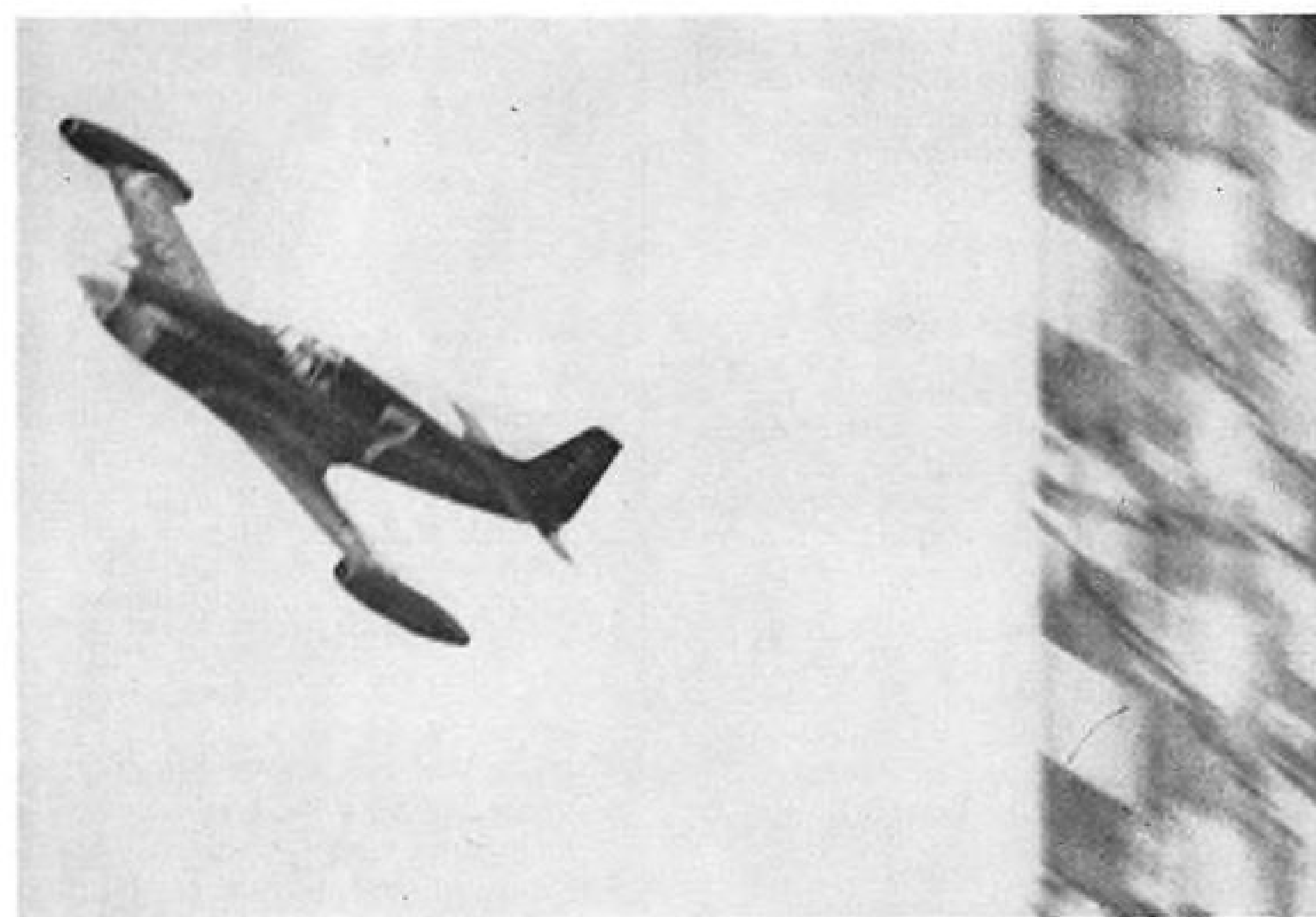
Picture Report



From the National Air Races . . .

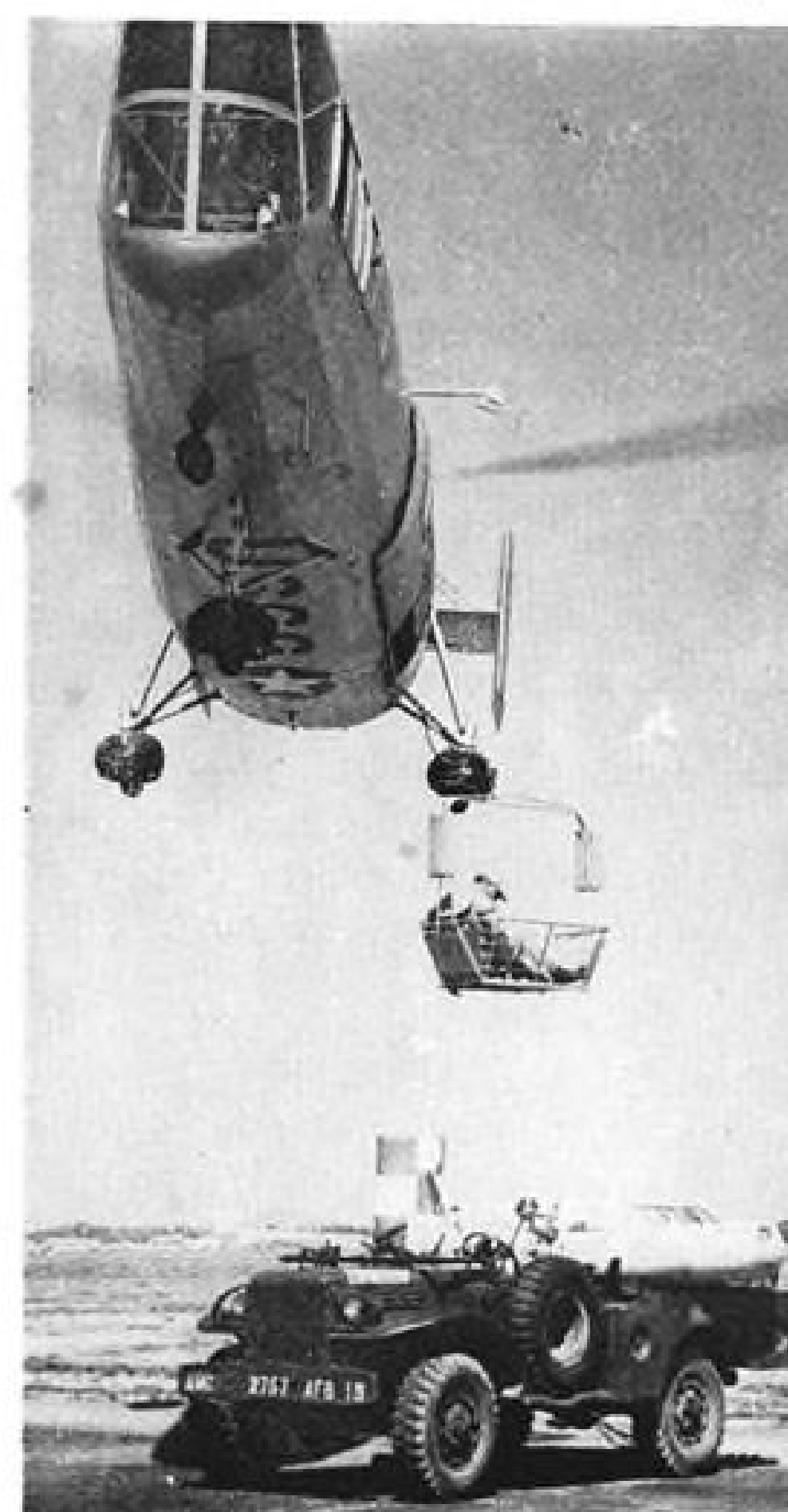
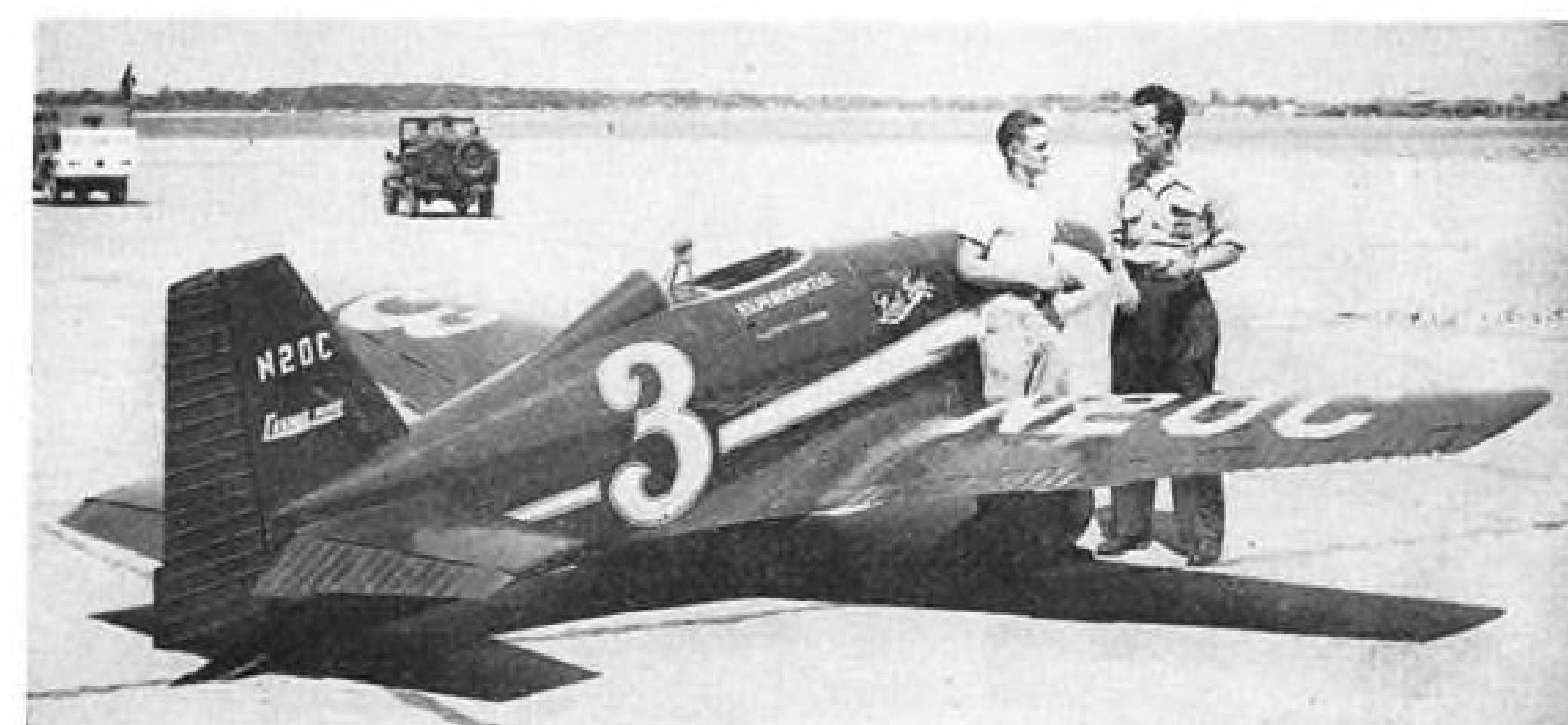
ABOVE: Lt. W. C. Rew, the winner of the Allison Jet Race, receives his trophy from Ron Hazen, Allison chief engineer. LEFT: Miss Marilyn Rich performed aero-acrobatics, suspended above the field by this Bell copter. BELOW RIGHT: Bill Odom is shown rounding the pylon on his first

lap in the ill-fated Thompson Race. BELOW LEFT: Goodyear winner Bill Brennan is greeted at the finish line by starter Earl Steinhauer. BOTTOM: Entries in the Soho Trophy Race are lined up in the race-horse start, which was used for most of the races.



. . . At Cleveland

ABOVE: Cook Cleland's F2G, winner of the Thompson, after the race. RIGHT: Pusher entry in the Goodyear Race. MIDDLE RIGHT: Billie Robinson, who piloted Little Toni, is briefed by owner Tony LeVier, who did not enter any of the races. The craft pulled out of the Goodyear when it lost its canopy. BOTTOM RIGHT: Lt. Obie Smith flew this modified racer to fourth place in the Goodyear Consolation. BELOW: Coast Guard demonstrates a simulated sea rescue with this Piasecki helicopter.



F-86 Speed Runs Steal National Air Races

North American jets exceed critical Mach over closed course.

By Stanley L. Colbert

CLEVELAND — North American F-86s, chief attraction at last week's National Air Races, have exceeded 710 mph. and 57,000 ft. altitude in flight tests.

The Sabres, top planes in U. S. Air Force's fighter stable, were shown to the American public for the first time in operational and racing roles. This was the second year that the swept-wing craft took top honors at the Air Races. Last year, in unofficial world speed record tests before the crowds, the F-86 reached 669.480 mph. in low level flight, piloted by Major Richard L. Johnson.

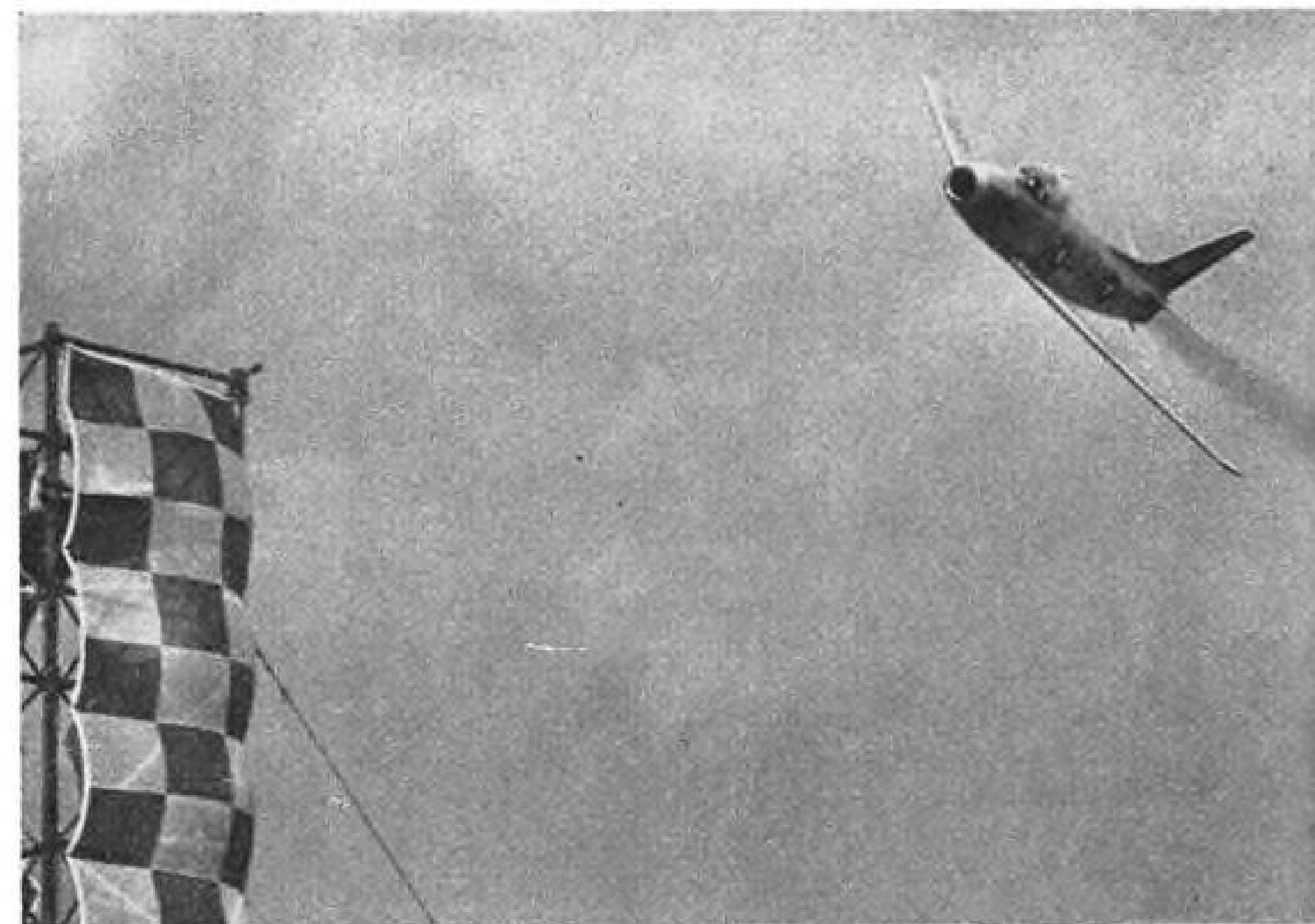
Four F-86 Sabres, two from March AFB and two from Langley AFB, were scheduled to participate in the jet division of the Thompson Trophy Race, but only two of the planes—both from the Fourth Fighter Group at Langley AFB—actually took off. One Sabre did not get off the ground; the other dropped out when the seat ratchet-lock failed, dropping the pilot too low to afford adequate visibility.

► **Winner**—Capt. Bruce Cunningham, who this year piloted the winning F-86 at an average speed of 586.173 mph. over the 15-mi. course for 15 laps, finished the race after he had lost all but a useless remnant of his elevators. All rivets on the trailing edge of the elevator had popped and skin around the tailpipe of the Sabre was wrinkled.

Capt. Martin C. Johansen, only other pilot in the race, finished the course at 580.152 mph., and recorded the fastest lap at 635.444 mph.

Both F-86s were loaded with 431 gal. of JP-1 fuel before the race started, but finished with considerably less than the Sabre's indicated safe minimum of 70 gal. While the seven-pylon Thompson course covers only 225 miles, the Sabres actually flew nearly 25 miles instead of 15 for each of the laps. Both planes landed with about 20 gal. left in the tanks.

► **Swift Descent**—The F-86 pilots were riding over the indicated Mach num-



ber of .95 on most of the gruelling laps. The planes are capable of a climb to 40,000 ft. in 15 min.; and a dive from 50,000 ft. to the deck in 2½ min., with speed brakes.

Last year AVIATION WEEK reported exclusively that the XF-86 had reached supersonic speeds during dive tests, a fact later confirmed by USAF. Since then the craft has flown at supersonic speeds in level flights at altitude.

The Sabres are powered by General Electric J-47 jet engines, delivering 5000 lb. static thrust dry and 6000 lb. with water injection. Neither plane in the race, however, used the water injection.

Earlier, in demonstrations by the USAF and Navy, more than 175,000 Labor Day-weekend spectators were treated to aerobatics operational flights by the F-86s, along with USAF's Lockheed F-80s; Republic F-84s; North American F-51s; Boeing B-29s, and Consolidated Vultee B-36s. Navy's show consisted of mass and team flights by Chance Vought F4Us; Piasecki HRP copters; McDonnell FHs and F2Hs; Grumman F7Fs, F8Fs and F9Fs; Douglas ADs; and the Martin Mercator and Mars.

► **British Style Possible**—This year's Air Races, evidently satisfying to the general public, did little to further industry knowledge of the comparative quali-

ties of each type operative aircraft. Last month, in Great Britain's first National Air Race, no two aircraft of the same type were entered in each event, a system many industry people would like to see adopted in U. S. competitions.

In one of Britain's races, the Hawker P. 1040, Vampire 3 and D. H. 108 were pitted against each other. Several events were held for the various types and makes of personal planes, such as the Gemini, Chipmunk, Proctor 1 and III, Hawk Trainer, Miles Mercury and Messenger.

Here at Cleveland, private planes were demonstrated to the public in fly-bys, and even then, only three Beech planes, a spraying version of the Piper PA-11, and the de Havilland Beaver were shown. The PA-11, after circling in front of the grandstand, swooped over the crowds and sprayed them with gallons of Jacqueline Cochran's "Shining Hour" perfume.

Weather followed the pattern for Labor Day weekends in Cleveland, with at least one day of rain. On the last day, heavy winds nearly upset the scheduling of races and events. But while F-86 pilots bemoaned the turbulence, Bill Brennand, winner of the Goodyear Trophy Race, told AVIATION WEEK he was not bothered at all by the winds.

A favorite with the crowds was the return visit of the de Havilland Vampires, members of the Royal Canadian Air Forces 410th Fighter Interceptor Squadron, commanded by Flight Lieut. W. R. Tew.

Specialty acts included a rescue demonstration by a Coast Guard Piasecki HRP-1, flown by Cmdr. Frank Erickson, who devised the flotation gear on the copter; flights by the prone-pilot position Weebie; aerobatics by Betty Skelton and Bevo Howard; and a "race" between three vintage 1930 Curtiss pusher planes.

End of Races?

Odom crash again raises question as to value of airplane speed contests.

By Alexander McSurely

CLEVELAND—A tragic ending to the 1949 National Air Races sacrificed a famous pilot, a mother and a child on the altar of speed and again raised the question of the value of air race competitions in view of the lives they cost.

Capt. William Odom, holder of numerous round-the-world and long-distance non-stop flight records, crashed to his death in the second lap of the Thompson Trophy race.

► **Races May Move**—The 1950 National Air Races may be moved from Cleveland as a result of protests developing in the residential areas around Cleveland Airport following the Odom crash, it was reported at the pilots' meeting following the races.

Ben Franklin, NAR General Manager, told the pilots that his organization had sanction from the Federation Aeronautique Internationale to continue the races in 1950, but that the present race management might move the show. At least two other cities, Dallas and Houston, already have put in bids for 1950.

Franklin told the United Press at Cleveland that "after what happened yesterday, it's possible that the suburbs here may try to obtain injunctions against the races. We'll just have to wait and see what happens."

► **Cleveland Wins**—Comdr. Cook Cleland, Willoughby, Ohio, airport operator, and 1947 Thompson winner, rode on victoriously to set a new closed-course record for reciprocating engine aircraft with an average of 397.071 mph.

Odom's plane, an F-51, had been modified by J. D. Reed of Houston, Tex., and used wing-tip radiators, eliminating fuselage radiator frontal area for a cleaner design. The plane

Goodyear Trophy Race

Place	Pilot	Entrant	Elapsed Time	Speed Mph.
1.	Wm. Brennand	S. J. Wittman	7:06.30	177.340
2.	Keith Sorensen	Keith Sorensen	7:07.78	176.726
3.	S. J. Wittman	S. J. Wittman	7:08.95	176.244
4.	Vincent Ast	Glenn Fulkerson	7:09.61	175.974
5.	Herman Salmon	LeVier & Assoc.	7:10.21	175.728

(12 laps of 1.75-mile course—21 miles. All planes powered by Continental engines.)

Allison Jet Trophy Race

Place	Pilot	Elapsed Time	Speed Mph.
1.	Lt. Walter C. Rew	26:13.5	594.806
2.	2nd Lt. F. N. Fugate	26:26.3	590.007
3.	1st Lt. P. E. Coleman	28:19.7	550.643
4.	Capt. C. J. Bennette	29:44.0	524.623

(Indianapolis Municipal Airport to Cleveland Municipal Airport—259.98 miles. All flying F-80C Shooting Stars, powered by Allison J-33-23 turbojets.)

Tinnerman Trophy Race

Place	Pilot	Plane Make	Elapsed Time	Speed Mph.
1.	B. W. McKillen, Jr.	Goodyear F2G	16:19.10	386.069
2.	W. V. Newhall	N. A. F-51K	16:35.43	379.735
3.	J. H. McArthur	Spitfire	17:31.27	359.565
4.	J. B. Hardwicke	Lockheed F-38	19:10.79	328.470
5.	J. P. Hagerstrom	Lockheed F-38	20:13.10	311.598

(Seven laps of 15-mile course—105 miles. Total purse \$7500 and trophy.)

Sohio Trophy Race

Place	Pilot	Plane Make	Elapsed Time	Speed Mph.
1.	William Odom	N. A. F-51	16:13.24	388.393
2.	Ron Puckett	Goodyear F2G	16:22.16	384.866
3.	Charles Tucker	Bell F-63	16:30.75	381.529
4.	Steve Beville	N. A. F-51D	16:43.40	376.719
5.	Ken Cooley	N. A. F51	16:52.22	373.437

(Seven laps of 15-mile course—105 miles. Total purse \$7500 and trophy.)

Thompson Trophy Race

"R" Division

Place	Pilot	Plane Make	Elapsed Time	Speed Mph.
1.	Cook Cleland	Goodyear F2G	33:59.94	397.071
2.	Ron Puckett	Goodyear F2G	34:18.31	393.527
3.	Ben McKillen, Jr.	Goodyear F2G	34:49.84	387.589
4.	Steve C. Beville	N. A. P-51D	35:24.19	381.214
5.	Charles Tucker	Bell F-63	35:40.93	378.340

(Fifteen laps of 15-mile course. Total purse \$40,000 and trophy.)

Bendix Trophy Race

Place	Pilot	Plane Make	Elapsed Time	Speed Mph.
1.	Joe DeBona	N. A. F-51C	4:16:17.5	470.136
2.	Stanley Reaver	N. A. F-51	4:33:17.5	450.221
3.	Herman Salmon	N. A. F-51		449.214
4.	Don Bussart	DeHavilland Mosquito		343.757

(Southern Calif. to Cleveland cross-country.)

Thompson Jet Trophy Race

Place	Pilot	Speed Mph.
1.	Capt. B. Cunningham	586.173
2.	Capt. Martin Johansen	580.152

(Flying F-86As on 15-mile course over 10 laps)

Navy Jet Carrier Race

Place	Pilot	Speed Mph.
1.	Lt. R. S. Laird	548.978
2.	Lt. Cmdr. W. Biggars	544.805
3.	Lt. T. S. Sedaker	536.776
4.	Lt. E. A. Buxton	509.601

(432 miles from carrier Midway in Atlantic to Cleveland flying F2H Banshees)

Bendix Jet Trophy Race

Place	Pilot	Speed Mph.
1.	Maj. Vernon Ford	529.614
2.	Capt. J. W. Newman	524.620
3.	Lt. Col. L. E. Moon	524.551
4.	Capt. Harry M. Lester	514.747

(Flying F-84Es from Rosamond Dry Lake, Calif. to Cleveland)

had been called the fastest propeller-driven aircraft in the world. Odom flew it in the second-fastest time among Thompson qualifiers, exceeded only slightly by Cleland. Then he piloted it to win the Sohio preliminary race at 388.393 mph. before the fatal crash. Odom also participated daily in a fly-by exhibition of his "Waikiki Beech" Bonanza, which he flew last spring from Honolulu to Teterboro, N. J., for a new light-plane nonstop record of approximately 5000 miles.

► **Cochran Buys Plane** — Jacqueline Cochran, prewar Bendix race winner and wife of Floyd B. Odlum, Consolidated Vultee board chairman, had purchased the "Beguine" F-51 from Reed and asked Odom to pilot it for her in the Thompson.

Odom's plane crashed after it apparently went out of control in a turn on the seven-pylon course. It struck a house, killed a woman in the house, and fatally injured a child who died shortly afterwards, and killed the pilot.

► **Goodyear Sweep**—Goodyear's wartime F2G Corsairs made a clean sweep of the first three places in the Thompson race, as Ron Puckett and B. W. McKillen, Jr., followed Cleland in second and third places. McKillen had previously won the Tinnerman Trophy race, while Puckett had finished a close second to Odom in the Sohio race. Another F2G owned by Cleland and piloted by Dick Becker, his associate, was disabled in qualification trials. The F2G, powered with a Pratt & Whitney 4360 engine rated at 3000 hp., is probably the most powerful single-engine airplane of the piston-engine species now flying.

Records were shattered in both the jet and piston engine divisions of the Bendix race. Maj. Vernon A. Ford, Middletown, Pa., flew a Republic F84 Thunderjet fighter from Muroc AFB to Cleveland at an average of 529.615 mph., compared to the previous jet Bendix record of 494.78 set in 1946 by Col. Leon Gray.

► **DeBona Wins**—Piston-engine division, which carries prizes of \$25,000 for the winners, found Joe DeBona, Beverly Hills, Calif., setting a new mark of 470.136 mph. during his flight from Rosamond Dry Lake, Calif., to Cleveland. DeBona's F-51 plane was owned by film star James Stewart. Previous record was 460.42 mph., set by Paul Mantz in 1947.

A McDonnell Banshee, piloted by Lt. R. S. Laird, took off from the carrier Midway, near New York City, and flew at a speed of 548.978 mph. to win the American Steel & Wire Co. race.

► **Allison Race**—Allison Division of General Motors Corp., again sponsored a jet race from Indianapolis to Cleveland for F-80 fighters, which was won by Lt. W. C. Rew at a speed of 594.806 mph.

New light on the B-36 controversy was shed when Lt. Tony Buxton took a McDonnell Banshee from a standing start to 40,000 ft. in 10 min. to win the Westinghouse-Navy jet climbing race.

The Banshee has been touted by the Navy as one of the few fighters capable of dealing with the redoubtable intercontinental bomber at the high levels where many modern fighters get into maneuvering and stalling difficulties.

Three Banshees participated in the climb race with one piston-engine Grumman F-8-F Bearcat providing a contrast for the spectators.

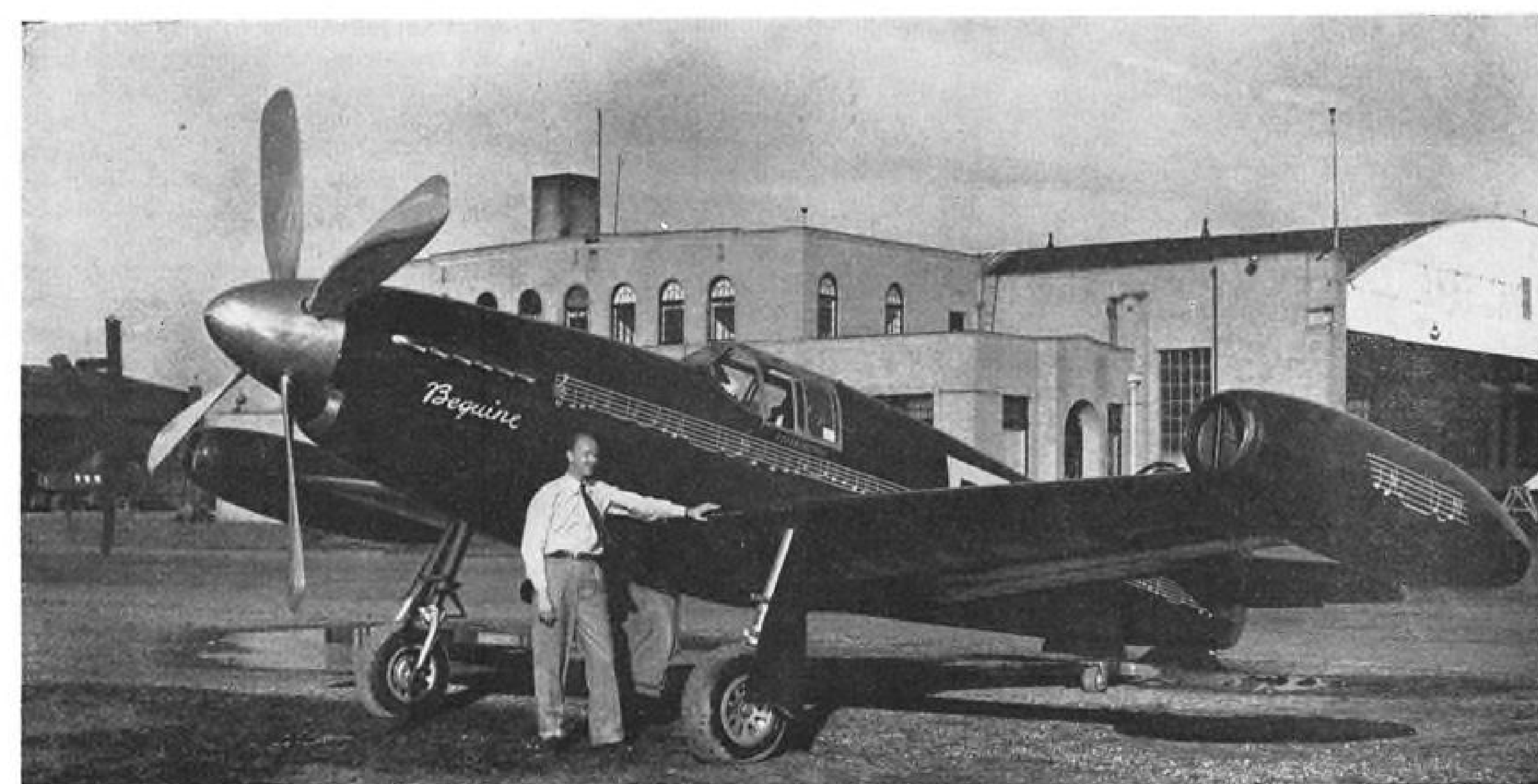
► **New Class**—The racing pilots' meeting heard a proposal for a new contest. The race management is urging a class of racers using power plants larger than those of the Goodyear midgets (85-hp. Continentals), but limited probably to 500 or 1000 cu. in. displacement (200-450 hp.). Franklin hinted that he already had a sponsor willing to back such an event in 1951, if the pilots provided the planes by that time.

A show of hands called for by Tony LeVier, president of the Professional Racing Pilots Assn., indicated at least ten of the group are willing to build that type of entry.

Clarence Bell, chairman of the Goodyear Race committee, said that in three years with 24 races (including preliminary heats) there had been no accidents in the midget race competitions.

► **Other Side**—Charles Tucker, Northrop test pilot and Thompson Race participant, pointed out that many of the pilots had large personal investments in the wartime fighter planes now principally used in the unlimited power classification. He also suggested the danger of building "home-made racers of higher horsepower" and emphasized the strong construction of wartime fighters and the availability of spare parts to keep them in good shape.

Another show of hands indicated that Tucker had many supporters in wishing to continue the unlimited class with military planes.



THE BEGUINE, piloted by Bill Odom, was favored to take the Thompson.

Workmanship Pays Off in the Races

More mature approach helps solve problems of high speed flight; skilled service personnel a large factor.

By Robert McLarren

CLEVELAND—Closer attention to professional advice and a more mature approach to the problem of speed vs. endurance was found in the high-horsepower group of racing pilots at the 1949 National Air Races. Much of this more conservative attitude resulted from a vigorous technical committee but was due in large measure to lessons learned from ill-fated experiences of preceding races.

Workmanship continued to pay off in such events as the famed Thompson, Sohio and Tinnerman high-power races. Results of the races were determined by caliber of service personnel, which, in the case of the winners, comprised skilled, professional aid, rather than the familiar enthusiastic but unexperienced mechanics used by the losers through the years. Races are won by tight clamps and strategically-placed supporting brackets.

► **"Beguine"**—A fabulously expensive \$50-110,000 estimate) example was the "Beguine" in which, except for the tragic piloting error of Bill Odom, the profitable Thompson Trophy Race would likely have been won. This modified North American A-36 (P-51B) surplus fighter, which featured a wing-tip location of the radiators, was a finer piece of machinery (entirely new Rolls-Royce V-1650 Merlin engine, accessories and

equipment) than any airplane at the races and its official closed-course speed of 405 mph. was a record for propeller-driven aircraft.

Odom lost his life in a maneuver identical to that which cost the life of Art Chester last year and proved the reality of danger in closed-course racing. Odom had cut a pylon and was attempting to turn around when he apparently blacked out and the airplane rolled over on its back and into the ground in a blinding flash. After pulling too tightly on the pylon, Odom eased back on the stick, hoping to clear it. Realizing he would have to circle, he pulled back on the stick, tightened the turn to the stalling point which produced a high-speed stall and forced the pilot to 10-12 G acceleration from which he blacked out.

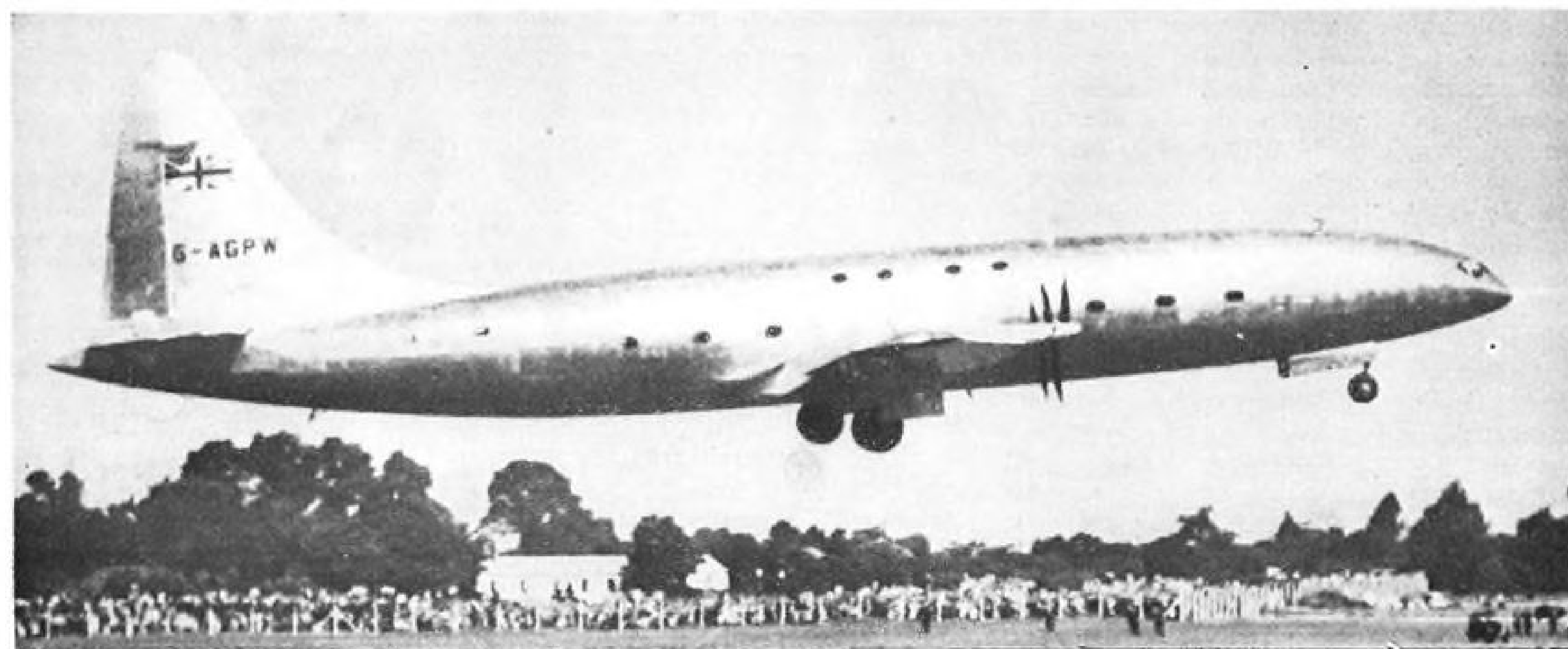
► **Thompson**—As in previous postwar high-power races, victory went to those whose engines continued to operate. Cook Cleland's \$16,000 victory in the Thompson classic was a tribute to his engine, in which he had installed elaborate injection equipment which he did not use. The one-two-three victory of the surplus Goodyear F2G-1 Corsair fighters again proved the basic advantage of power over aerodynamics. The Pratt & Whitney R-4360 Wasp Major engines in these three aircraft, although operated at 65-73 in. Hg., 2800-3000 rpm. (3700-4000 hp.), sustained the

225-mi. grind and were in amazingly good condition upon completion. All three aircraft (Cleland, Puckett and McKillen's) were in astonishingly good condition after the race, without oil trails or bent skin, although some fabric had been torn away.

In the Goodyear event, in which all racers were restricted to stock engines, fast takeoff assumed important proportions with many heats being won by the pilot first in the air. This required low-pitch propellers which sacrificed high-speed performance. Veteran Steve Wittman, who has flown in every National Air Races ever held, produced the equivalent of a two-pitch propeller with the scimitar-bladed wooden design he built himself. Under the load of takeoff, the blades twist to low pitch for the required quick acceleration but around the course the lightened load reduced the pitch to high rpm. conditions.

► **Wittman Changes**—Steve Wittman and his associate Bill Brennan swept the field with simplicity of design and high engine speed in the two airplanes that have placed high in all the mid-season races. Only modification for the 1949 Goodyear Trophy event were some additional clean-up of engine cowling and propeller whittling, the latter consisting of cross-grain lamination. Master piloting completed the money-winning combination.

Second-place winner Keith Sorensen proved one of the fundamental aerodynamic rules by entering the race with the smoothest exterior finish of the entrants. Although of unimpressive lines, his "Mike Argander Special" placed second in the Goodyear final due simply to this beautifully-smooth finish



BRABAZON TAKES OFF

Bristol's Brabazon I, after an investment of five years' time and about \$48 million, has made its first flight from the specially-constructed runway at Filton, England. Test pilot Bill Pegg, who trained for the flight

by flying the Convair B-36 at Ft. Worth, flew the eight-engine transport for 27 minutes before landing. Press reports of the plane's being airborne at 80 mph. after a run of about 1500 ft. would indicate it was

lightly loaded. With a span equal to that of the Convair XC-99 (230 ft.) the Brabazon's length is some five feet shorter. The Mark I is powered by 2100-hp. Centaurus engines. A later version will use turboprop power.

coupled, of course, with expert piloting.

Amateur aerodynamicists again blocked many entrants of chances at the Goodyear Trophy. Many aircraft were obviously wasting their owners' money and their pilots' risks in the race by poor layout of components, surprisingly crude lines and painfully "leaky" lines.

► **Salmon Switch**—Herman "Fish" Salmon, for example, attempted to improve on the classic lines of the Cosmic Wind series of aircraft designed by Glenn Fulkerson, Lockheed aerodynamicist, by raising the wing and substituting a steel tube fabric-covered fuselage, which placed him in fifth position behind a standard Cosmic Wind piloted by Vincent Ast. Salmon had done an excellent job on his cylinder-head fairing and canopy installation but lost all these advantages by a rectangular fuselage and angular empennage.

Only unique new Goodyear entrant this year, despite wild rumors of super-fast "mystery" ships, was the twin-boom pusher of the Lawrence Institute of Technology, Detroit, piloted by Carl Ambler. Despite an outstanding pilot's job, the gleaming white airplane was slowed by poor detail design. In addition to the obvious disadvantages of pusher installations, the student designers failed to appreciate the vital importance of detail design and finish in speed contests. Despite drag-producing tail wheel installations on both lower fin, wingtip bumpers were added, as well as combination fabric and formed metal skin that was poorly managed.

Pilots were far more reluctant to compound their own fuels this year than last. Standard Oil Co. of Ohio furnished all Goodyear entrants with 100 gal. of either 80 or 91 octane (only two flyers used the latter due to its obvious lack of advantage), and high-powered racers with 400 gal. of a special racing blend compounded especially for the occasion. Sohio prepared 130/170 octane fuel, containing 4.34 mm. lead and with a heat content of 19,100 Btu. per gal. Bill Odom and Alvin Johnson used triptane fuel to which they added about 4 mm. lead.

► **Fuel Injection**—All were equipped with fluid injection, although it was not used in all cases. Standard Pratt & Whitney 50-50 methanol-alcohol-water injection fluid was used by Ron Puckett and Ben McKillen in their Wasp Major engines. Cook Cleland had equipped his trophy-winning Corsair for "stabilized" hydrogen peroxide injection but a late report indicated that this was not used in the race. Remaining racers used water-alcohol injections in 40-60 ratios with injection rates varying from 1.9 to 2.8 gal./min. An indication of the quantity (and weight) water required is gained by the one-half hour required for the race.

► **Military**—The North American F-86A Sabre swept-wing jet fighter led the parade of service aircraft in technical interest. The Thompson Trophy Race "J" Division provided an accurate yardstick to the performance of the airplane at sea level. From a single, closely-guarded record-breaking aircraft last year, the Sabre has blossomed into a quantity-production type with full squadrons in attendance. Foreshadowing the future of sonic-speed aircraft operational difficulties was the well-used appearance of these planes. While machine-tapered skin and careful surface finish and access door flushness are meticulously provided at the factory, under field service conditions much of this fairness is lost.

Particular attention was paid inadvertently, to this problem in the four Grumman F9F Panther jet fighters flown by the "Blue Angels" acrobatic team due to the light blue paint coating given these planes for identification purposes. The trim, folding-wing fighters feature fixed, stressed-tip tanks, which are not ejected upon exhaustion.

► **Climb Race**—A feature of current importance was the Westinghouse climb race, featuring four McDonnell F2H-1 Banshee fighters, climbing from a standing start to 40,000 ft. in 10-12 min. Lack of accuracy as to the time stems from the fact that no official clocking was made. However, the aircraft is capable of doing the job in little more than one-half this time so that no performance of a military nature was revealed. The Banshee uses ordinary AN-F-58 gasoline and features 20-mm. cannon, in contrast to the .50-cal. machine guns used on Air Force fighters, including the F-86.

Evidence of the importance of detail design was seen in the condition of the two F-86 Sabre's upon completion of the jet division of the Thompson race. The second-place airplane suffered only a sprung access door but the winning fighter of Capt. Bruce Cunningham developed a sudden high-speed flutter that instantly ripped the elevators to shreds, leaving only a badly ruptured inboard segment. The center and outboard hinge brackets, with accompanying elevator portions, were carried away and the remaining portion sheared along the trailing edge. The successful completion of the race and subsequent landing were made, apparently, by the use of stabilizer trim control.

P. O. Studies Air Star Routes

Post Office Department is making a survey to determine what air star routes to inaugurate under recently-enacted legislation authorizing the service.

Contracts for the routes will be let

by competitive bid. All types of mail will be transported. Star routes paralleling certificated airline routes are barred.

► **CAB Notified**—When the Post Office decides to establish a route, the Civil Aeronautics Board will be notified before bids are called. The Board will have a 30-day period in which to consider the proposed new service and can veto it if it decides it is in competition with the certificated airline system.

Post Office officials estimate that about a dozen air star route awards will be made over the coming year. These will be in areas where surface transportation is difficult. The Puget Sound region, the Great Lakes region, the Grand Canyon and other mountainous areas have been mentioned.

The department is now operating two domestic air star routes in the Great Lakes region. Until the new air star route legislation was enacted authorizing an unlimited number of domestic routes, the department was limited to five.

AA-Delta Interchange Gets Temporary OK

An equipment interchange agreement providing through-plane service between American Airlines points west of Dallas and Delta Air Lines points east of Dallas has been approved temporarily by the Civil Aeronautics Board.

The decision will permit faster schedules over a southern transcontinental route from Miami, Jacksonville, Atlanta, Birmingham and New Orleans to Los Angeles and San Francisco.

Under the interchange agreement, six DC-6s (all with standardized cockpits) will be required initially. American will furnish four planes and Delta two.

► **Planes on Lease**—As each of the planes passes the interchange point (Dallas), it will, under the agreement, be under lease to the connecting carrier. Captains assigned to the interchange flights will be authorized to deliver and accept delivery of the leased planes.

► **Protest Made**—Eastern and National had protested that even temporary approval of the American-Delta equipment interchange would prejudice their bids for a southern transcontinental route. They argued that interchange service is not a satisfactory substitute for one-carrier service. CAB assured NAL and EAL that approval of the temporary interchange will not affect outcome of the southern transcontinental route case.

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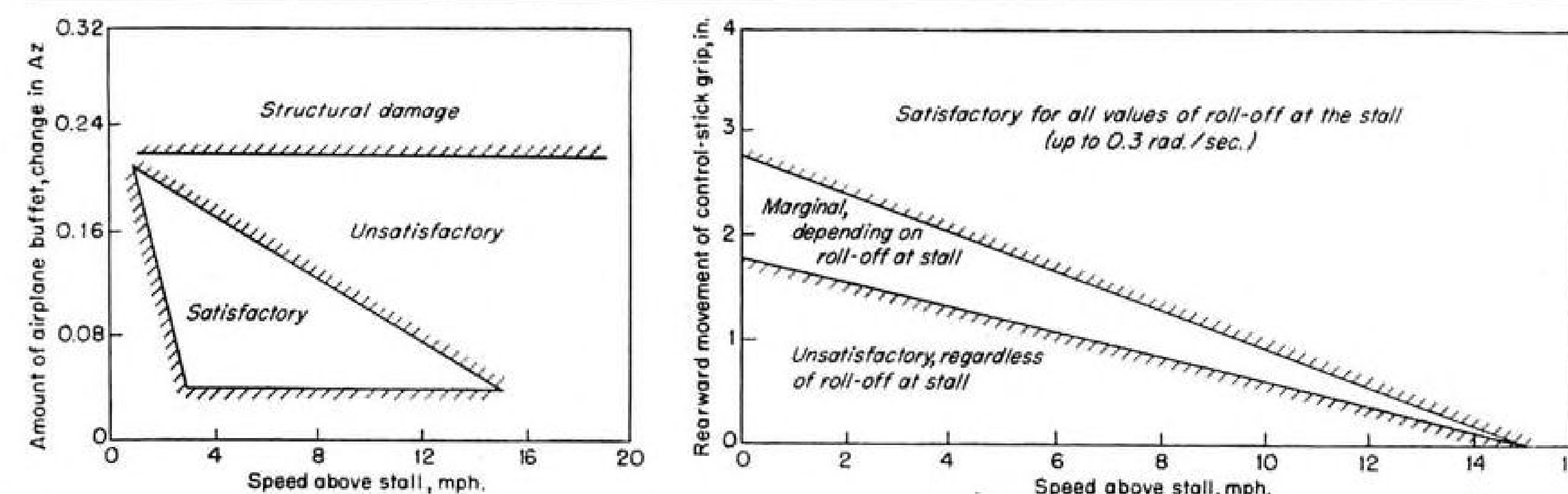
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CORRELATION of pilot opinion of stall warning with: airplane buffet (Fig. 1, left); rearward movement of stick (Fig. 2, right).

Summing Up Findings on Stall Warnings

Pilots' reports on stalls correlated with readings from special instruments to set up design criteria.

One of the most important research projects in aviation history was the establishment of quantitative design criteria for describing the flying qualities of aircraft.¹ This study reduced pilot opinion to mathematical values useful for design and placed the design of good handling qualities into a new airplane on a rational basis for the first time.

It is now possible to compare all of the flying qualities with specific quantitative requirements except one—stall warning.

► **Stall Warnings**—Current flying qualities specifications state that approach to the complete stall shall be accompanied by a definite stall warning consisting of one or more of the following: (1) Buffeting and shaking of the airplane and controls, (2) marked increase in rearward travel of the control column or marked increase of control force for further speed reduction, and (3) preliminary development of the stall through small amplitude pitching and rolling motion.

The requirements also state that the stall warning shall occur at a speed not less than 1.05 or more than 1.15 times the stalling speed for each of the various flight configurations.

With the exception of the limits of stalling speed, none of these requirements provide the designer with any quantitative data to go by in the layout of the airplane.

Obviously, if he is to meet these requirements he must know: (1) Amount of airplane buffeting, (2) amount of elevator shake, (3) amount of elevator

buffet, (4) maximum amplitudes of roll and pitch velocities, and (5) amount of change in elevator stick position and control force prior to the stall.

► **NACA Investigates**—To provide answers to these questions, the National Advisory Committee for Aeronautics obtained data on 16 airplanes, ranging from single-engine fighter to four-engine bomber types, flown by five research pilots having varied backgrounds.

Instrumentation was installed in the airplanes and pilots' notes made in which opinions of the stall warning were expressed.

By comparing pilot's opinion with data obtained from the instrumentation it was possible to get quantitative expressions for his opinions.²

One of the first problems presented by this approach was a complete lack of correlation of pilot opinion concerning several of the questions asked.

For example, control shaking shown by the elevator control-position recorder did not give a good indication of the resultant feel of the control stick experienced by pilot, probably because of play and/or stretch in the control system.

Another item eliminated was amount of buffet shown by the force variation at the control-stick grip. This showed no consistent correlation with buffet or shaking of the controls, possibly because of friction in the control system and the fact that the force recorded depended upon restraint supplied by pilot.

► **Correlation**—Only items found which produced consistent quantitative measurements and could be correlated with

pilot observations of the stall warning were normal acceleration, rolling velocity and elevator-control position. Fig. 1 indicates the buffet boundaries of the airplane approaching a stall, in which pilot opinion indicated satisfactory and unsatisfactory conditions.

These data were obtained by an accelerometer, and the ordinate used is the increment in normal acceleration factor, Az. Incremental value of Az measured at the first point of buffet was approximately 0.04, apparently the smallest change in acceleration that pilot was able to detect.

His ability to detect the lower limit of buffeting is influenced by a number of factors, such as its frequency, presence of other transverse vibrations and by intensity of the noise. In this regard, jet aircraft would possibly offer more ideal conditions for detecting stall warning produced by buffeting.

► **Dependency Factors**—Judgment of whether the stall warning is satisfactory at the first indication of airplane buffet is dependent not only on the initial amplitude but also on the speed above the stall at which buffet first begins and how rapidly the buffet increases in amplitude with decreasing airspeed.

Region on the right of Fig. 1 indicates that buffeting did not serve satisfactorily as a stall warning, since at speeds in excess of approximately 15 mph. above the stall the buffeting was removed too far from the complete stall to serve as a satisfactory warning of the approaching stall.

Another unsatisfactory aspect of the early buffet is that it might build up to such great magnitude as stall is approached that the pilot fears structural damage to the airplane (upper region of Fig. 1).

Boundary for lowest speed above stall at which the pilot would accept buffet-ing as a satisfactory stall warning is about 3 mph., as shown at the left of Fig. 1.

Data on preliminary rolling motion preceding the stall indicate that the rolling velocity must be at least 0.02 rad. per sec. (1.15 deg./sec.) to be perceptible to the pilot as a stall warning, and at least 0.04 radians per second to be considered satisfactory as a warning.

The information indicated that pilots generally did not consider rolling velocities greater than 0.06 rad. per sec. as satisfactory warning of the stall.

► **Stick Movement**—One of the best

correlations of pilot opinion of stall warning with observed data was in rearward movement of the stick approaching the stall, shown in Fig. 2.

In the top region, a stick movement greater than $2\frac{1}{4}$ in. was considered satisfactory for values of rolling velocity up to 0.03 rad. per sec.

In the middle region, the warning was marginal, depending on the magnitude of the roll-off at the stall, with the warning being considered satisfactory for small values of rolling velocity and unsatisfactory for large values.

However, regardless of the degree of roll-off at the stall, $1\frac{1}{4}$ in. or less of stick travel was considered unsatisfactory as

a warning of the stall.

These tests now make it possible to complete the list of quantitative flying qualities requirements as follows: Stall warning is considered satisfactory when any of these conditions are present—(1) airplane buffeting occurs at speeds from 3 to 15 mph. above the stalling speed and results in an indicated acceleration factor increment of 0.04 rad. per sec., (2) preliminary controllable rolling motion from 0.04 to 0.06 rad. per sec. occurring anywhere within a range of 2 to 12 mph. above the stalling speed, and (3) rearward movement of the control stick at the grip is at least 2.75 in. during the 15 mph. speed range immediately preceding the stall.

References

1. Gilruth, R. R.: Requirements for Satisfactory Flying Qualities of Airplanes. NACA Rep. 755, 1943. (Also see AVIATION WEEK, Jan. 5, 1948.)
2. Anderson, Seth B.: Correlation of Pilot Opinion of Stall Warning with Flight Measurements of Various Factors which Produce the Warning. NACA TN 1868, April, 1949.

New Technique Aids Magnetic Field Study

An electron-optical shadow technique for studying electrostatic and magnetic fields of extremely small dimensions has been developed at the National Bureau of Standard's electron physics laboratory.

The new method, conceived by Dr. L. L. Marton, uses an electron lens system to produce a shadow image of a fine wire mesh placed in the path of an electron beam. From the distortion in the shadow network, caused by deflection of the electrons as they pass through the field under study, accurate values of field strength are computed.

While somewhat similar to the schlieren electron-optical technique previously developed at the Bureau, the new shadow method is said to be much better adapted to precise determinations of field intensity.

It is expected to be an invaluable tool in broadening knowledge of space-charge fields, patch fields in thermionic emission, fields produced by contact potentials, charge distribution in a gaseous plasma, waveguide problems, and the basic properties of metals.

Greatest value of the electron-optical shadow method is said to lie in its utility for exploring complex electric and magnetic fields of extremely small dimensions or in which a probe of greater size than an electron would disturb the field under study. The method also is stated to be well adapted to study of the fundamental nature of ferromagnetism. An investigation into the behavior of fringe fields of the ferromagnetic domains is underway.

What Is Future for Control Surface Tabs?

Historic development and present use measured against requirements of high-speed, very heavy aircraft.

By Robert McLarren

The control surface tab has been accurately called "the pilot's friend," but right now it is the subject of a serious technical debate.

Against a group of designers which believes the tab can help in any design problem is ranged another circle of men which insists increasing speeds and weights of aircraft have brought an end to the tab's usefulness.

Here's the basis of the controversy:

Although the work of flying an airplane is done by the control surfaces, the amount of physical effort required of the pilot is regulated directly by the design of a comparatively minute movable area of the surface to which it is attached, and moving in directions and rates differing greatly from that of the surface.

► **Variety**—The tab is a fairly new device in aircraft, yet it has already expanded into a infinite variety of shapes, sizes, applications, purposes and methods of operation (Page 30). This gives the aircraft designer a broad range of solutions to a particular design problem.

But some designers are convinced that the tab has about reached the end of its speed-weight range of usefulness. They base their opinion on the superiority of irreversible, power-driven controls which not only eliminate tabs, but the necessity for control surface balance as well.

► **Pro and Con**—Critics of power-driven controls base their argument on the admittedly serious consequences of power failure. They point out that safety should demand both systems in a given airplane, so the power-driven system is superfluous. The power-driven control advocate counters by saying that the weight-saving possible, together with other savings in manufacturing costs, offset, at least in large degree, the slight reduction in flight safety.

The argument comes into sharp focus now because this is the transitional stage in aviation history during which speeds are leaping from 450 mph. into the supersonic region, and aircraft size is jumping to upwards of 350,000 lb.

► **It All Depends**—As in most technical arguments, particularly those dealing with the optimum range-of-application of a device or system, solutions depend entirely on the assumptions and range-of-conditions selected. The controversy actually lies not in the answers given, but in the values chosen in developing solutions.

A further factor compromising technical appraisals of devices or systems is the well-known gap between theory and design data on the one hand and the finished article on the other. Much of the value of control surface tabs can be lost by manufacturing inaccuracies and loose tolerances in assembly and rigging. But, again, many designers feel that the increased cost of tightening fabrication and assembly tolerances would more than offset any improvement in control system operation.

► **Borrowed**—Like many other basic elements of the airplane (together with much of its terminology), the tab came from the shipbuilding industry and was invented by Flettner, famed German engineer who designed the well-known Flettner rotor-ship.

The "Flettner rudder" was first applied to a European merchant vessel in 1921. It was an instant success and was installed on at least 25 sea-going

ships in the ensuing five years.¹

It is difficult to determine who first applied the Flettner tab to aircraft but the British aircraft industry took the earliest interest in the device and was using it in various forms long before it made its appearance in the U. S.

► **First Use**—A de Havilland DH-10 was fitted experimentally with the device in 1926-27. This was a large, twin-engine bomber powered by two Liberty engines and weighing 8500 lb. fully loaded.² Application of the Flettner tab to this machine was a logical step since it used only a single vertical tail in contrast to the multi-surface empennage generally used on multi-engine aircraft during World War I and the 'twenties.

This experimental application was followed shortly by the first analytical work on the subject in 1928 by K. V. Wright, of the British Advisory Committee for Aeronautics.³ The combination of the success of the experimental tests plus promising wind tunnel results led the British aircraft industry to make wide application of the device, and it appeared the following year on such large flying boats as the Short Calcutta, Short Singapore, Blackburn Iris and Saunders-Roe Valkyrie.⁴

In all of these applications, the tab appeared as a rectangular surface supported aft of the rudder and separated by a gap of approximately one tab chord length.

► **Over Here**—The tab made its first appearance on production airplanes in this country in 1932-33. The Boeing B-9 bomber appeared initially with a tab extending the entire length of the rudder trailing edge. Then, this installation was replaced by a small, rectangular tab mounted aft of the trailing edge, much in the manner of the British installations, except attached directly to the rudder.

The Curtiss Condor transport appeared at this time with tabs on both the elevators and the rudder. These tabs differed from previous installations in that they were inset into the surfaces. This configuration was developed on the basis of wind tunnel tests by Curtiss-Wright which indicated that this arrangement was equally as satisfactory as the trailing tab.⁵

► **Refinement**—Although these tabs were equally useful as balance and trim tabs, the famed Boeing 247 transport, first of the modern, high-speed designs, appeared in 1933 with separate balance and trim tabs. At the same time, small, adjustable trim tabs were used on the Boeing P-26 single-seat fighter. These small, metal surfaces could be bent on the ground only but were highly effective in providing trim in flight.

Tab Control

A graphic example of the remarkable power of the trim tab was the inverted loop performed by an American Airlines DC-4 near Mount Riley, Tex., Oct. 8, 1947. The airplane, as loaded at the time, was slightly tail-heavy, a condition the pilot had balanced out by raising the elevator trim tabs, which depressed the elevator and trimmed the airplane.

The gust lock was engaged without warning, resulting in the elevator being brought to neutral. With the tab up, the airplane immediately went into a climb. The pilot attempted to correct this by applying "nose down" movement of the trim tab wheel in the cabin, which moved the trim tab even farther up and increased the angle of climb even more. At this point, the gust lock was released, freeing the elevator. With the trim tab raised to a steep angle, the elevator was depressed and the airplane executed a half-outside loop before corrections in trim tab and power could be applied.

The tiny trim tabs of the transport, loaded with 48 passengers and crew, actually caused the 73,000-lb. airplane to execute an outside loop.

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The first controllable trim tab in a U. S. fighter plane was on the Consolidated PB-2A two-place escort design, which appeared in 1935. The first balancing tab installation was on the little-known Curtiss XP-31 Swift, which in 1933 used balance tabs on the ailerons and the elevators. The Republic P-35 fighter of 1936 trimmed one aileron and the elevators and rudder; the Curtiss P-36, the following year, trimmed the rudder and elevators.

Boeing also pioneered in the Navy fighter field with adjustable trim tabs on the XF7B-1 of 1933. The Curtiss F11C of that same year provided adjustable trim on the ailerons. The Curtiss XF12C-1 two-seat fighter featured the first Navy controllable trim tabs on its elevators. The Grumman F3F fighter of 1935 introduced controllable trim tabs on its rudder.

Since these pioneering applications, the use of control surface tabs has grown in complexity and importance until by the beginning of World War II it was a universal feature of high-powered aircraft of all types throughout the world.

► **Definitions**—Because of the wide variety of tab forms and arrangements, it is convenient to classify them according to basic function without reference to individual methods of operation or linkage systems:

• **Trim tab**—This is a movable portion

of a control surface used simply to trim the airplane to straight, level flight in such a manner that it may be flown "hands off."

• **Balance tab**—This is a movable portion of a control surface that is linked with the wing or stabilizer in such a manner that it moves in an opposite direction throughout the range of motions of the surface to which it is attached, and serves to reduce the pilot effort required to actuate the control.

• **Servo tab**—This is a movable portion of a control surface which is linked to the cockpit in such a manner that the tab directly controls the airplane through movement of the surface to which it is attached.

There is a wide variety of subdivisions of these main classifications. For example, the trim tab may be adjustable on the ground only or controllable from the cockpit; the balance tab may be made controllable from the cockpit so that it functions both as a trim and a balance tab; a spring link may be inserted in the servo tab in such a manner that it functions both as a balance and a servo tab. And other combinations are used.

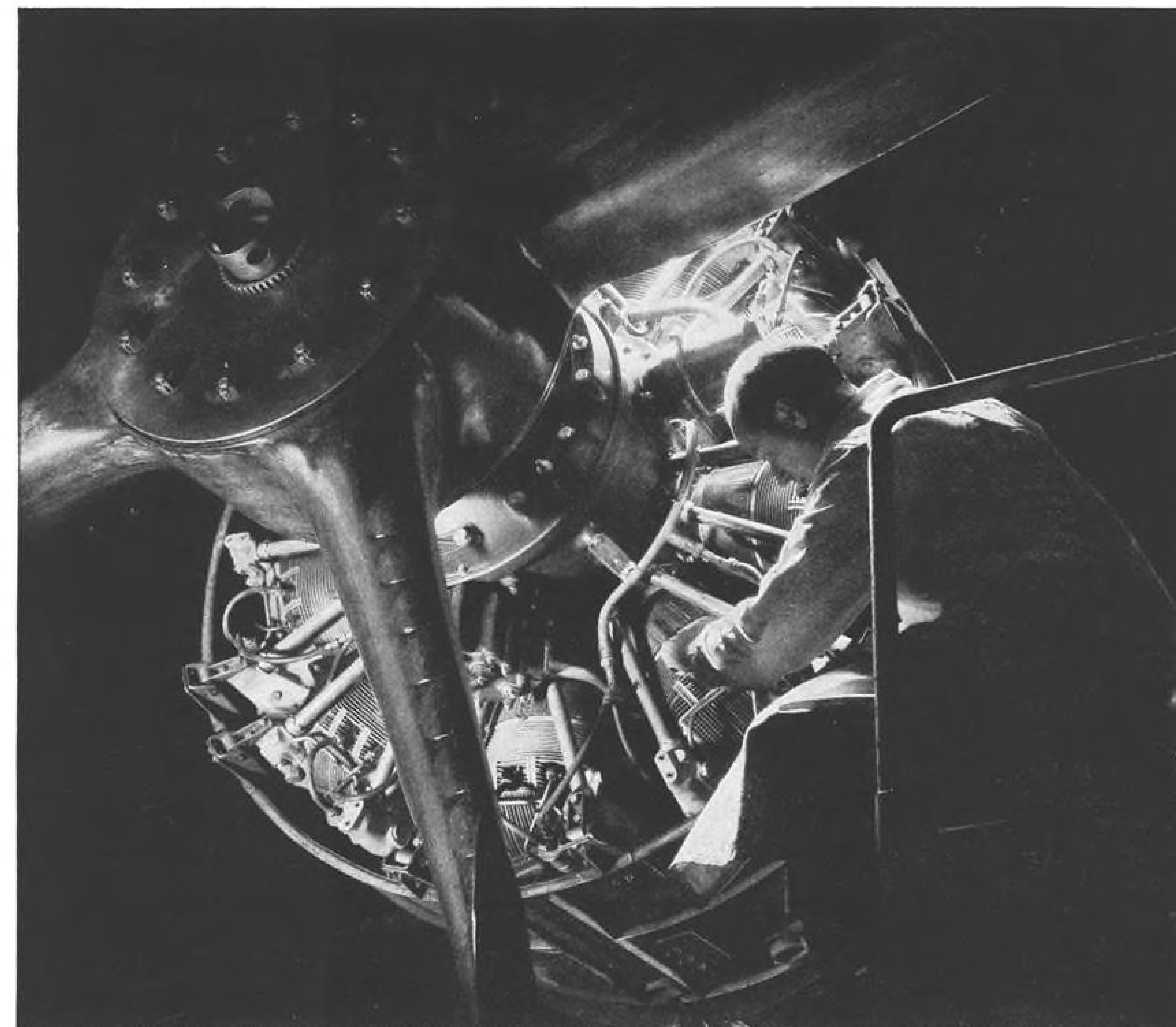
► **Search for Data**—The principal contribution of the Wright Brothers to aviation, it is often claimed, was a means of controlling an airplane in flight. The Langley machine had no control surfaces, other than a vestigial rudder, which later tests proved ineffective. Earlier designs, both powered aircraft and gliders, had either no control means or systems obviously inadequate in power.

A major portion of subsequent aviation history was occupied with research and development of stability and control characteristics. The two qualities are closely interrelated; but of the two, stability is much more amenable to mathematical treatment and, therefore, to rigorous design analysis.

Control has been largely a matter of opinion and it was not until 1943 that qualitative appraisal of aircraft handling characteristics was reduced to the necessary derivatives and coefficients useful to the aerodynamicist.

Following this important reduction of test pilot opinion to actual design data, it became possible for the designer to give a new airplane stability and control characteristics that would insure safe flying qualities without pilot fatigue or discomfort. However, the latter consideration gave rise to a wide variety of opinion. The second important step in the process was to find out how much strength an average pilot had to exert in flying an airplane.

► **Pilot Effort**—Several approaches to this problem have provided important data, but some conflict still remains between military and civil agencies, and



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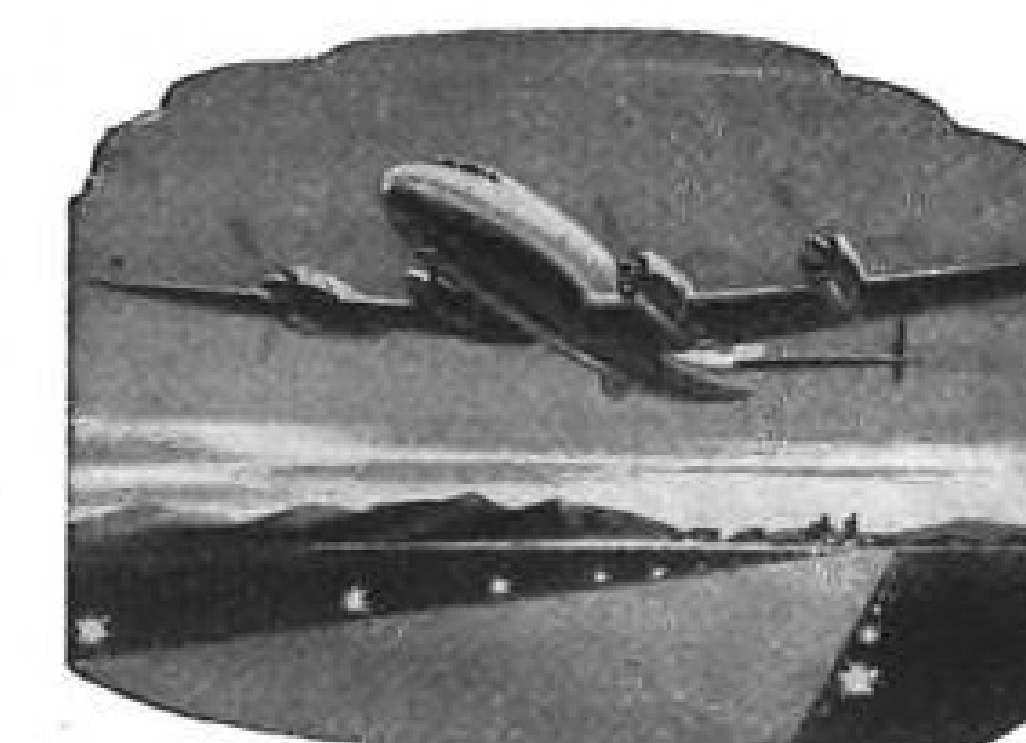
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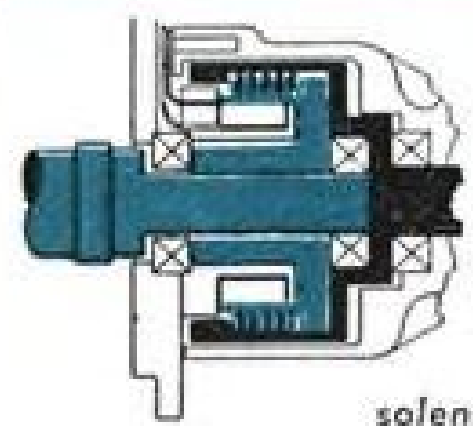



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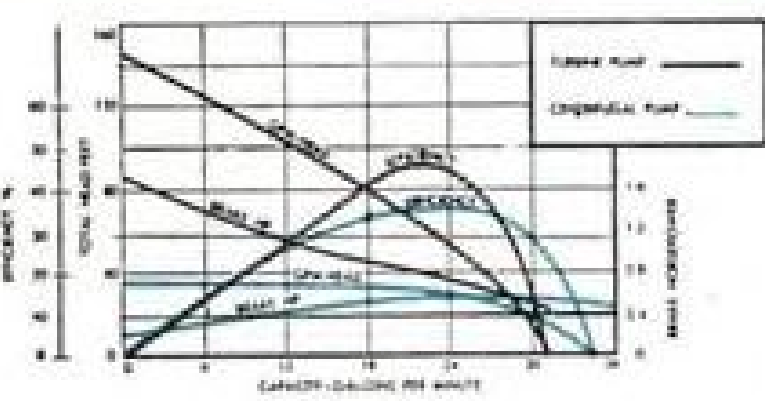


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between the U.S. and British researchers." These data, however, do establish the existence of:

- Greatest control effort of which a pilot is capable.
- Maximum effort reasonable over a short period of time.
- Greatest effort pilot desires to exert over a period of time.

Generally, these three figures diminish by a factor of two in each case: if the first is 100 lb., the second is 50 lb. and the third is 25 lb.

There are rather specific control forces beyond which the pilot feels uncomfortable, actual fatigue and, in the extreme case, inadequate strength to deal with the situation. These are the basic design conditions towards which the engineer works in the layout of the airplane and its control system.

► **Genesis**—There is only one speed at which an airplane will fly without a force being exerted on the control: design cruising speed. Any deviation from this speed will require a pressure on the controls in order to hold the airplane in steady, level flight. A change in the c.g. of the airplane, the power of the engines, etc., requires a change in control forces.

In order to increase the range of c.g. and power conditions over which the airplane would fly "hands off", designers early provided an adjustable stabilizer, the leading edge of which could be raised or lowered through a crank in the cockpit. Slight changes in this stabilizer position balanced out the unbalanced force and reduced the control forces to zero.

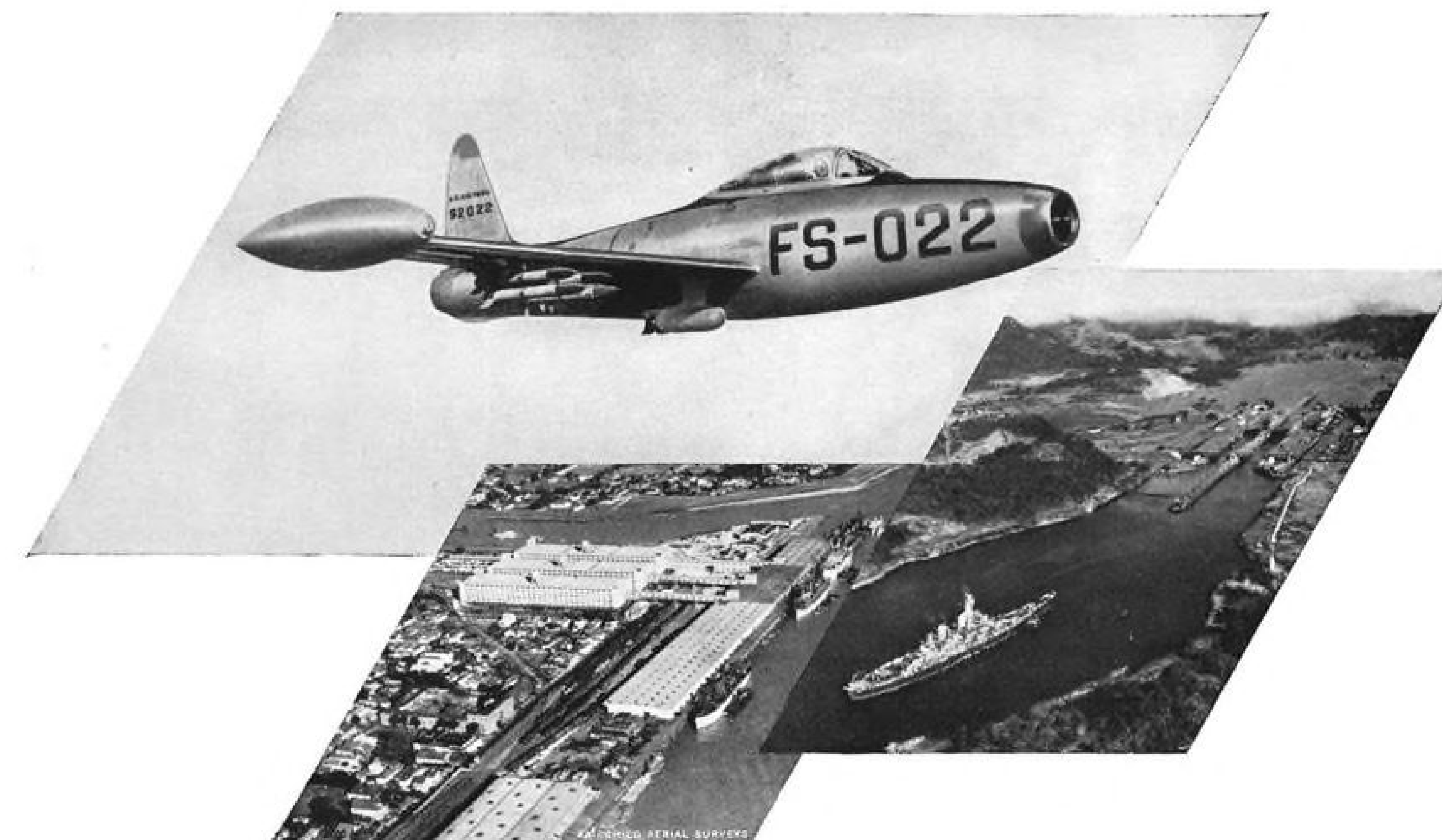
This device, while eminently satisfactory, was structurally complicated and expensive. It was to eliminate the adjustable stabilizer that the trim tab first came into use.

► **What Tab Does**—Assume that the airplane c.g. is slightly aft of its design position, resulting in a slight tail heaviness to the airplane and the necessity for the pilot to hold the stick forward slightly in order to maintain level flight.

The trim tab is a small movable area of the elevator located at maximum-elevator-chord in a spanwise direction. This small area is deflected upward, creating a down-load on the elevator trailing edge.

The product of tab angle, tab area and distance of the centroid of this area from the elevator hinge line is equated to the product of elevator area times centroid of elevator area from the elevator hinge line. When these two products are equal, the total stick force is zero, and the elevator will remain in its slightly down position without further attention from the pilot.

This is the simple principle of the trim tab. This relationship applies to the ailerons and rudder as well as the



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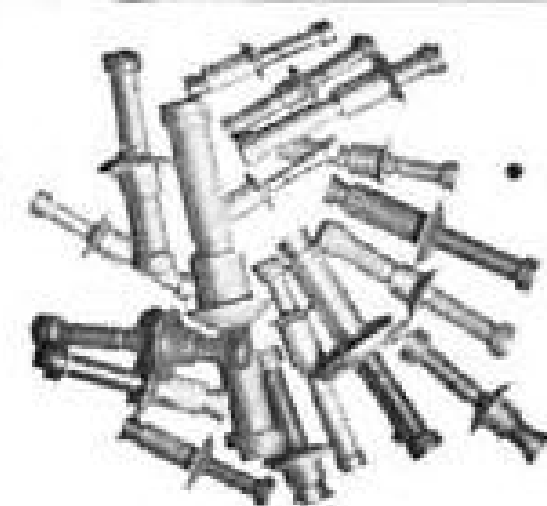
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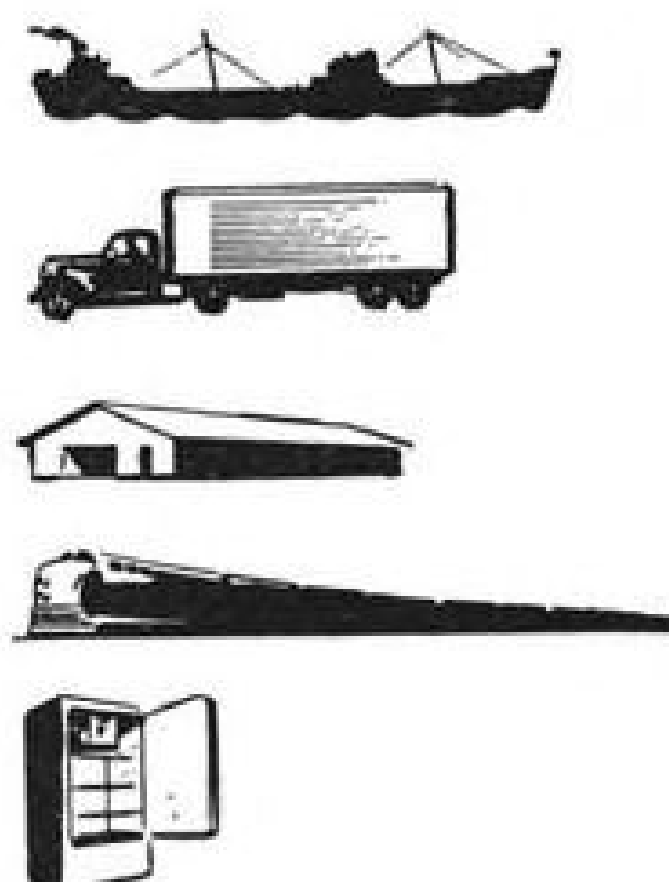
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elevator. Trim tabs equate control forces to zero to trim out any undesirable moments in the airplane. They are irreversible and are used only for aircraft trim.

► **Balance Tab**—In maneuvers, the controls must be manipulated rapidly, so the trim tab cannot be used. Control forces during maneuvers in a given airplane vary with the degree of deflection of the control surface and the velocity of the airplane.

Since it has been shown that there exists a maximum control force which the pilot can exert, it follows that for a given control deflection there also exists a maximum airplane speed beyond which the pilot cannot move the control to the required angle.

To solve this problem, a small hinged section of the control trailing edge is linked to a fitting on the surface to which the control is attached. When the control is displaced, the tab moves in the opposite direction, reducing the control force produced by the control displacement.

Since the degree of displacement of the balance tab is proportional to the degree of displacement of the main surface, the degree of balance increases with control displacement, resulting in substantially reduced stick force per degree control displacement.

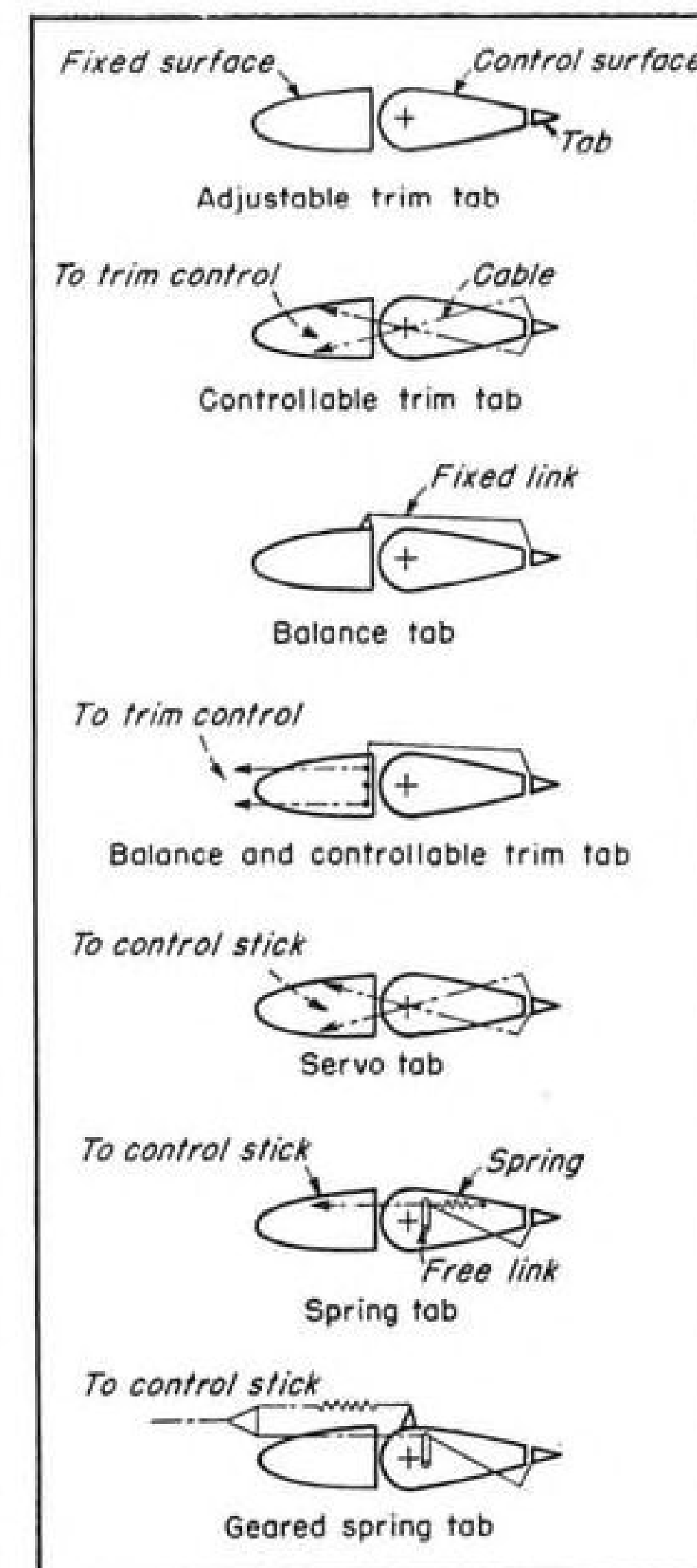
► **Servo Tab**—The original purpose of the Flettner rudder was to control a ship through operation of the rudder tab only, the rudder itself being free to swing. Thus, a small force with a long moment arm is made to do the same amount of work of a large force with a short moment arm.

This principle of the servo tab has been applied to a number of airplanes experimentally, notably in England. But its main drawback is its lack of effectiveness at slow speed.* Tabs are not effective when deflected more than about 20 deg. Since large control surface deflection is required at slow speed, large tab deflection would be required and this deflection is not available.

Another British contribution to tab design was the insertion of a spring into the servotab system.¹⁰ The pilot's control cable is connected to one end of the spring, the other end being fixed to the surface control. The control cable is attached through a link to the tab.

This arrangement overcomes the low-speed difficulty mentioned above since, at low speeds, the spring force is very large compared to the cable force and the surface is moved, in effect, as a plain, manually-controlled surface. At high speeds, where the aerodynamic load is large compared to that of the spring, the arrangement functions, in effect, as a servotab.

An improvement over the spring tab has been made by W. H. Phillips, of the



NACA Langley laboratory, by the addition of a connection between the spring and the control cable that is independent of the servotab linkage.¹¹ Known as a geared spring tab, this arrangement has the advantage of producing a stick force per-G that doesn't vary with airspeed. It also overcomes the poor low-speed characteristics of the servotab.

► **Balance Problem**—Although tabs provide the most effective means of balancing deflected control surfaces, the problem exists of control surface balance in neutral (i.e., when the tab is aligned with the surface). Static balance is usually achieved by the addition of lead weights bolted in the surface leading edge forward of the hinge line.

Dynamic balance may be obtained in a wide variety of ways. However, balance has become increasingly critical with the increase in size and speed of aircraft. In the case of jet fighters and large bombers and transports the balance becomes exceedingly fine.

► **Manufacturing Variations**—Such delicate balance poses one of the major manufacturing problems since it is well-known that two aircraft delivered in sequence from the same production line often have widely different control characteristics due to slight manufacturing variations.

These differences result in lengthy and expensive changes in hinges, control surface leading edge profiles or even such crude but effective methods as interchanging surfaces until the "right" combination is attained at random. This same difficulty is experienced in replacing a damaged aileron or elevator with a new one.

And this problem cannot be solved economically simply by the tightening of manufacturing tolerances. Aircraft control surfaces cannot be built with any kind of economy under mass-production methods with the precision of a fine watch. It is in effectively "masking" these errors that spring servotabs have an important application, since they reduce the necessity for dynamic balance appreciably. In the case of powered-operated servotabs, they render any form of balance unnecessary.

► **Control Requirements**—Flying qualities requirements state that the elevator control should be sufficiently powerful to hold the airplane off the ground in an attitude permitting a fully stalled landing with an elevator pull force not to exceed 50 lb.

Critical aileron requirement is that at every speed below 80 percent of maximum level flight speed it should be possible to obtain a value of $pb/2V$ (p, maximum rolling velocity in radians per second; b, wing span; and V, true airspeed in feet per second) of 0.07 with a wheel force of not more than 80 lb. and a stick force of not more than 30 lb.

Critical rudder requirement is that at all speeds above 1.4 V_s (stalling speed) the rudder shall be powerful enough to provide equilibrium of yawing moments in multi-engine aircraft with one engine out and the remaining engines developing full rated power with pedal force of not more than 180 lb.

► **When Trim Tabs Needed**—Trim tabs are essential when the airplane design does not meet these control force requirements. However, trim tab design is a simple and straight-forward procedure. In fact, trim tabs were in use several years before any extensive mathematical treatment of their characteristics was available. Tests have proved that trim tab aspect ratio is comparatively unimportant, since the ratio of tab chord to surface chord is of only minor importance.

Although the best spanwise location for an aileron trim tab is at the tip, this presents structural difficulties and the next best location—at the aileron root—is usually chosen. Midspan aileron trim tabs are of less effectiveness. Trim tabs are most effective at very small angles of deflection, their effectiveness decreasing to about 20 deg., after which their effectiveness is largely lost.

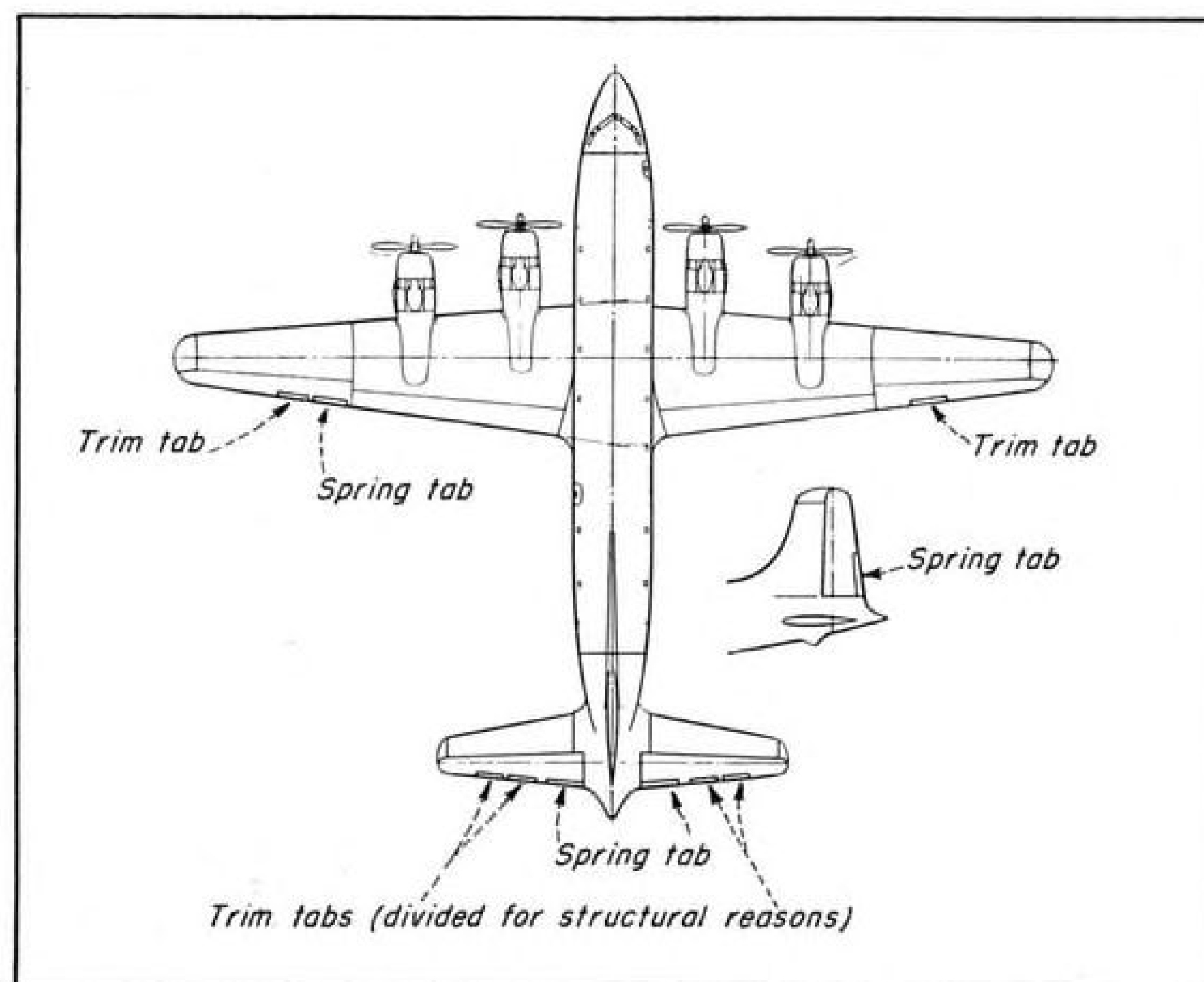
A trim tab should have a ratio of tab area to surface area of 5-10 percent,¹² a

chord of 10-20 percent and an aspect ratio of 5-10. To provide fine adjustments, the gear ratio between cockpit trim tab wheel and tab displacement in degrees should be fairly large. Because trim tabs must be irreversible, great care should be taken to prevent backlash, which can be prevented by the use of a fine thread on the tab operating drum.

► **Balance Tab Data**—Balancing tabs have the inherent characteristic of reducing the effectiveness of a control surface to which they are attached (due to their movement in a direction opposite to that of the surface). For this reason, a control surface must have a greater chord, span or maximum deflection in order to obtain the same lift effectiveness.²³

As in the case of the trim tab, the minimum-chord balance tab that can be used with any chord control surface is limited by the condition that the tab should not be deflected beyond its 20 deg. effective range.

One of the principal advantages of the balance tab is the fact that final modifications in the characteristics of the system, as indicated desirable by flight tests, can be made by altering the rate of tab deflection through shortening or lengthening the link arm. The general requirements of size and shape given above for the trim tab are applicable to the balance tab.



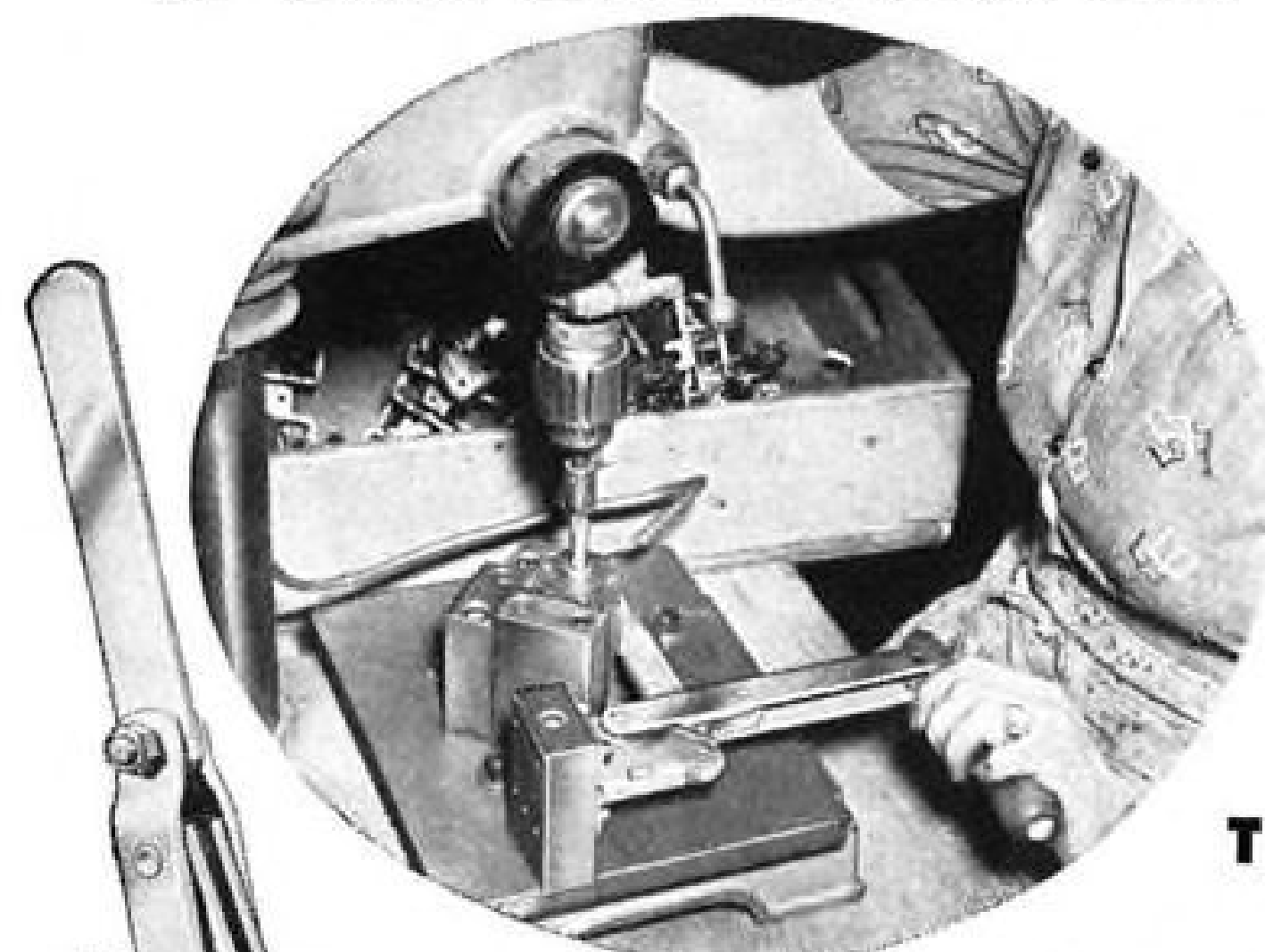
TABS now come in all sizes and shapes, and for all purposes.

► **Tab Gap**—Gaps at tab hinges reduce the tab effectiveness and the reduction resulting from tab gap is so large as to make an extremely narrow gap or even tab seals advisable. Tab effectiveness is sensitive to geometry and surface con-

ditions, and is reduced by increasing the trailing edge angle, roughness of the surface to which it is attached, or any turbulence which tends to increase the boundary layer thickness near the trailing edge. (Cont'd. on p. 33)

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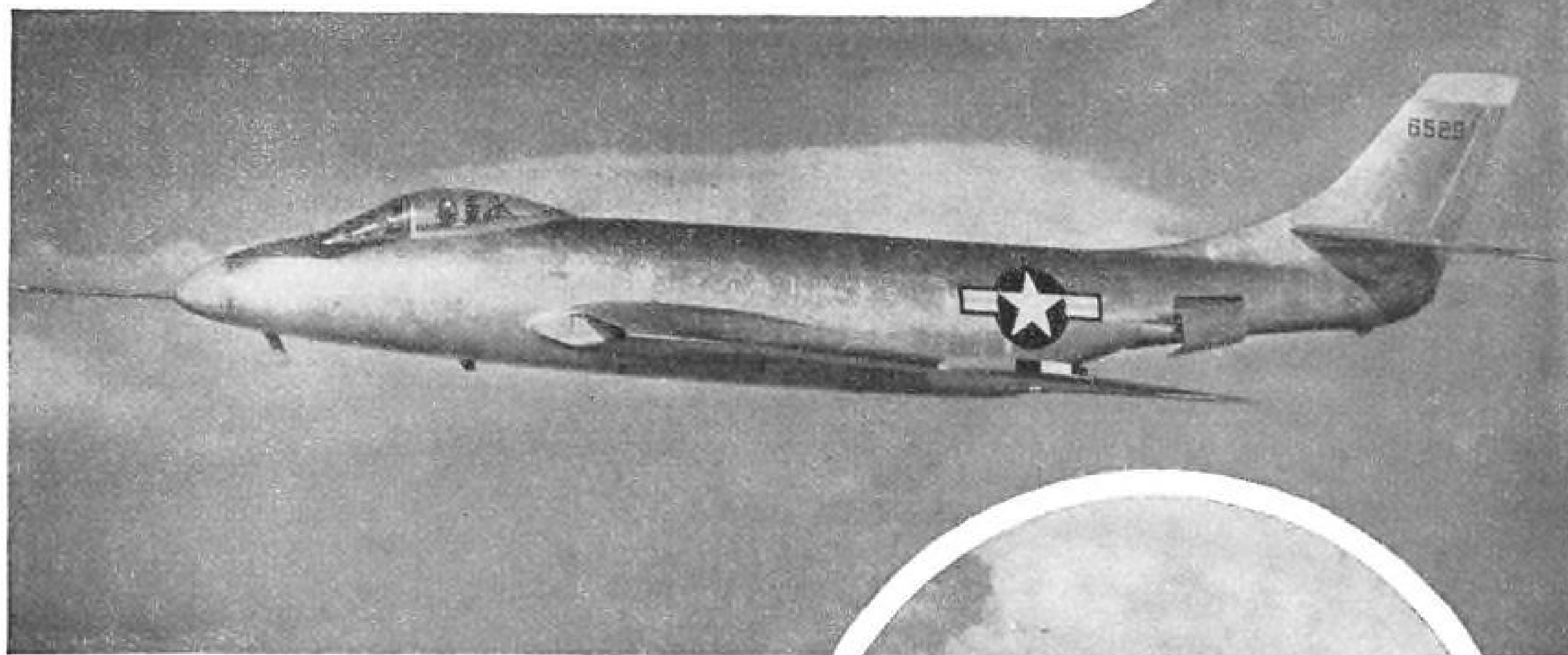
RIGHT—Propelled by an engine without moving parts, tracked by radar, piloted by remote control, Martin Gorgon IVs (built for Navy propulsion research) have made the longest flights ever achieved by pilotless aircraft powered with ram-jet engines.

LEFT—Viking rockets, another product of Navy-Martin teamwork, will soon go up in the vicinity of 200 miles into the ionosphere and telemeter invaluable information back to the ground for future research. These amazing rockets will go many miles beyond the V-2, reach a maximum speed of 8,000 ft. per second.

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► **Spring Tab Use**—The spring tab actually qualifies as a form of control surface boost and is often compared to power-boosted control systems. By the use of spring tabs, satisfactory control force characteristics may be obtained over a large center-of-gravity range on airplanes varying in weight from about 16,000 lb. to 500,000 lb. or more.

It is theoretically possible to provide a value of stick-force gradient in maneuvers that does not vary with speed, no matter what spring stiffness is used. If the geared spring tab is used in conjunction with a control surface that has zero variation of hinge moment with angle of attack, the force-per-G may be made independent of speed at any center-of-gravity location.¹⁰

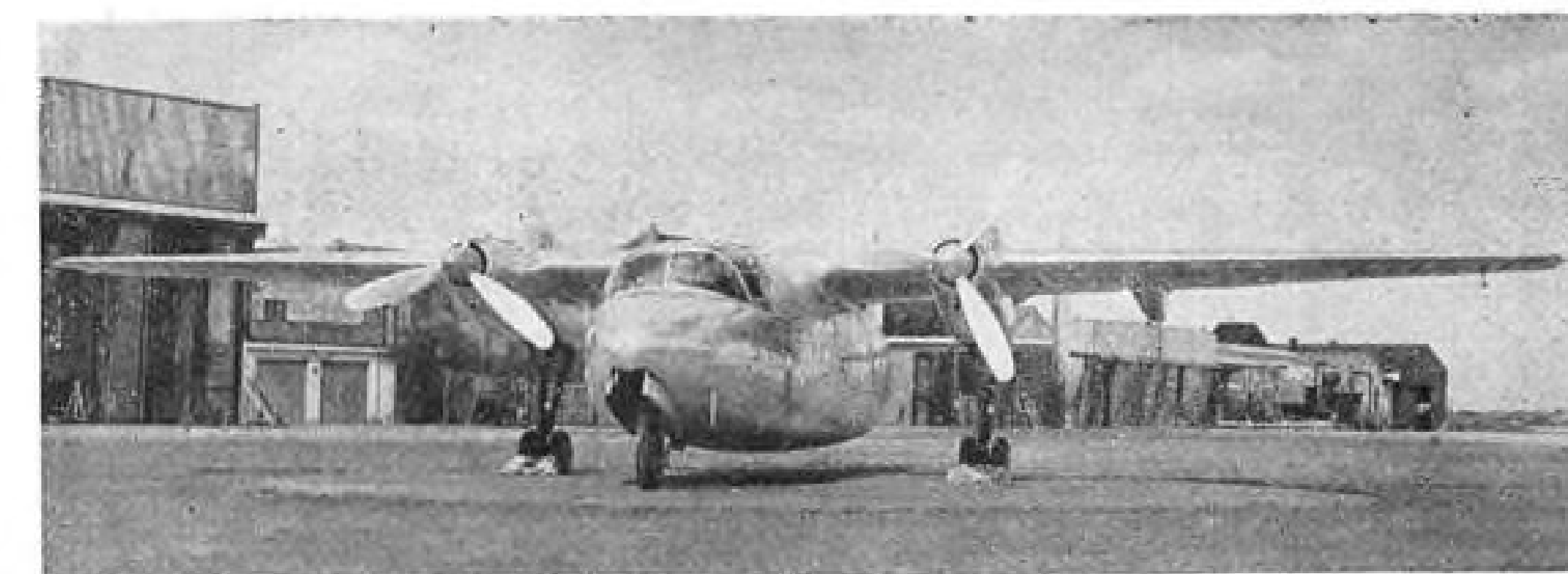
As a result of the smaller increase in control force, with airspeed, of spring tab, the rolling velocity obtainable with a given control force may continue to increase with increasing airspeeds.¹⁰ Therefore, the principal design difficulties introduced by the spring tab involve the provision of adequate structural strength to withstand these increased rolling velocities at high speeds.

Although the use of spring tabs may allow large deflections at high speeds, any danger of overbalance because of compressibility effects or surface-covering distortion can be reduced because the control surfaces need not be closely balanced.

► **Preloaded Spring**—If the spring in a spring tab is preloaded and any tab movement is thus prevented until a certain control force is exceeded, the control-force characteristics for forces below the preload are the same as those for a control surface without a tab. Also, at forces above the preload the variation of force with deflection is the same as that for a spring tab without preload. Thus, preload is an effective remedy for the ineffectiveness of spring loaded controls at low speeds.

An interesting application of the device is the use of a leading, or unbalancing tab, which has been proposed for fast jet fighters (notably by Republic Aviation). The advantage of this system is that at low airspeeds it may give greater control surface effectiveness per degree surface deflection than a surface without a tab.

One of the design problems with spring tabs is the fact that although the tab decreases the hinge-moment coefficient of the control surface for a given value of lift coefficient increment, it accomplishes this at the cost of an increase in required stick deflection.¹¹ This is because more control surface deflection must be produced to compensate for the loss of lift created by deflection of the tab, and because part of the available stick travel is required to compress the spring.



Short-Haul Turboprop Transport

Accenting the theory that air travelers will place a premium on reduced noise and vibration, Britain recently has flown its third turboprop-powered transport, the Handley Page Marathon. Incorporating two Armstrong Siddeley Mamba engines, each developing slightly more than 1000 hp. and 300 lb. thrust, the craft further emphasizes quiet operation by having its wing completely sealed from the fuselage.

► **Performance Data**—The new transport is designed to cruise at 260 mph. at 10,000 ft.

Takeoff run is estimated at 2100 ft. Rate of climb is 2100 fpm., and with one engine out will be 600 fpm. Maximum still air range is set at 900 mi.; normal still air range, 700 mi.

► **Seating, Haulage**—Maximum seating capacity is 22. With full complement of passengers and approximately 1000 lb. of freight, range will be 500 mi.

With 18 passengers and 540 lb. of baggage, distance will be 770 mi.

Used as a freighter, the craft would haul almost 5500 lb. for 500 mi., and for the 770-mi. trip, close to 4400 lb.

► **Cabin Details**—While estimated service ceiling of the Mamba Marathon is 35,000 ft. (16,000 ft. on one engine), it is not expected that the craft normally will be used for high-altitude operation. However, provisions have been made for the fuselage to take a

pressure differential of 2½ psi.

The design stresses visibility from the cockpit. Forward vision to the ground exceeds 15 ft. and scanning sweep is better than 200 deg.

Passenger cabin is 18 ft. long, 7½ ft. wide and approximately 6 ft. high.

► **Thin Wing**—The craft's general configuration is clean. Because a thin wing is employed it cannot accommodate the tailpipe from the turbine. This necessitates leading the jet stream through a duct above the airfoil.

Another unusual bulge in contour is on the wing undersurface, outboard of each nacelle. This houses the flap mechanism.

► **Production Economy**—The Mamba-powered Marathon is basically similar to its piston powered predecessor, except for the engine installations.

This allows the same jigs and tooling to be used for both craft and will mean substantial production economies should the turboprop version be ordered by the airlines.

► **Turboprop Lead**—The Mamba Marathon and other turboprop transports—Hermes V. Viscount and Apollo—highlight a situation unique in aeronautics, for no other country is known to be producing this type of airliner.

This gives Britain a distinct edge in the transport field, one that should pay dividends in foreign markets.

Despite this increase in required deflection the pilot can attain deflections that he would not otherwise have the strength to achieve. Full stick deflection for full control deflection may be obtained in a given airplane to which a spring tab is applied by simply reducing the mechanical advantage of the stick. This will, of course, result in an increase in stick force for any given operating condition.

► **Spring Tab Flutter**—One of the major problems posed by spring tabs is their susceptibility to flutter.¹² This condition may be avoided in two ways, either used separately or in combination: (1) increase the stiffness strength of the tab, or (2) provide tab mass balance.

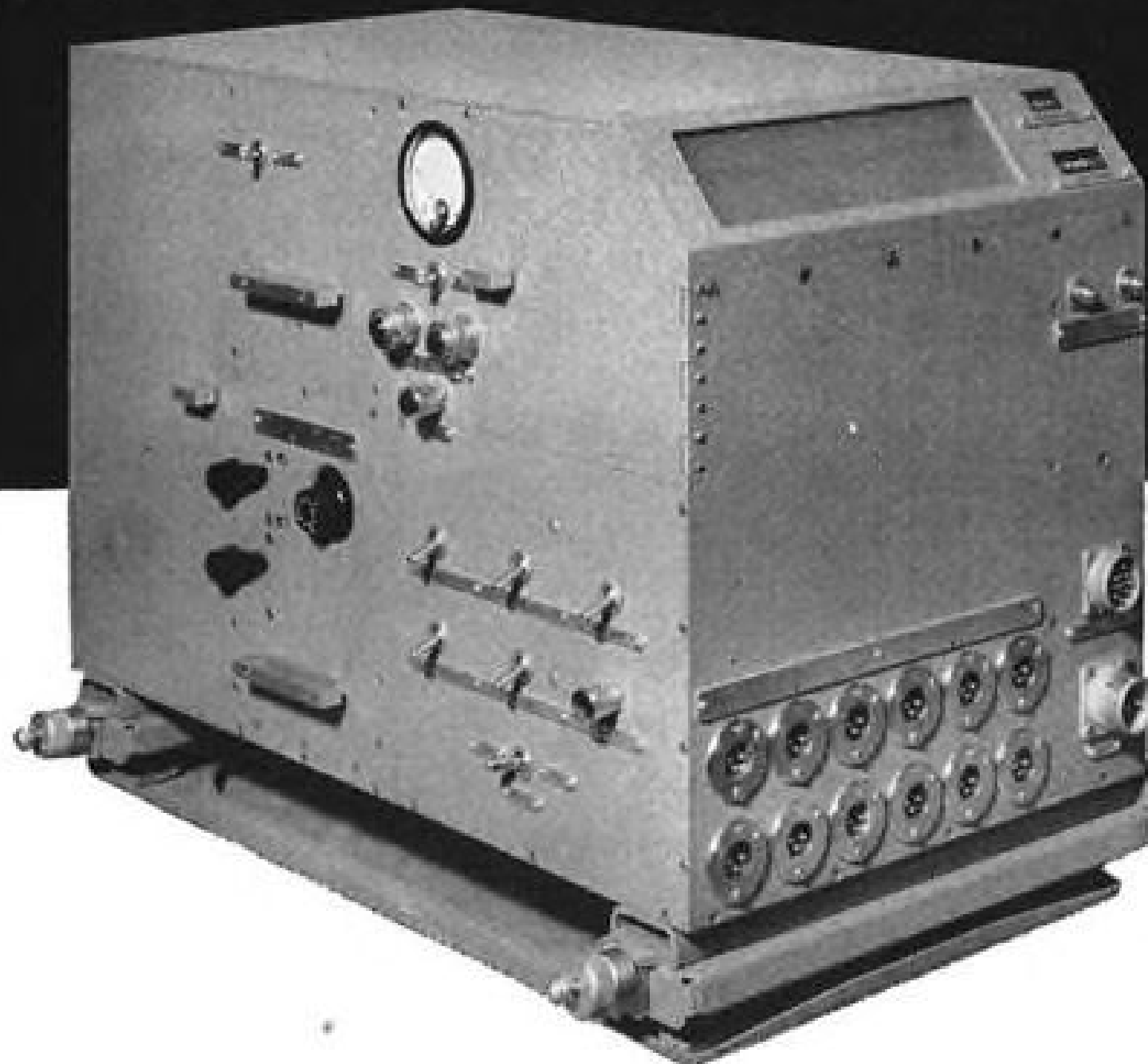
Increasing the strength of the tab simply adds weight to the airplane. Mass balance also adds weight but could, in addition to aerodynamic balance, still further reduce the control forces on the tab-control surface combination.¹³ Although tabs with sealed internal balances did not have substantially improved characteristics, ordinary nose overhang balance has indicated an effective means of reducing the control forces on spring tab-control surface combinations.

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Stops "Dutch Roll"

A system which automatically prevents "Dutch roll"—sidewise oscillation of the tail caused by gusts and eddies in the air—on the XB-47 Stratojet is reported to have been developed by Boeing Airplane Co., Seattle, Wash.

The system is designed to move the rudder either left or right to counter-balance the effect of a side gust on the tail the instant it occurs.

It consists primarily of a rate-of-change gyro from an E-6 auto pilot, a turbosupercharger amplifier and a turbo waste-gate motor which is connected to a rudder push-pull rod.

When the Stratojet's tail starts to yaw, the gyro puts out current signals which are built-up by the amplifier to actuate the small turbo motor. The motor is operated to shorten or lengthen the push-pull rod, moving the rudder a maximum of five degrees to the right or left.

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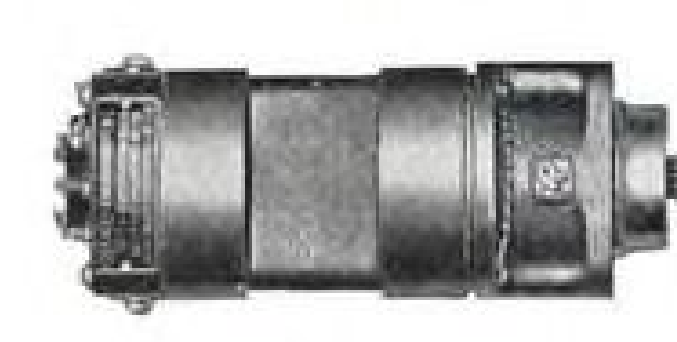
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Cost Estimates for B-36 Program

	Airframe	Gov. Furnished Property	Total	Unit Cost
Original 95 B-36 fiscal year '42-'47 funds...	\$224,855,380	\$220,921,847	\$445,777,227	\$4,692,392
Subsequent modification from fiscal '49 ('48 supplementary funds)	41,936,479	105,911,521	147,848,000	1,556,294
Subtotal for 95 B-36s...	\$266,791,859	\$326,833,368	\$593,625,227	\$6,248,686
75 B-36s from fiscal '49 ('48 supplementary funds)	130,039,200	224,931,290	354,970,490	4,732,939
Total	\$396,831,059	\$551,764,658	\$948,595,717	
Cost of design			435,623	
Cost of experimental models			39,475,234	
Total estimated cost			\$988,506,574	

Summary of Termination Costs (Fiscal Year 1947-1949)

Termination costs	
Senior Officers Board (Dec. '48-Jan. '49).....	\$16,497,637
Senior Officers Board (Feb.-Mar. '49).....	\$22,862,185
Losses from Fiscal Year 1948 and Prior Funds	
B-54	\$8,822,122
YB-50C	6,526,000
F-87	1,161,928
R-12A	143,828
	16,653,878
Total	\$56,013,700

What the B-36 Is Costing USAF

Comptroller gives breakdown for original and repeat order, and shows financial effect of cancellations.

By Robert Hotz

Revised figures on U.S. Air Force contract cancellations show the shift of approximately \$573 million in aircraft contracts during the past nine months cost the government \$56,013,700.

These figures, as compiled by Lieut. Gen. Edward Rawlings, USAF comptroller, list the following payments tentatively scheduled to the companies whose contracts were cancelled or shifted:

- North American Aviation, Inc., \$15,667,943 out of contracts covering \$192,230,000. This covers cancellations of contracts for 50 B-45C jet bombers and 116 F-93A jet fighters.

USAF retained a contract for North American to build two YF-93A prototypes at a cost of \$10,168,443. North American is now scheduled to get \$5,095,145 for settlement of the B-45 contract in contrast to \$12 million originally estimated by USAF. The F-93 contract settlement will cost \$464,355 in contrast to an original estimate of \$6,631,557. This leaves \$6,904,855 now available for new procurement from the B-45 settlement reserve and another \$6,367,202 from the F-93 reserve.

- Boeing Airplane Co., \$13,062,878 out of contracts totaling \$202,937,000. This is for the airframe contract for 43 B-54 VDT-powered bombers. Another \$9,799,307 will be required to

settle contracts for government-furnished parts to be used on the B-54s. Cost of terminating all B-54 contracts totals \$22,862,185, leaving a balance of \$137,815 out of the \$23 million reserve originally set aside for cancellation costs. Also chargeable to B-54 cancellation costs are \$15,348,000 from fiscal 1948 funds allocated for a YB-50C and B-54 prototype development. Boeing also received a \$54,477,000 contract for an additional five B-47 bombers which will require about \$5 million in electronics equipment.

- Northrop Aircraft, Inc., \$13,923,000 out of original contracts totaling \$112,500,000 for 30 B-49 jet Flying Wings and 30 C-125 trimotor transports. USAF plans to spend \$3,335,982 for a prototype RB-49 jet wing. Cancellation of the B-49 contract will cost \$10 million, with the C-125 contract termination cost now set at \$698,137. This leaves \$1,136,000 of the original reserve set aside for terminating Northrop contracts, available for new procurement.

- Convair, \$240,000 out of an original \$2,500,000 contract for the YT-32A, a bombardier-trainer version of the Convair-Liner.

Also salvaged from the cancellations is \$6,502,200 worth of government-furnished equipment for the cancelled aircraft that can be used in other aircraft now in production.

Curtiss-Wright is scheduled to receive \$1,161,928 in settlement of its cancelled contract for 88 F-87A night fighters, and Bell Aircraft Corp. is earmarked for \$143,828 to cover a cut-back in its R-12A helicopter contract.

Rawlings estimated total cost of the B-36 production program now stands at \$988,506,574 for 169 production models and one XB-36. About \$487 million of this authorized expenditure has been spent on B-36 production to date.

- Boost in Total—Original order of 95 production model B-36 bombers was based on a unit cost of \$4,692,392 per plane, of which nearly half was government-furnished equipment. Modifications of these planes with late model Pratt & Whitney Wasp Major engines, addition of four General Electric J-47 turbojets and the new K-1 radar bombing system will add another \$1,556,294 per plane and boost total unit cost to \$6,248,686.

The second increment of 75 B-36 bombers will cost only \$4,732,939 apiece including all of the equipment added to the original 95 planes. Write-off of production tooling on the original order is largely responsible for the reduced unit cost.

Original intercontinental bomber design competition won by the B-36 in 1941 cost the Air Force \$435,623 of which \$300,168 was paid to Boeing for

its unsuccessful design and \$135,455 to Convair for the B-36 design.

On the total B-36 production program, Convair will receive an estimated \$396,831,059 or about 41.8 percent of the total funds being spent for B-36 production. Government-furnished equipment including engines, electronics, flight instruments and controls will cost \$551,764,658.

PRODUCTION BRIEFING

► **Ryan Aeronautical Co.** has received a new \$1 million Air Force contract to continue development and fabrication of additional XQ-2 remote-controlled jet-powered aerial target planes. Previous contract, signed more than a year ago, was for about \$2 million.

► **Fairchild Aircraft Ltd.**, Montreal, has accepted a \$600,000 offer for sale of the company's building and land in nearby Longueuil. Company spokesman refused to say who made the bid.

► **Standard-Thomson Corp.** is in volume production on its latest model heat exchanger for jet aircraft. In non-aviation field, company is working on a dry ice refrigeration system for railway freight cars.

► **Jamieson Aircraft Co., Inc.** production of the three-place all-metal Jupiter has been delayed two to three weeks due to loss of parts and damage to plant and equipment in the recent hurricane. Plant is located in Deland, Fla. ► **Curtiss-Wright Corp.**, under USAF contract, is conducting research into cause and possible elimination of noise and interference in aircraft radios and electronic devices. Program is expected to extend for more than a year.

► **Northrop Aircraft, Inc.** has given pay increases ranging from \$8.65 to \$10 per month to its nearly-8000 employees at the Hawthorne, Calif., plant. Annual vacation and sick leave will be increased by two days to 96 hours a year for personnel with five years' service. Bonuses of 8 cents an hour will be paid for second- and third-shift craftsmen and office workers.

► **Babb Co. Ltd.** of Canada is moving its Dorval warehouse to St. Johns Municipal Airport, St. Johns, Quebec. Previously, as the first step in consolidating its inventories at one location, Babb moved all Lockheed supplies to St. Johns from Fort Erie, Ontario.

► **William S. Jack**, former head of Jack & Heintz Co., has plans for doing research and prototype work on supersonic aircraft instruments at a 30,000-sq. ft. plant now under construction at Solana Beach, Calif. Jack expects peak production employment to reach 500-600; will continue his policy of "more humanism in management."

Latest Air Force Bid Awards

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

ABSTRACTS

For dolly assemblies (49-1827):
Dayton Aircraft Products, Inc., Dayton, on a bid of \$369,632.90.

For electric drills (49-2073):
Companies sharing—United States Electrical Tool Co., Cincinnati, on a bid of \$1632, and Milwaukee Electric Tool Corp., Milwaukee, on a bid of \$909.60.

For 449 cabinets (49-2188):
Companies sharing—All Steel Equipment, Inc., Aurora, Ill., on a bid of \$6291.04, and Universal Steel Equipment Corp., Long Island City, N. Y., on a bid of \$5866.

For multi-purpose pressure transmitter (50-13):

Bendix Aviation Corp., Teterboro, on a bid of \$161,597.80.

For 55 plates (49-2138):
Companies sharing—J. C. Busch Co., Milwaukee, on a bid of \$472.50, and Herman Stone Co., Dayton, on a bid of \$4281.12.

For lathes (49-2317):
E. A. Kinsey Co., Cincinnati, on a bid of \$53,881.88.

For power cable (49-2131):
Companies sharing—Okonite Co., Chicago, on a bid of \$6179.75; Baitinger Electric Co., Inc., New York, on a bid of \$10,190.08, and Electric Industrial Equipment & Supply Corp., Baltimore, on a bid of \$2576.90.

For 3925 shipping cases (49-1008):
Duro Bullt Mfg. Co., Aurora, Ill., on a bid of \$230,593.75.

Invitations to Bid

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

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

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

Current bid proposals:

Cycle analyzer, 9 each, bid invitation No. 50-65, issue date Aug. 29, delivery 45 days.

Tester assembly, 75 each, bid invitation No. 50-66, issue date Aug. 29, delivery 45 days.

Test stand, 2 each, bid invitation No. 50-67, issue date Aug. 29, delivery 45 days.

Hydraulic gaskets, packing, 1-18 items, bid invitation No. 50-63, issue date Aug. 29, delivery 60 days.

Life Preserver, 300 each, bid invitation No. 50-72, issue date, Aug. 29, delivery 60 days.

Relay assemblies, 300 each, bid invitation

No. 50-73, issue Aug. 29, delivery 60 days.
Tester assembly, 7 each, bid invitation No. 50-74, issue date Aug. 29, delivery 75 days.

Curtiss drain cock, 6500 each, bid invitation No. 50-76, issue date Aug. 29, delivery 60 days.

Photographic equipment, 1-92 items, bid invitation No. 50-79, issue date Aug. 30, delivery by Oct. 31, 1949.

Telephoto lens, 10 each, bid invitation No. 50-80, issue date Aug. 30, delivery Sept. 30, 1949.

Tester Assemblies, 3 each, bid invitation No. 50-99, issue date Sept. 7, delivery 60 days.

Photographic Equipment, 1-12 items, bid invitation No. 50-94, issue date Sept. 6, delivery by Feb. 1950.

Meters, 1-2 items, bid invitation No. 50-103, issue date Sept. 6, delivery 30 days.

Spray Paint Booth, 1-2 items, bid invitation No. 50-105, issue date Sept. 6, delivery 30 days.

Voltammeter, 1-2 items, bid invitation No. 50-104, issue date Sept. 6, delivery 30 days.

\$100-NSL Machine, 12 each, bid invitation No. 50-98, issue date Sept. 7, delivery 60 days.

Tester Assemblies, 1-3 items, bid invitation No. 50-95, issue date Sept. 7, delivery 45 days.

Positioner, 17 each, bid invitation No. 50-100, issue date Sept. 7, delivery 30 days.

Spark Plug Cleaner, Cabinet, 1-2 items, bid invitation No. 50-97, issue date Sept. 6, delivery 30 days.

Grinders, 2 each, bid invitation No. 50-101, issue date Sept. 7, delivery 30 days.

Tow Target, 1-2 items, bid invitation No. 50-88, issue date Sept. 6, delivery by Nov. 1, 1949.

Air Compressor, 4 each, bid invitation No. 50-92, issue date Sept. 6, delivery 30 days.

Vapor Degreaser, 6 each, bid invitation No. 50-93, issue date Sept. 6, delivery 30 days.

Scale, 22 each, bid invitation No. 50-90, issue date Sept. 6, delivery 30 days.

Tester, 5 each, bid invitation No. 50-91, issue date Sept. 6, delivery 45 days.

Tube, 1-2 items, bid invitation No. 50-89, issue date Sept. 6, delivery fifty percent within 45 days, balance within 60 days.

Cameras, 1-2 items, bid invitation No. 50-86, issue date Sept. 6, delivery by Nov. 30, 1949.

Enlarger, 10 each, bid invitation No. 50-87, issue date Sept. 6, delivery by Dec. 1949.

Stand Assemblies, 5 each, bid invitation No. 50-82, issue date Aug. 31, delivery 60 days.

Brake-Sheet, 5 each, bid invitation No. 50-85, issue date Sept. 6, delivery 2 units within 90 days, balance within 30 days thereafter.

Stand Assemblies, 10 each, bid invitation No. 50-81, issue date Aug. 31, delivery 75 days.

Naval Aviation Awards

Navy department has announced award of contracts for the following aviation items:

For Engines, Model R-4360-53:
United Aircraft Corp., Pratt & Whitney Aircraft division, East Hartford, Conn., \$29,192,000.

For development, design and manufacture of automatic & hand electric steering control:
Sperry Gyroscope Co., Great Neck, N. Y., \$200,000.

For replacement parts for navigation receivers, frequency selectors, etc.:
Collins Radio Co., Cedar Rapids, Ia., \$62,762.20.

For checkout & test of electronic equipment in one government-owned model PO-1W aircraft:
Lockheed Aircraft Corp., Burbank, \$243,483.



By *Major Al Williams*, ALIAS, "TATTERED WING TIPS,"
Manager, Gulf Aviation Department, Gulf Bldg., Pittsburgh 30, Pa.

You could casually mention, for instance, that the reason Gulfpride Aviation—Series D—is the world's finest detergent dispersant oil for horizontally opposed engines is because it's the only lightplane engine oil that's Alchlor-processed. (That's an extra refining step that gets extra nonlubricating impurities out of the oil.)

Or you might point out that Gulfpride Aviation—Series D—frees stuck rings and valves and keeps them free longer. And that it's raised overhaul periods by hundreds of hours.

Or talk to the hangar gang about how Gulfpride Aviation—Series D—is a detergent dispersant oil which cleans inside engine surfaces and holds the dirt in suspension until an oil drain.

ters-and-bank-note-ink commissions as Perch Pilot (bottom rung) for Little Known Facts!



So if anyone whispers, "S-s-st! Want to hear a Little Known Fact, etc., etc.," make him show you his commission. If he hasn't got it, he's an imposter and should be shot, stabbed, kicked, beaten, and snubbed.

But that doesn't go for W. F. Bennett, Manager of Chatham Flying Services, Chatham, Mass. Because he sent the following Fact (including proof!), and his commission's on the way:

"The fuel load for one hour of full-power operation of the XS-1 would amount to 42 tons!"

Okay. How about one from you?
Address above.

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



GULF AVIATION PRODUCTS

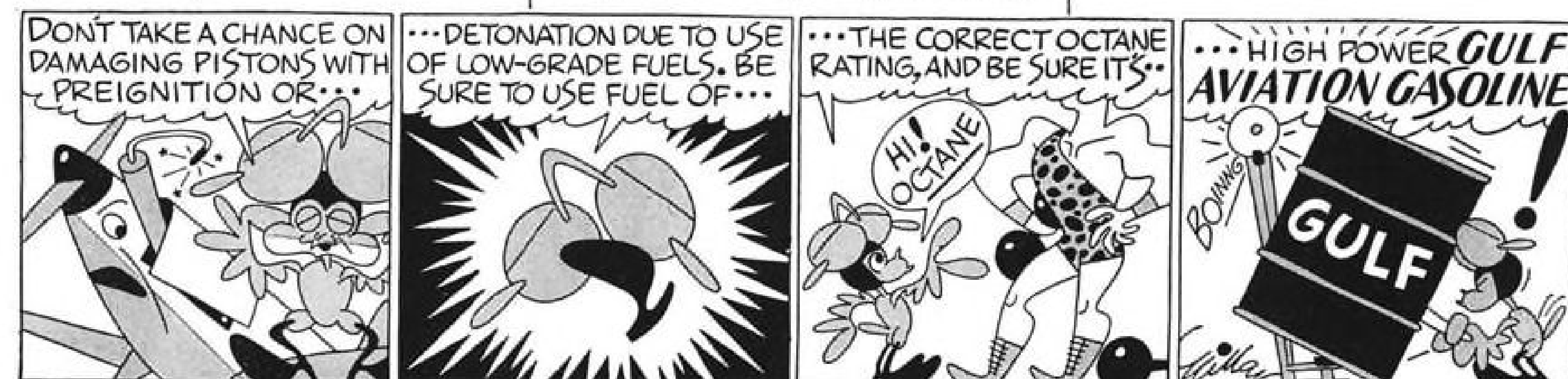
Of course, if you can combine this expert talk with expert flying... then, by golly, you are an expert!

And you don't have to convince nobody of nothing!

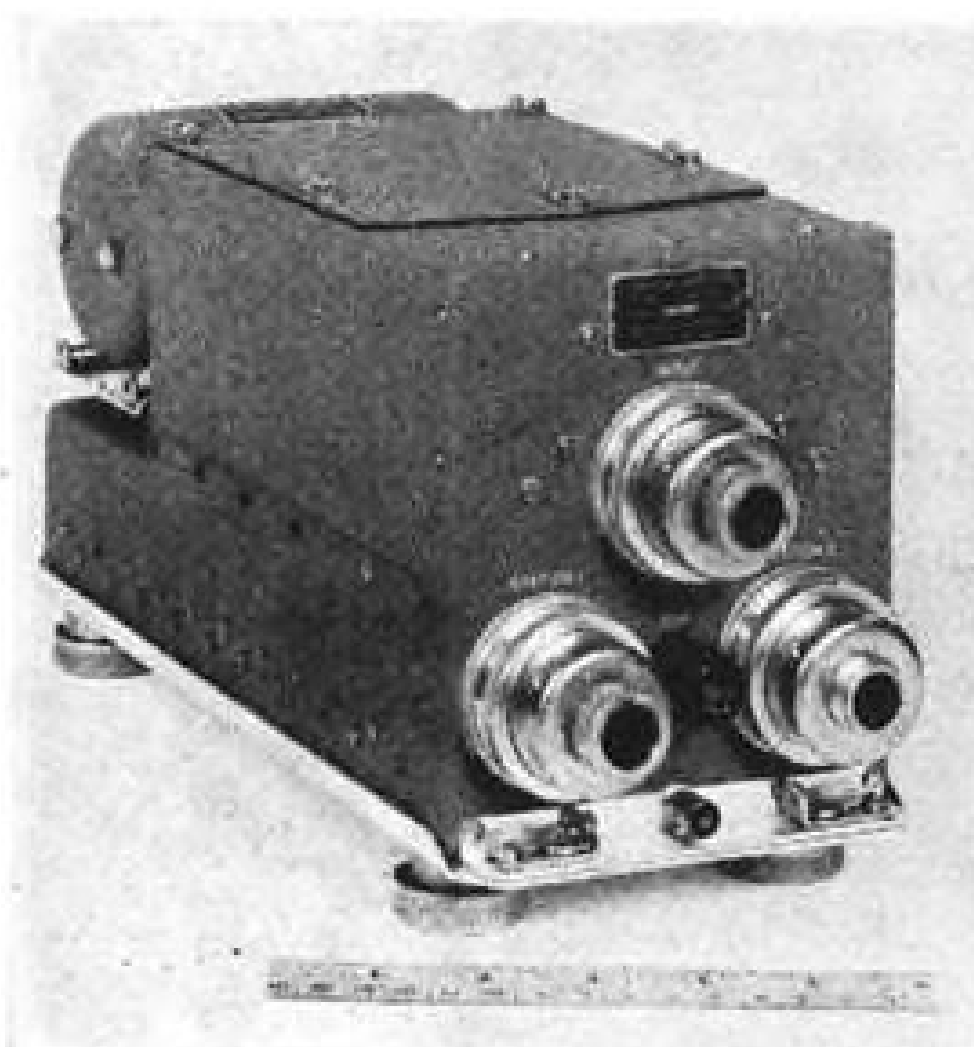
LITTLE KNOWN FACTS DEPT.

No Little Known Fact About Well Known Planes is official until it appears on this page!

What's more, no other page gives genuine, looks-like-engraving, curlicue-let-



NEW AVIATION PRODUCTS



Communication Aid

CAA-approved F-11 isolation amplifier, developed by Aircraft Radio Corp., Boonton, N. J., is designed to permit operation of communication equipment by pilot and copilot without interference from each other.

It enables pilot and copilot to select any combination of 10 receivers, side-tone, interphones, etc., with complete independence of the other's choice. It also provides loud speaker operation to both.

Company states no interference exists between the two channels regardless of signals selected by either pilot. Unit weighs 8.3 lb. and is approved under certificate 1R4-1.



Pullers and Wrenches

Redesign of five "Proto" puller parts and addition of two new units is announced by Plomb Tool Co., 2209 Santa Fe Ave., Los Angeles 54, Calif.

Three screws, for wheel and heavy- and medium-duty pullers, have detachable non-rotating tips. Dowel connection holds tip on screw and keeps it properly aligned.

Heavy-duty, 3/4-in.-drive stud puller

is adaptable for power tool use. Diameter and turning radius have been shortened and weight reduced from 4 1/2 to 2 1/2 lb.

Blind bearing puller has tapered, expanding end to give smoother operation.

New parts are 12 3/4 in. short rod, 4056RS, designed to permit use of slide hammer puller in close places; and narrow puller jaw, 4027, for medium-duty pullers. Latter gets into tight places and can be used for removing wheels, gears, etc., which have cut-out sections for inserting narrow jaws.



No-Flutter Antenna

Diapole antenna developed by National Aeronautical Corp., Wings Field, Ambler, Pa., for use with Narco omnirange unit, is aerodynamically stabilized to prevent flutter.

Company states that after series of comparative tests, tapered, stainless steel rods were selected because of their resistance to breakage during icing conditions.

The mast and pedestal are constructed of cast aluminum.

Cuts Heavy Cable

Portable, hand-operated cable cutter, offered by Beverly Shear Mfg. Co., 3001 W. 111th St., Chicago, Ill., is designed to impart slicing, rather than pinching action to assure sharp, clean cuts on steel cable at one stroke. Unit also is stated to be particularly adapted to cutting hollow core material, steel reinforced rubber hose, heavy electrical cable, and conduit.

Cable is inserted between blades and spring-tensioned hold-down arm with V-block then is pushed down to firmly secure cable for cutting. Company claims unit easily cuts heaviest cable because of double link which compounds downstroke force. Blades are adjustable to compensate for wear and resharping.

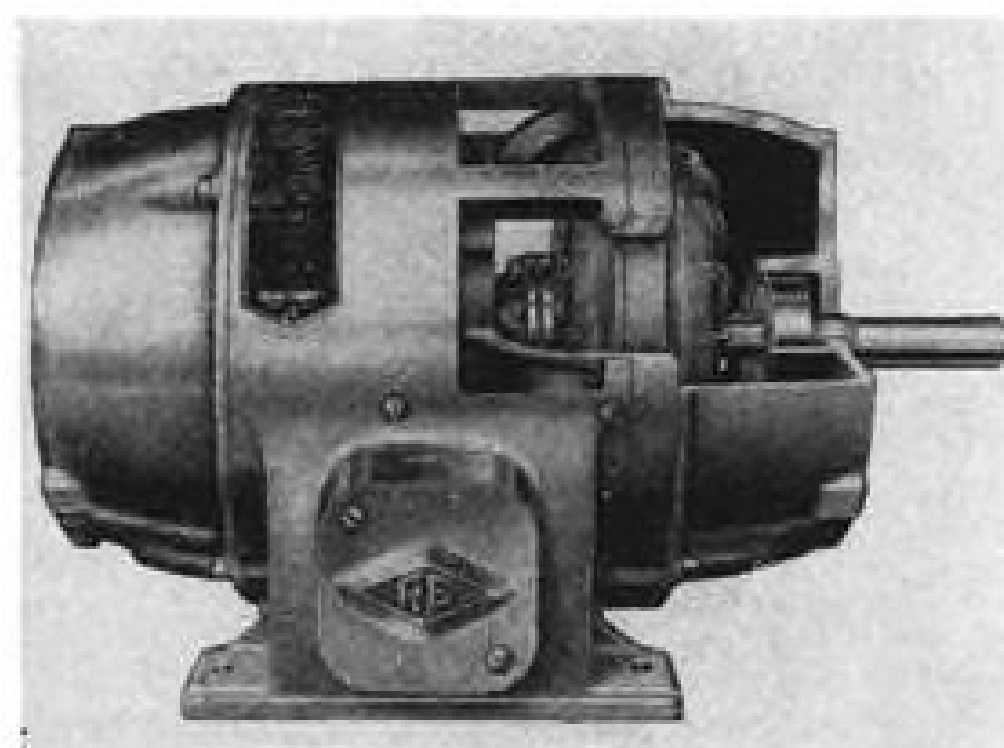


New Sparkplug

Single-electrode sparkplug, D-26, offered by Aviation Dealers Corp., 13440 S. Central Ave., Los Angeles, Calif., is stated to give hotter spark in concentrated area and easier to adjust than multiple-ground electrode plugs.

CAA-approved plug has heavy-duty nickel electrode and is claimed to have high resistance to heat because of aluminum oxide insulator which resists chipping, cracking, pitting and detonation. Its design is intended to permit speedy cleaning and replacement of parts.

Company states that at completion of CAA 200-hr. endurance test, comparative power curves showed performance was equal to other well-known plugs.



Fluid-Drive Motor

For operating conveyors, extractors, and bridge and trolley drives, a single-frame, integrally designed, electric fluid-drive motor announced by Reuland Electric Co., Alhambra, Calif., is stated to offer savings in original cost and mounting area over conventional electric fluid-drives.

Unit is especially suited for loads requiring smooth acceleration and protection from jamming and shocks. It's claimed high-inertia loads are easily accelerated, because motor is practically up to speed before any load is applied.

Other advantages claimed: Motors can be selected closer to hp. requirements, reduced starter current, shocks are absorbed in oil cushion. Supplied in standard foot-mounted or round body frames, units can be positioned horizontally or vertically and are available in 1/2 to 10 hp. sizes.



Aeroproducts Actuators in Action...

when the McDonnell BANSHEE takes to the air

The big positioning jobs on the Banshee are performed by Aeroproducts Actuators because they're built for the big jobs—because they are compact, reliable, accurate and low in weight-strength ratio. They reflect the experience in precise blade actuation perfected in the constant-speed Aeroprop.

Because the efforts of Aeroproducts field service are applied to your actuator as well

as propeller needs, constant liaison is maintained. Let Aeroproducts, backed by General

Motors Research, work with you from development and design to production.



In addition to the electro-mechanical types illustrated, hydraulic and pneumatic actuators are also available.

1. Main landing gear door Stroke 8.4" Operating load—1800 lbs.
2. Main landing gear Stroke 8.55" Operating load—3950 lbs.
3. Wing fold Stroke 15.83" Operating load—7800 lbs.
4. Nose landing gear Stroke 19.53" Operating load—7000 lbs.

Aeroproducts

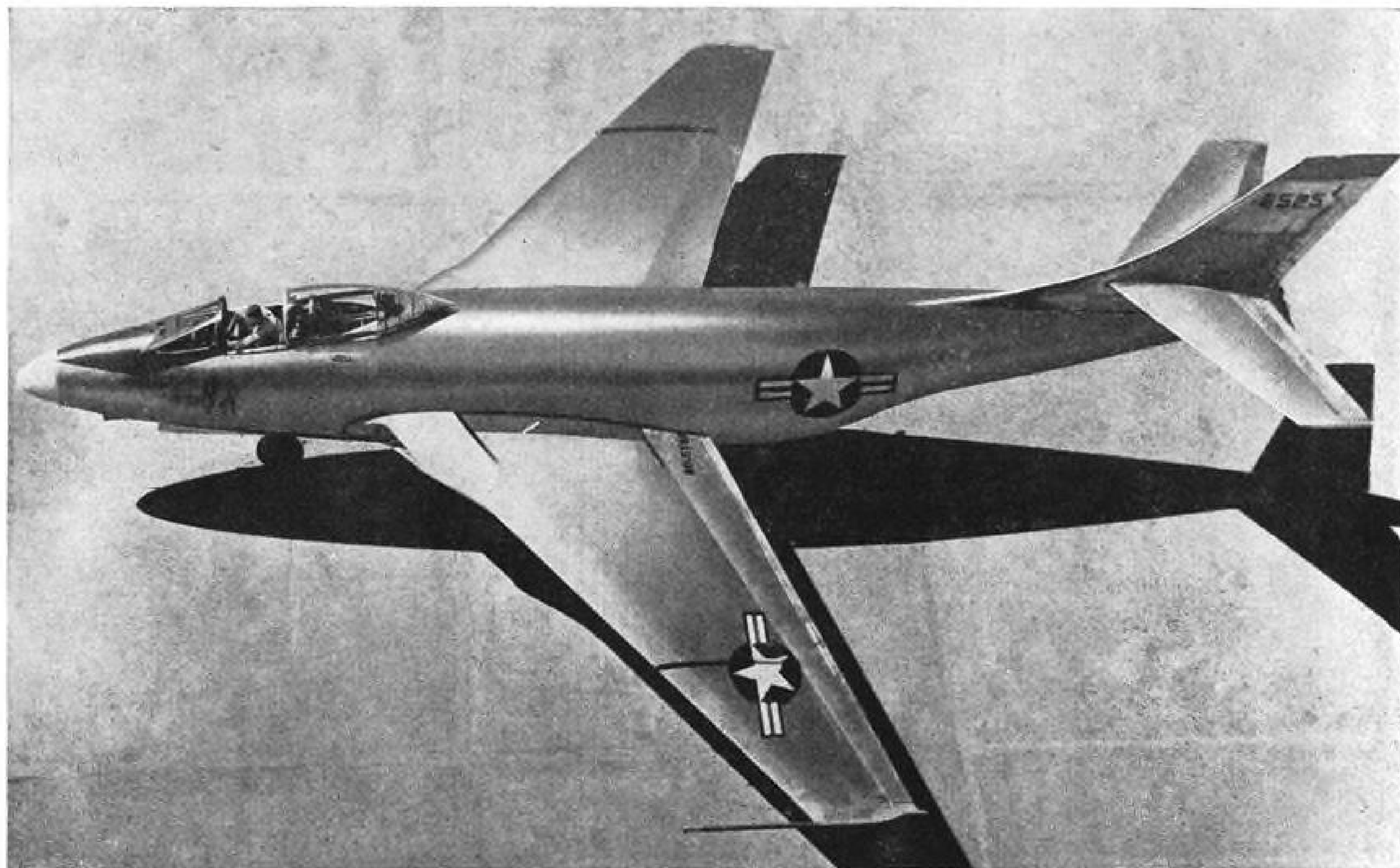


BUILDING for today
DESIGNING for tomorrow



AEROPRODUCTS DIVISION • GENERAL MOTORS CORPORATION • DAYTON, OHIO





THE McDONNELL XF-88, now undergoing extensive tests at Muroc Air Force Base, is an Air Force "penetration" fighter, capable of operating deep inside enemy territory as a fighter-bomber

or bomber-escort. It is a single-place, twin turbo-jet plane with a pressurized cabin, and weighs some 15,000 pounds, has a wing span of approximately 40 feet. Data restricted.

What material helps make the XF-88 possible?

Answer: Aluminum! The shark-bellied, lethal-looking McDonnell XF-88, with its very thin wings and tail assembly, wouldn't be practical—couldn't perform as remarkably as it does—without the use of light, strong aluminum.

Builders of *all* modern aircraft are drawing upon aluminum's versatility more and more—to perform design miracles which step up the speed, strength and power of today's planes.

That's why it was important when, little more than three years ago, Permanente Metals began integrated

production of *Kaiser Aluminum*—opening to manufacturers a dependable new source.

Today Permanente Metals contributes more than one quarter of a billion pounds of aluminum to the nation's yearly supply. Almost as much as the entire country produced just ten years ago!

In achieving such production, Permanente Metals is setting high standards in the industry for high quality aluminum, on-time deliveries, unexcelled service.

Result: Today every major U. S. Aircraft builder consistently uses *Kaiser Aluminum*!

Permanente Metals

PRODUCER OF

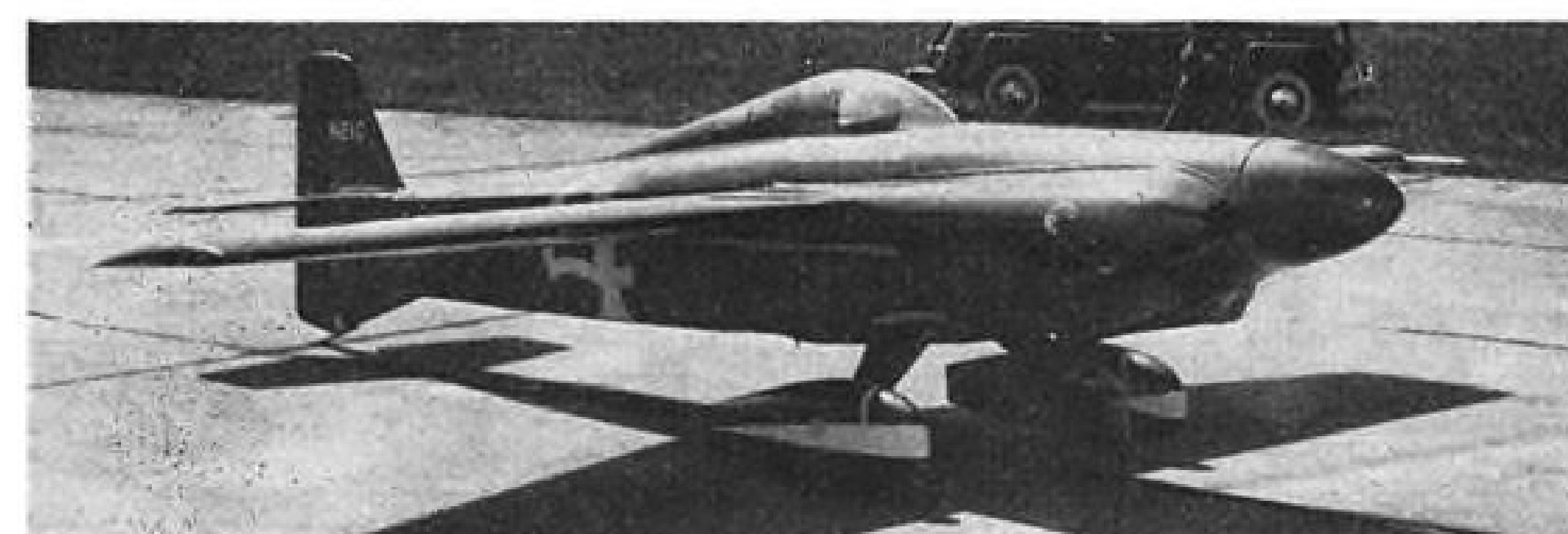
Kaiser Aluminum

SOLD BY PERMANENTE PRODUCTS COMPANY, KAISER BUILDING, OAKLAND 12, CALIF. . . . WITH OFFICES IN:
Atlanta • Boston • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Houston • Indianapolis • Kansas City • Los Angeles
Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Portland, Ore. • Seattle • Spokane • St. Louis • Wichita
EXPORT OFFICE, OAKLAND, CALIFORNIA • WAREHOUSE DISTRIBUTORS IN PRINCIPAL CITIES

SALES & SERVICE



JINNY, flown by Al Foss, was not fast enough, placed sixth.



HERMAN "Fish" Salmon kept the LeVier Minnow, placed fifth.

Midget Race is Close Contest

Brennand's victory credited to his 'jockey' weight and good piloting; LeVier withdrawal gesture praised.

By Alexander McSurely

CLEVELAND—Higher speeds and close competitions again made the 1949 Goodyear midget races the high point of the National Air Races for many of the spectators.

Bill Brennand, weight 106 lbs., piloted "Buster," the red Wittman special, to win at a new record speed of 177.34 mph. It was the Oshkosh, Wis., pilot's second triumph in the three years of the Goodyear Trophy races. He won in 1947 and placed fourth in the 1948 race. His airplane, and its closely similar sister-ship "Bonzo," appeared little changed from last year's race except for the addition of new streamlined wheelpans. Brennand used one of the new McCauley aluminum thin-blade racing propellers, while Steve Wittman's Bonzo, which placed third at 176.244 mph., turned one of Wittman's newly designed wooden "scimitar blade" propellers.

► **Dark Horse**—Second place was taken by a "dark horse" contestant, Keith Sorenson, of Los Angeles, who outflew

such veteran midget-race pilots as Steve Wittman, and Herman "Fish" Salmon. In the seventh lap Sorenson's little black and white plane nosed up to threaten Brennand's lead, but the leader pulled out again, and left Sorenson behind him during the remainder of the race.

Analysis of the race indicates that jockey-size Brennand's light weight was probably a strong contributing factor to his success, along with his excellent piloting. His plane was first to break ground and sprang into an immediate lead after the race-horse start. He flew low and fast at pylon height. He told AVIATION WEEK that he had expected Wittman's plane, which is usually slightly faster, to pass him, but after he stayed out in front for several laps he decided it was up to him to win.

Wittman and Brennand do not believe that they are getting the maximum performance possible out of their little racers even yet, and are preparing additional modifications for next year. A new set of wings for "Buster" is nearly completed and will be installed

probably before the planes go to Miami for the Continental Motors midget races in January. Incidentally, both Brennand and Wittman have won previously at Miami.

► **Cosmic Winds**—Two of the three Cosmic Wind type all-metal midget planes built by LeVier and Associates, fought a nip-and-tuck race for fourth place, with Vincent Ast in Fulkerson's green Ballerina barely nosing out Herman "Fish" Salmon, last year's winner. Salmon had reworked his fuselage, carrying back the fairings on the cooling vents to fair into the wing. Salmon flew a "daisy-clipping" race while Ast flew almost directly over him, throughout the race, and dived slightly to pass him at the finish.

The plane owned by Tony LeVier, third of the Cosmic Winds, ran into bad luck in a semi-final heat, when it popped the canopy and Billie Robinson, the pilot was forced to withdraw from the race. LeVier decided not to run it in the consolation Goodyear race for planes eliminated in the earlier heats because its qualification speed had been so much higher than that of the other planes in the consolation.

LeVier had planned to use a special methanol injection system in "Little Tony," his plane, and had arranged it so that it came within the legal requirements of the Goodyear specifications, and was approved by the contest committee. Some reports were that it increased his plane's speed more than 10 mph. As a result of protests by the other pilots that the system gave LeVier too great an advantage, LeVier agreed to withdraw the system.

► **Anonymous Note**—Protests included anonymous letters written to AVIATION WEEK, and later threats of pilots to withdraw from the Goodyear race if LeVier did not drop his system. LeVier's sportsmanlike attitude in withdrawing the system, after it had been ruled as within the regulations, was highly praised by the contest committee.

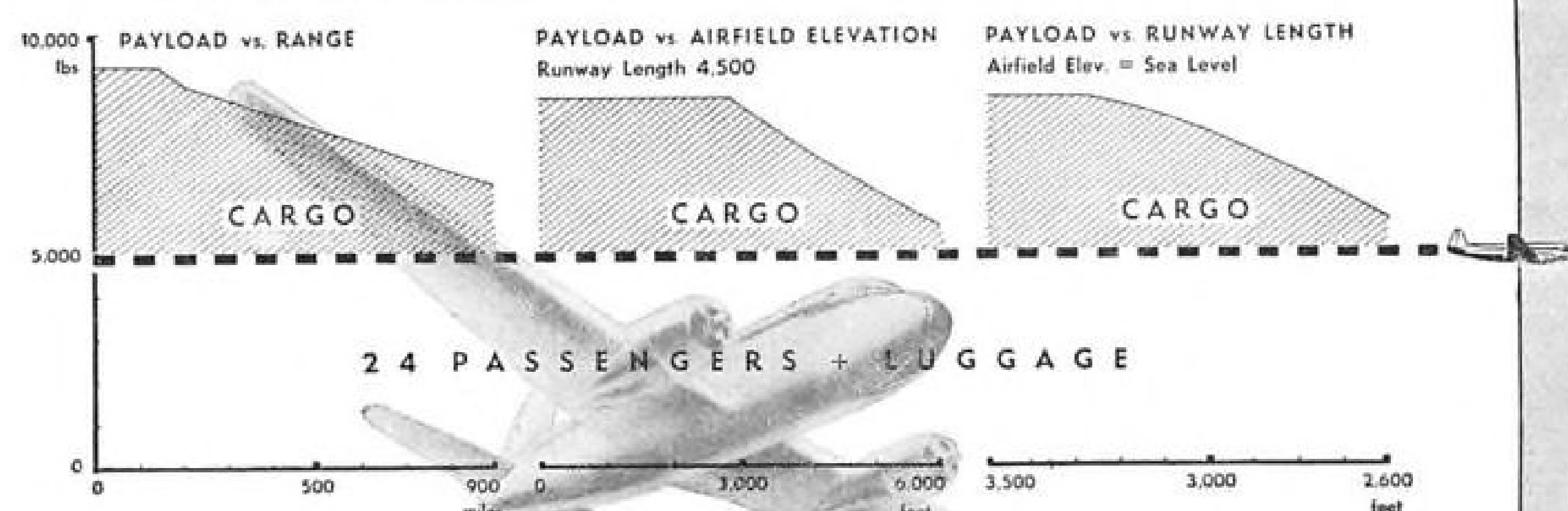
Sorenson's dark-horse plane, second-place winner in the Goodyear, was a plane which he and Mike Argandar, another West Coast pilot and plane builder had been building. Argandar was killed while flight-testing a midget designed by the late Art Chester. Then Sorenson, and Argandar's widow decided to complete the plane as a partnership venture, and in tribute to Argandar.

One of the most improved planes in the 1949 Goodyear was the sleek all-metal Foss special which went to the finals this year after winning its qualifying heat. Foss flew a good race in the finals but his plane with its distinctive high stabilizer was still not fast enough to catch the Wittman, Sorenson and Cosmic Wind planes.

THE UNSEEN PASSENGER OFFERS HIS SEAT

"The unseen passenger" is a common occurrence on most transport planes. With due consideration to the take-off weight it is not always possible to carry the full complement of passengers, although empty seats are available in the plane.

"The unseen passenger" does not, however, appear on the Scandia. Under practically all conditions this plane can take the full number of passengers with luggage — in addition to a paying freight.



CONDITIONS

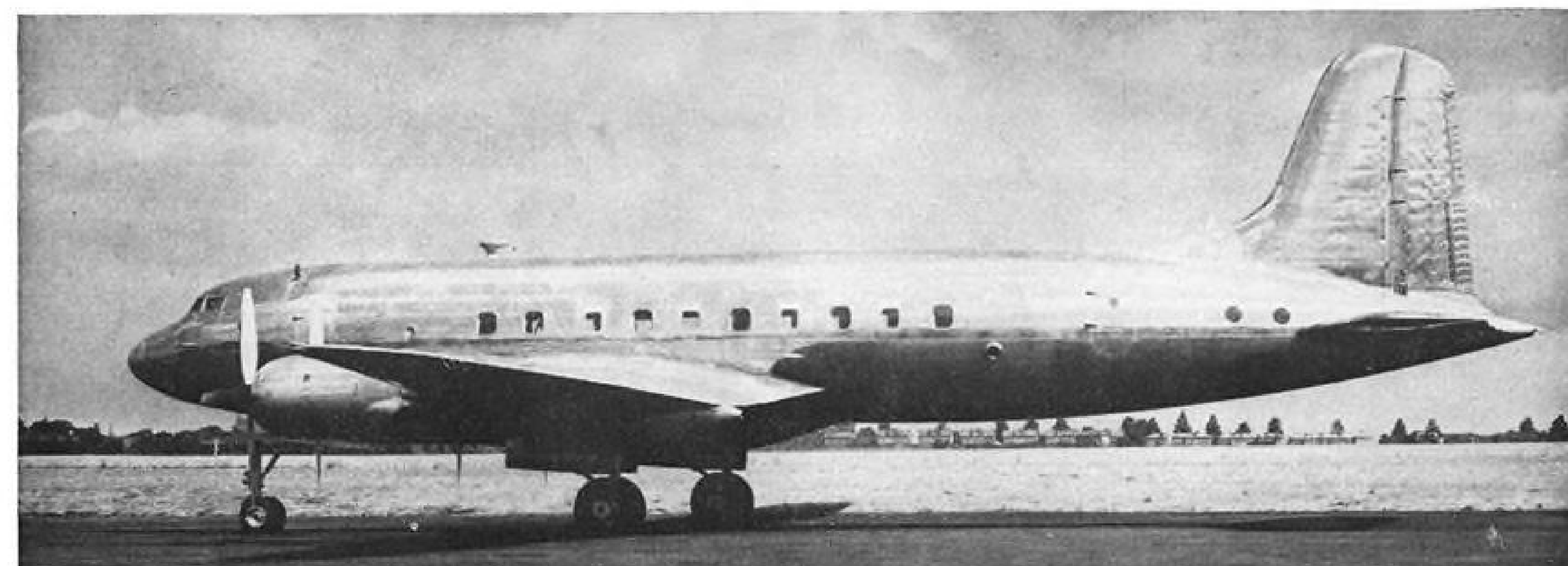
Cruise Altitude 10,000 feet
Cruise Power 750 BHP
Headwind 10 MPH
ATA Fuel Reserve — Standard Atmosphere

Trip Length of 300 miles is Parameter in the Graphs for Airfield Elevation and Runway Length

Scandia

SVENSKA AEROPLAN AKTIEBOLAGET • SAAB AIRCRAFT COMPANY • SWEDEN

AIR TRANSPORT



HERMES V, fourth and largest of Britain's stable of turbine transports, has its 97-ft. length and 84,000 lb. lifted by . . .



. . . FOUR THESEUS engines which total 9800 hp. for takeoff.

H. G. Hazelden at the controls, the ship flew for 30 minutes at about 2000 ft. The test was described as "completely successful," with the new airline reaching a speed of 345 mph. at less than full throttle.

► **Piston to Jet**—The Hermes V is a development of the Hermes IV, with the four Bristol Hercules piston engines replaced by four Bristol Theseus turboprops. This increases the takeoff rating from 8160 hp. to 9800 hp.

In other respects, the Hermes V is practically identical with the IV, which made its first flight about a year ago. Both have a computed payload of 17,000 lb.

While two prototype Hermes Vs have been ordered by the British Ministry of Supply as research aircraft to test further the potentialities of turboprop-powered transports, it is no secret that Handley Page would like to cultivate a few orders from airline operators. Until these orders are forthcoming, no production is contemplated.

► **Hermes IV**—Meanwhile, production of the 25 Hermes IVs on order for BOAC is nearly completed, with delivery of the first of the order expected this month and the remainder by the end of 1949. Builder's trials have been completed, and Air Registration Board certification was recently obtained.

The Hermes IV, which is fully-pressurized, is intended for operation along BOAC's Empire routes at altitudes of 30,000 ft., where it is designed to cruise at about 300 mph. with a range of 1500 miles. Maximum gross weight is given as 75,000 lb. but may be higher by the time the plane goes in service.

By contrast, the maximum gross weight of the Hermes V is 84,000 lb., and its cruising speed at 30,000 ft. is 325 mph. Rate of climb at takeoff

Britain Pushes Turboprop Liners

While pure-jet transports have stolen the spotlight, first airline order is for turbine-propeller planes.

(McGraw-Hill World News)

Great Britain is making sure its new turboprop transports will not play second fiddle to faster, more-spectacular pure-jet airliners such as the de Havilland Comet.

The British late last month flew their fourth and largest turboprop plane—the Handley Page Hermes V, which reportedly can carry the equivalent of 63 passengers and two tons of cargo.

Coincidentally, British Overseas Airways Corp. and British European Airways announced they are entering into negotiations with Vickers-Armstrongs, Ltd., on a joint order for the 40-passenger Viscount, the world's first turboprop airliner.

As the British prepared to push turboprop development they cast some barbs

at the U. S. commercial aircraft manufacturing industry.

► **Achilles' Heel**—Sir Miles Thomas, BOAC chairman, said the American system of mass production has its Achilles' heel. "It is less light of foot, less nimble in adapting new techniques to its ponderous, if powerful, production machinery. That should enable us in Britain to hold our ground."

Sir Hew Kilner, managing director of Vickers-Armstrongs' aviation division, declared that after 1950 piston-engined planes could be regarded as obsolescent. He said that he, for one, expected the Americans to "sit up and realize this before long."

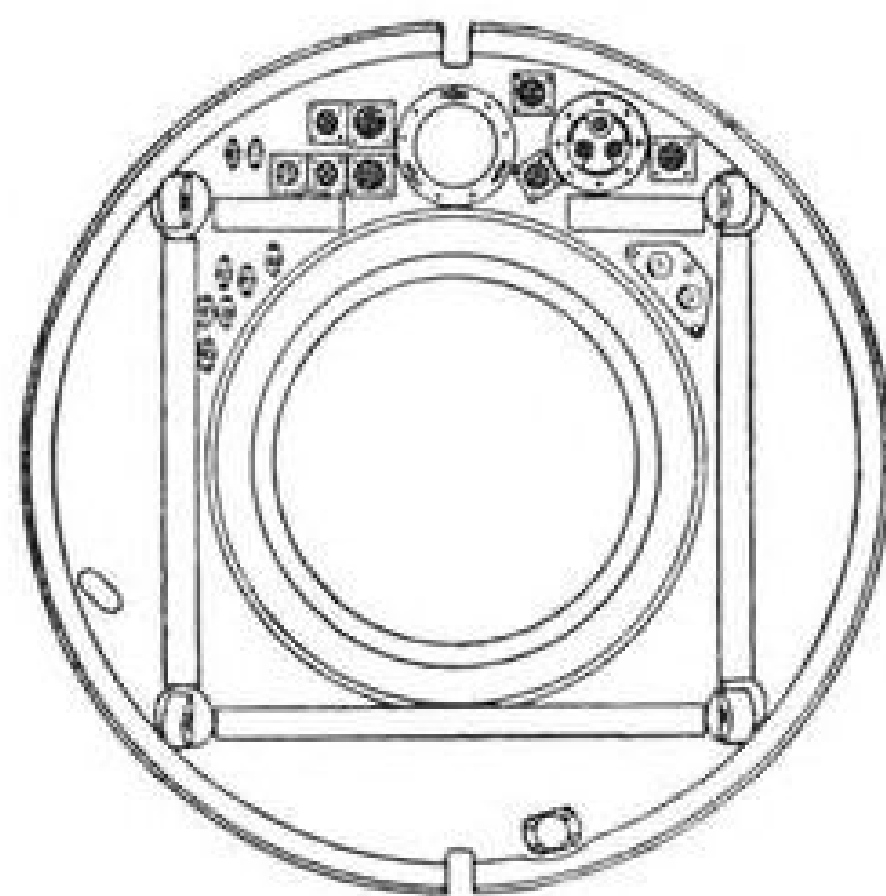
First flight of Britain's newest turboprop transport, the Hermes V, was made at the Handley Page airfield at Radlett, Hertfordshire. With Chief Test Pilot

Mamba

No 10

memoranda

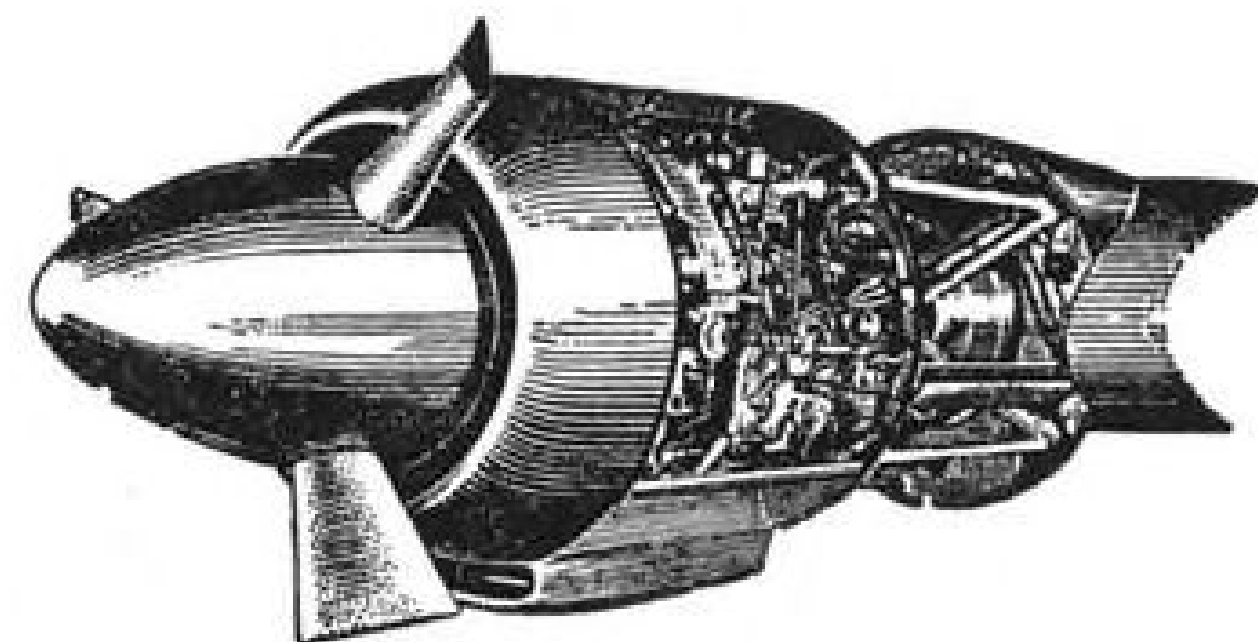
EASE OF INSTALLATION



Every attention has been given to providing the most quickly detachable power unit. All services have been carefully grouped on the rear bulkhead close to the four attachment points.

**ARMSTRONG SIDDELEY
MOTORS LIMITED**
Parkside, Coventry, England.

Branch of the Hawker Siddeley Group



is 2000 ft. per minute. Dimensions of both the Hermes IV and V: span 113 ft., length 97 ft., and wing area 1408 sq. ft.

► **Viscount Order**—Number of Vickers Viscounts ordered by British government-owned airlines has not been disclosed. But it is understood that BEA will take 20 and BOAC "about a dozen." BOAC's proposed order is on behalf of its associate company, British West Indian Airways.

BEA had initially turned down the Viscount in favor of the Airspeed Ambassador piston-engined airliner. Twenty Ambassadors are on order and are expected to go in service by 1951 on BEA's Continental services radiating

from London. These planes, for the most part, will be fitted out to carry 46 or 49 passengers.

Vickers-Armstrongs, which designed the Viscount for similar services with four Rolls Royce Dart turbine engines, carried through its project, and the prototype flew a year ago. Late last spring, the builders revised the design, using a longer fuselage to carry a greater number of passengers. It is this modified version, termed the Viscount 700, which will be built under the new order. Expected delivery date is 1953.

There is no Viscount 700 in existence at the moment. But the prototype Viscount, since its first flight in August has flown more than 250 hr.

Will NWA's Boeings Pay Their Way?

CAB vice chairman Ryan voices negative opinion on use of 377s by carrier on transcontinental-Orient service.

A \$15 million question mark is flying over the Boeing Stratocruisers placed in transcontinental service by Northwest Airlines this month.

Majority of the Civil Aeronautics Board still believes the ten double-decked transports purchased by NWA will promote economical and efficient service. But the Board's vice chairman, Oswald Ryan, has added his voice to those contending that Northwest's management may have made a serious error in acquiring high-capacity planes costing \$1.5-million each.

► **Loan Stirrs Controversy**—NWA contracted for the Boeings early in 1946. Six months ago, the carrier asked Reconstruction Finance Corp. help in swinging a \$21 million bank loan to be used primarily for the Stratocruiser purchase.

It is this financing arrangement (in which RFC's commitment may be a maximum of \$12 million) that has opened the way for attacks on NWA's Stratocruiser program. Last May, a government financial expert appearing before the Senate Interstate and Foreign Commerce Committee said that CAB should veto NWA's proposed RFC loan because the money would be used to buy giant planes for operation over thin-traffic routes.

Despite this protest, CAB in a split decision endorsed the RFC loan to Northwest. And now, belatedly, the Board has issued an opinion setting forth the reasons for its action.

► **Majority Opinion**—The CAB majority, including Chairman Joseph J. O'Connell, Jr., and members Josh Lee and Russell Adams, said re-equipment of U.S. certificated carriers with fleets of modern aircraft (such as the Stratocruiser) is clearly desirable and consis-

tent with the Board's function of encouraging and developing air transportation.

"The Stratocruiser appears to represent substantial progress in aircraft design both in terms of performance and economy," the CAB majority continued. "Although no operational experience for them is yet available, it would appear that the Stratocruisers may well have among the lowest unit operating costs of any aircraft in commercial service."

► **Responsibility Defined**—Because of

congressional concern over how far CAB would go in assuring repayment of the loan, the Board made clear that its approval of the deal does not guarantee to Northwest any more mail compensation than the carrier would be entitled to otherwise. It said approval of the RFC arrangement does not constitute a moral commitment by the Board to underwrite automatically later actions by Northwest with respect to the Stratocruisers.

"All new aircraft are experimental in nature, both with regard to their technical and economic aspects. If it develops that the equipment is not suited for the purpose for which it is designed, or that there is too much of it, the dictates of economical and efficient management require that the carrier correct the situation either by disposal of this or other equipment or by less intensive utilization."

► **Competitive Problem**—CAB said that with the Stratocruisers Northwest should be able to correct certain handicaps under which it has been laboring for 18 months because its principal competitors placed modern four-engine equipment (such as Constellations and DC-6s) on paralleling domestic routes. The opinion noted that competitors also are in the process of putting new four-engine planes on links paralleling Northwest's international operations.

NWA plans to put five of its ten Stratocruisers in domestic service, three on the Orient run and two on the West Coast-Hawaii link of the airline.

► **Ryan Replies**—In his dissent, CAB Vice Chairman Ryan said Northwest



FLIGHT ANNOUNCEMENT JUKEBOX

Airline dispatchers at Seattle-Tacoma Airport use a newly developed push-button public address system for announcing incoming and outgoing flights. Each flight announcement, coded by letter and number, is listed in a small remote control box at each of the eight gates. When the airline agents meets a flight, he pushes two buttons on the box, releasing the proper recorded

announcement over the public loudspeakers. Heart of the system is a 100-selection Seeburg player. One announcement is cut on each side of a 10-inch disk. At present 60 records are used to cover the arrivals of UAL, WAL and NWA. It is stated that the new device will save \$1400 monthly over comparable systems employing the services of live operators.

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is in a most difficult position by reason of its Stratocruiser commitment. He warned that CAB approval of the RFC commitment requires the Board to underwrite the Stratocruisers through mail pay insofar as use of the planes under honest and efficient management for a reasonable trial period may result in increased financial needs by Northwest.

"Normally an airline should take the risk that selection of new equipment which has the effect of increasing mail pay requirements may be found uneconomical, with the resulting higher expense disallowed by CAB. In the present case this risk is eliminated, because by approving the RFC deal the Board has, in effect, found that Northwest's initial decision to acquire Stratocruisers was sound."

Ryan agreed that the Stratocruiser gives every promise of making a notable contribution to international—and possibly domestic—air transportation. But he pointed out that the ship's lower cost per available seat mile is only significant if there are passengers to fill the seats.

► **Traffic Density Cited**—On its international route to the Orient, Ryan declared, NWA averaged only 13.5 passengers per mile in 1948—"hardly a respectable load for a DC-4, much less a Stratocruiser."

In the first quarter of 1949, Northwest's average load on its new Seattle-Honolulu run was 11 passengers, and Pan American's load on the route was about the same. Yet, Ryan noted, both Northwest and PAA plan to use Stratocruisers between Seattle and Hawaii even though their combined traffic could be handled easily by a DC-4.

Domestically, Stratocruisers are equally inappropriate for Northwest's operations, Ryan declared. He observed that NWA's passenger traffic per domestic route mile is less than one-half that of United Air Lines. "Under these circumstances it seems anomalous, at least, to approve Northwest's acquisition of the largest equipment available."

Travel Tax Evasion

Bureau of Internal Revenue has taken steps to halt widespread evasion of the 15 percent U.S. transportation tax.

The agency ruled this month that the tax on passenger tickets bought in the U.S. applies to the sending of funds outside the country for purchase of transportation ordinarily subject to the U.S. levy. During recent months, purchase by Americans of airline, rail and bus tickets in Canada and Mexico has become a thriving business.

► **Law Explained**—Specifically, the Bu-

reau of Internal Revenue's pronouncement said: "The 15 percent tax is due even if persons mail or telegraph or send cash, money orders or other funds to ticket offices, travel agents, etc., in other countries for tickets covering transportation in the U.S. The tax is also due if Americans arrange with travel or transportation offices in this country for the furnishing of such tickets from a foreign address."

Evasion of the U.S. transportation tax became a popular practice after Canada repealed a similar levy earlier this year (AVIATION WEEK, May 16). Bureau of Internal Revenue officials previously had indicated there wasn't much they could do to spike the evasion, and there is considerable doubt that the new ruling can be enforced effectively.

Feeders Ready

Turner and Bonanza plan scheduled DC-3 operations this fall.

Two more short-haul carriers, one in the midwest and the other in the far west, plan to inaugurate regularly-scheduled operations with a conventional transport-type equipment this fall.

Turner Airlines, Inc., Indianapolis, hopes to begin service over its feeder routes within the next month, using 21-passenger DC-3s. The company's links are between Cincinnati and Grand Rapids, Mich.; and between Louisville, Ky., and Chicago. Initial operations (two roundtrips daily) will be on the northern portions of the system—from Indianapolis to Chicago and Grand Rapids.

► **Nevada Carrier**—Bonanza Air Lines, Las Vegas, Nev., plans to start scheduled operations between Reno, Nev., and Phoenix, Ariz., with 26-passenger DC-3s by November. The carrier has been operating regular intrastate service between Las Vegas and Reno since the summer of 1946 but was not granted an interstate certificate until last June.

CAB recently approved transfer of Roscoe Turner Aeronautical Corp.'s feeder certificate to Turner Airlines. The franchise was originally issued to Roscoe Turner Aeronautical Corp. in February, 1948, but previous plans to inaugurate service under it fell through because of financing difficulties.

President of Turner Airlines is Col. Roscoe Turner, speed flyer and fixed base operator. R. Paul Weesner, president of Nationwide Air Transport Service, a Miami-based contract and non-scheduled carrier, is executive vice president and actual operating head of Turner Airlines.

The feederline's certificate is now scheduled to expire on Feb. 6, 1951. ► **Stock Distribution**—The agreement transferring the feeder certificate provides that Roscoe Turner Aeronautical Corp. will receive 20,000 shares, or 25 percent of the outstanding stock of Turner Airlines, for the franchise. Four DC-3s, spare engines, parts and radio equipment now owned by Nationwide Air Transport Service will be made available to Turner Airlines by Weesner interests in exchange for 60,000 shares (the remaining 75 percent of the outstanding stock) of the feeder company.

In approving the certificate transfer, CAB specified that Nationwide Air Transport Service must surrender its letter of registration as a large irregular carrier within six months and must not engage in any air transportation thereafter. In the alternative, the Weesner family interests must divest themselves of control of Nationwide Air Transport Service to eliminate any common control of Turner Airlines and the uncertificated operator.

► **Contract Operations**—Nationwide has been operating as a contract carrier since February, 1946. It has had contracts with the Department of Agriculture to fly farm workers recruited in the Caribbean area to the U. S. and home again.

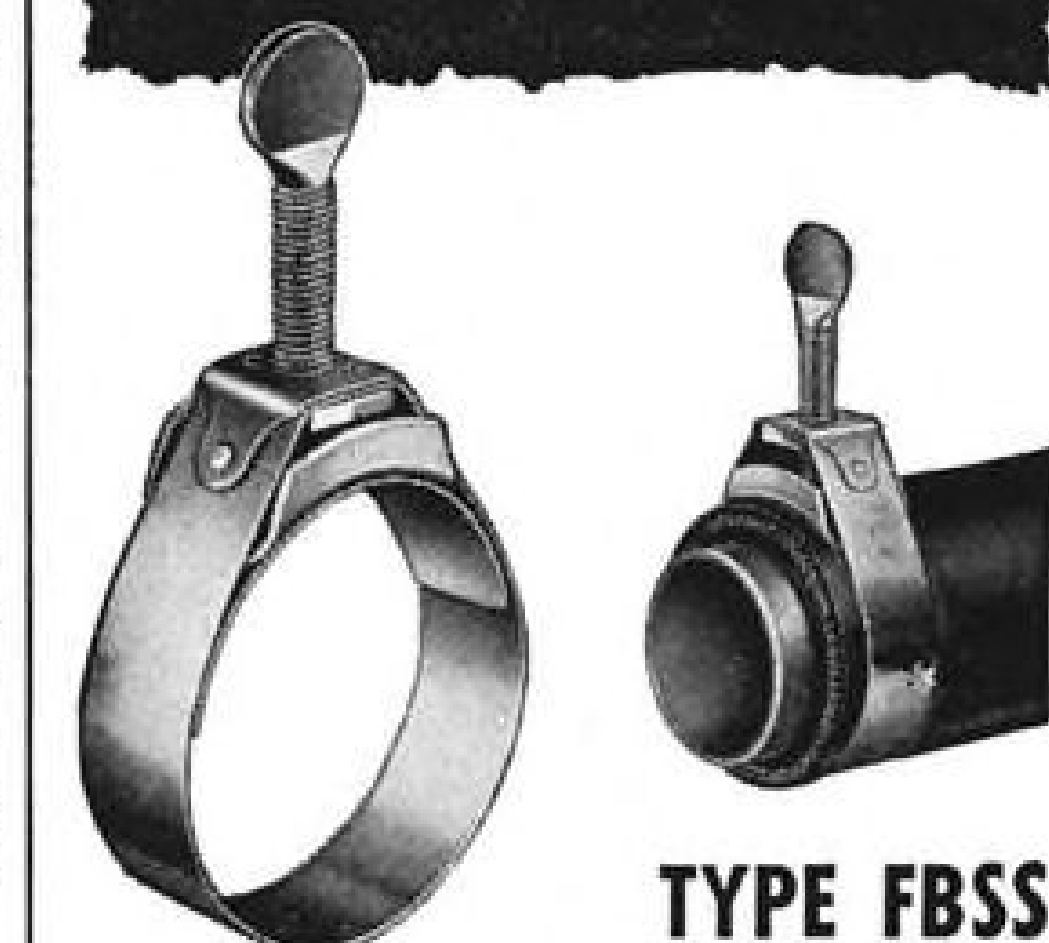
U. S. Immigration and Naturalization Service has used Nationwide to transport deportees (mostly Latin Americans) to their own countries. The carrier controls two subsidiaries in Miami and Brownsville, Tex., which are engaged in aircraft maintenance and overhaul. Recently Nationwide has carried fruit, vegetables, shrimp and other cargo—on a nonscheduled basis between points within the U.S. and between Mexico and the U.S.

CAB said it realized that to require Nationwide to dissolve its nonscheduled operations would probably result in a heavy loss to the company. But the Board believes it is not in the public interest to approve control of a feeder by a large irregular air carrier.

► **TWA-Bonanza Deal**—Early activation of Bonanza Air Lines hinges on CAB approval of an agreement the carrier has made to take over TWA's Phoenix-Las Vegas link. The arrangement would continue for the life of Bonanza's three-year temporary certificate or for as long as Bonanza holds its CAB franchise.

In designating Bonanza for a certificate last spring, CAB said the franchise would not be issued until the carrier made a satisfactory agreement with TWA to take over the Phoenix-Las Vegas operation and until the Nevada company could show it had adequate financial resources. Proof of adequate financial resources will be made available shortly, Bonanza president Edmund Converse told the Board.

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BEA's First Profit

(McGraw-Hill World News)

LONDON—July was the first month British European Airways made a profit since the airline was organized (Aug. 1, 1946). Annual figures for years ending March 31 have yet to show a profit over an entire year, and this is expected to be the case also with the year ended March 31, 1949, for which report has not yet been released. However, BEA is more hopeful of the outlook for a profit over the whole of the current fiscal year.

British Overseas Airways Corporation has yet to show a profit in any annual total, covering the airline as a whole. Its Atlantic line, however, has been more than paying its own way and its full share of the overhead, for some time. British South American Airways showed a small profit in its first year of operation, which was reduced in its second year's report.

► **Costs Reduced**—While the July operating profit is, perhaps, partly due to the seasonal factor of high traffic, two other measures have made significant contributions to the reduction of costs:

• **Rigid control** over expenditures and the introduction of cost-saving methods, under the advice of profes-

sional management-efficiency consultants. Considerable reduction in office staffs has resulted.

• **A bonus-incentive scheme** for BEA's maintenance workers, introduced toward the latter part of 1948, is believed to be unique among airline operators.

Dutch to Suspend

AMSTERDAM—KLM is considering suspension of its domestic Dutch airlines, currently sustaining substantial losses because of heavy competition from ground transportation over the short distances.

Dutch government intervention stopped a previous KLM attempt at suspension, but the carrier will definitely stop domestic operations at least for the winter. KLM recently cut in half the fares on its domestic lines.

Equipment Change

Wisconsin Central Airlines plans to acquire larger planes—probably DC-3s—for its feeder operations early next year, according to Hal N. Carr, vice-president. The company now uses six Lockheed Electras.

Carr said the decision to lift WCA's fleet capacity resulted from very encouraging gains in passenger traffic.

SHORTLINES

► **Aero Transportes, S. A.**—The Mexican domestic airlines has asked its government's permission to operate from Mexico City to Brownsville, Tex., New Orleans, Washington and New York. Company would use DC-4s for first-class and coach-type service. If the Mexican government approves, ATSA will ask CAB for a foreign air carrier permit.

► **American—Air Line Dispatchers Assn.** has negotiated a contract with AA calling for an average \$33 monthly increase retroactive to Apr. 16. New scale ranges from \$375 a month for the first six months to \$575 a month in the seventh year.

► **BOAC**—The airways corporation bill, providing for merger of British Overseas Airways Corp. and British South American Airways, has been signed by the King. Effective date is dependent on completion of negotiations for transfer to BOAC of rights and properties held by BSAA in foreign countries.

► **Capital**—Sept. 3 issue of Saturday Evening Post carries an article on J. H. Carmichael, Capital's president, under the title: "He Wants to Make Money on an Airline". . . . Company reported a net profit of \$254,161 in July and operating profit of \$290,500. Net profit for first seven months of 1949 represented a \$683,000 improvement over the same period last year.

► **Chicago & Southern**—Has declared a dividend of 35 cents a share. Company's net income for first six months of 1949 was \$296,621, or 58 cents a share, compared to \$267,682, or 53 cents a share, for the same period last year.

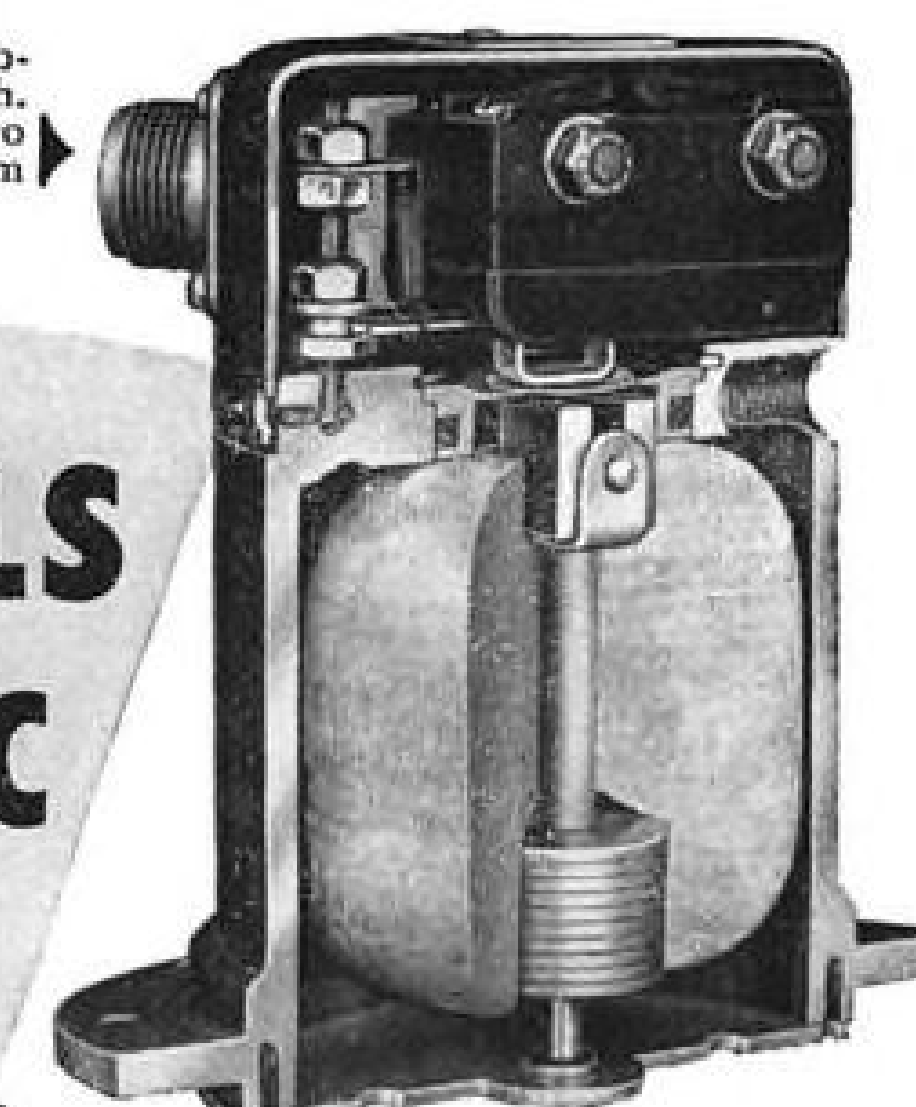
► **Mid-West Airlines**—Is now the official name of Iowa Airplane Co., Des Moines. CAB recently reissued the feeder's certificate under the new name. . . . Carrier still hopes to start service in Iowa, Nebraska, Minnesota and South Dakota shortly with single-engine Cessnas, but has asked CAB assurance that its franchise will be extended three full years after Sept. 1, 1949.

► **National**—Reports that about 20 percent of its revenues this summer have been from roundtrip excursion tickets. . . . Preliminary estimates place NAL's net profit for first-half 1949 at \$866,000, compared with a net loss of \$1,049,463 in the same period last year when a strike was in progress.

► **Pan American**—Plans to cut fares to Alaska up to 25 percent between Oct. 1 and Mar. 15.

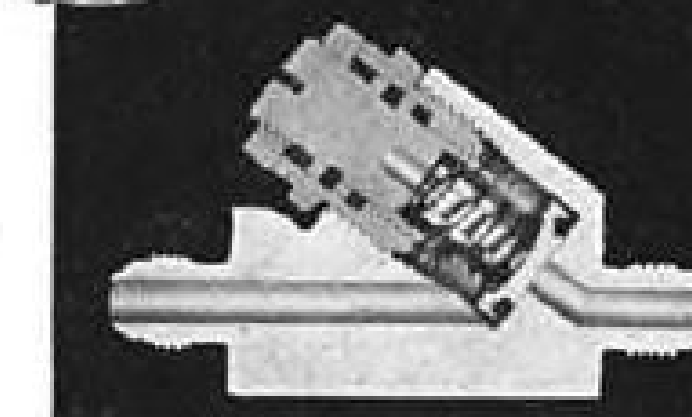
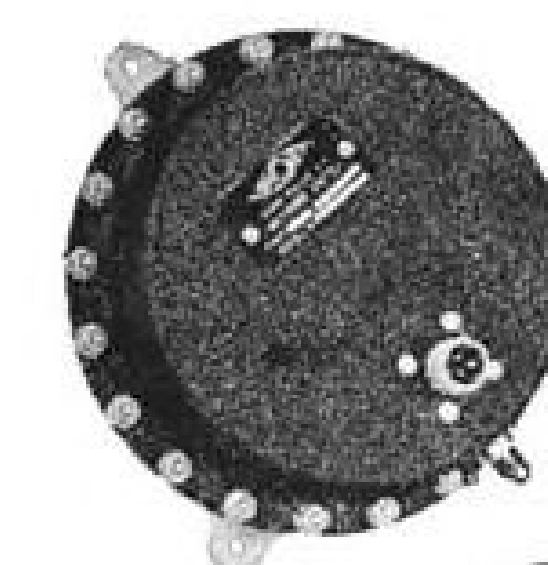
► **Pioneer**—Has been advised by the Texas adjutant general that it may have

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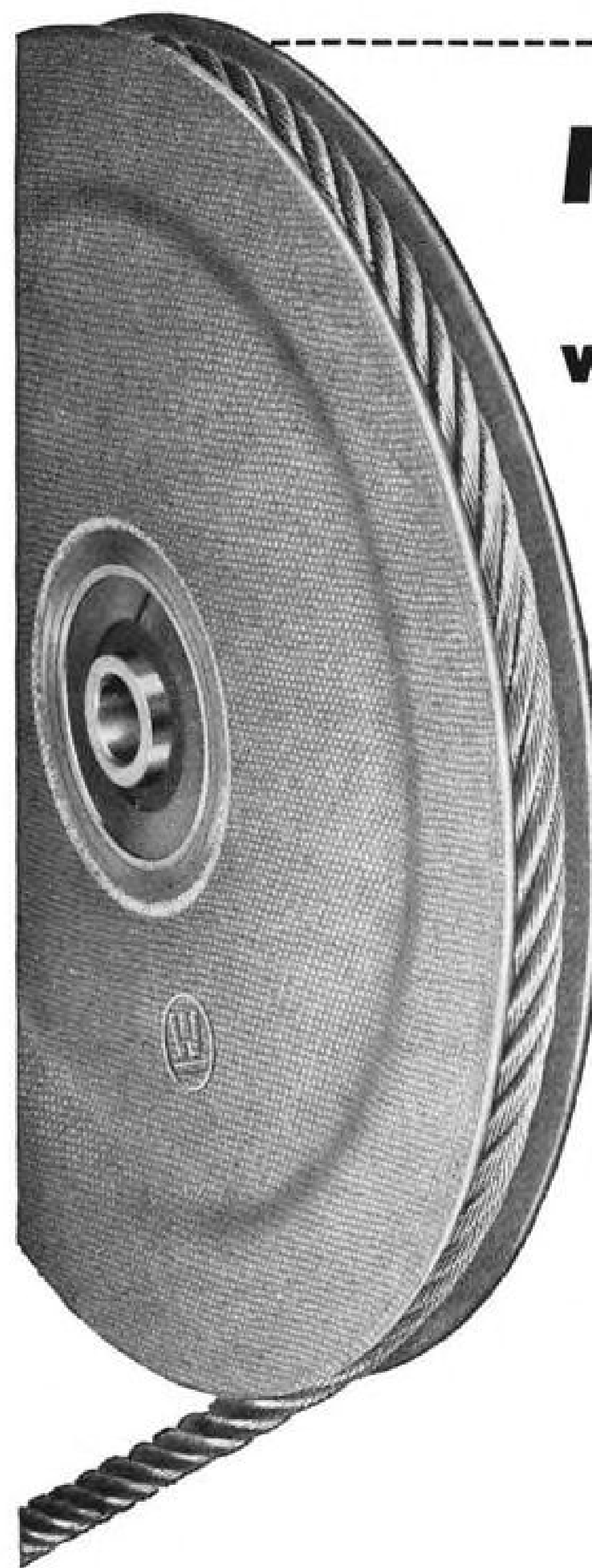
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to vacate its hangar at Houston Municipal Airport by Nov. 1 to make way for the Air National Guard.

► **Robinson**—Has bought its fifth DC-3. . . . The feeder began using Newark, N. J., Airport, instead of Teterboro, as its metropolitan New York terminal on Sept. 1.

► **Slick**—Has signed an agreement with Pan American Airways making possible air cargo shipments on a through way-bill between the U. S. and almost any point in the world.

► **Southern Airways**—Plans to open the final segment of its seven-state feeder route on Sept. 15. The link will be from Charleston, S. C., to Augusta, Macon and Columbus, Ga.

► **Transocean**—Has asked CAB for a certificate or exemption to carry passengers and cargo between Guam, Tinian and Saipan. Company says there is still no commercial means of transportation between the islands. A previous plea for an exemption was denied a year ago. . . . TAL has been making non-scheduled flights from the West Coast to Honolulu during the strike in Hawaii. Passenger fare is \$121.50 against scheduled airline fare of \$160.

► **United**—Has launched a Stratocruiser training program covering 600 employees. UAL expects to take delivery on the first of seven Boeings late this month. . . . Company's operating profit for July is estimated at more than \$1 million.

► **Western**—Has placed Convair-Liners in service between Los Angeles and Salt Lake City.

CAB SCHEDULE

Sept. 12—Oral argument in Milwaukee-Chicago-New York restriction case. (Docket 1789 et al)

Sept. 15—Oral argument in Pacific route amendment case. (Docket 2953 et al)

Sept. 19—Hearing on service to Springfield, Mass., through Bradley Field. (Docket 3748)

Sept. 19—Oral argument on Eastern Air Lines' overseas mail rate. (Docket 3722)

Sept. 19—Hearing on applications of American and Colonial Airlines for service to Toronto. (Dockets 3853 and 4032)

Sept. 21—Hearing in air freight tariff agreement case. (Docket 2719 et al)

Sept. 22—Oral argument on Mid-Continent Airlines' application for alternate Kansas City-New Orleans route. (Docket 1956)

Sept. 26—Hearing on Seaboard & Western and Transocean Air Lines applications for all-cargo certificates between the U. S., Europe and the Middle East. (Dockets 3041 and 3818)

Sept. 28—Hearing on disposal of Parks Air Lines' routes. (Docket 3965 et al)

Oct. 3—Hearing on Hughes Tool Co. control of TWA. (Docket 2796)

Oct. 10—Hearing on CAB investigation of International Air Transport Association agency resolutions. Postponed from Sept. 12. (Docket 3350)

Nov. 14—Hearing on final mail rate for Florida Airways. (Docket 3695)

Nov. 14—Hearing in Western-Inland mail rate case. (Docket 2870)

Jan. 9—Hearing in air freight rate case. (Docket 1705 et al)

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AVIATION WEEK, September 12, 1949

memo

*to DC-3 operators who will require additional
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WHAT'S NEW**New Books**

"Global Mission," by General of the Air Force H. H. Arnold. "Hap" Arnold's lively autobiography begins with his boyhood and carries on through to his retirement after World War II. Illustrated with many unusual historic photos, and well indexed, this 626-pp. volume forthrightly reveals the development of the world's greatest air force, and the personalities, plans, and decisions that were involved in its growth. Published by Harper & Bros., 49 E. 33 St., New York 16, N. Y., price \$5.00.

"Strategic Air Power," by Stefan T. Possony, is a scholarly analysis of strategic air power in World War II, what it means to us now, and its future. Published by the Infantry Journal Press, 1115 17 Street, N. W., Washington 6, D. C., 312 pp., price \$5.00.

"Guided Missiles," by A. R. Weyl, A.F.R.Ae. S., is a slim illustrated volume covering the evolution and principles of guided and directed missiles for military and peaceful purposes. Published by Temple Press, Ltd., Bowling Green Lane, London, E. C. 1, 139 pp., price 7/6d net.

Trade Literature

"Strength of Metal Aircraft Elements," is revised reference booklet for metal aircraft designers, prepared by Subcommittee on Air Force-Navy-Civil Aircraft Design Criteria of the Munitions Board Aircraft Committee. Available from Supt. of Documents, Washington, 25, D. C., price \$1.25.

"Publication GEC-253A," is catalog containing descriptions, specs, and prices of more than 150 GE arc-welding accessories. Available from General Electric Co., Schenectady 5, N. Y.

"How to Specify and Buy Alloy Steel with Confidence," is booklet available from Joseph T. Ryerson & Son, Inc., 16th & Rockwell St., Chicago, Ill.

"Fabricating and Forging Steel Tubing," is booklet clarifying terminology, and various operations, available from the Ohio Seamless Tubing Co., Shelby, Ohio.

Di-Acro Catalog gives latest information on Di-Acro system of dieless duplication, available from O'Neil-Irwin Manufacturing Co., Lake City, Minn.

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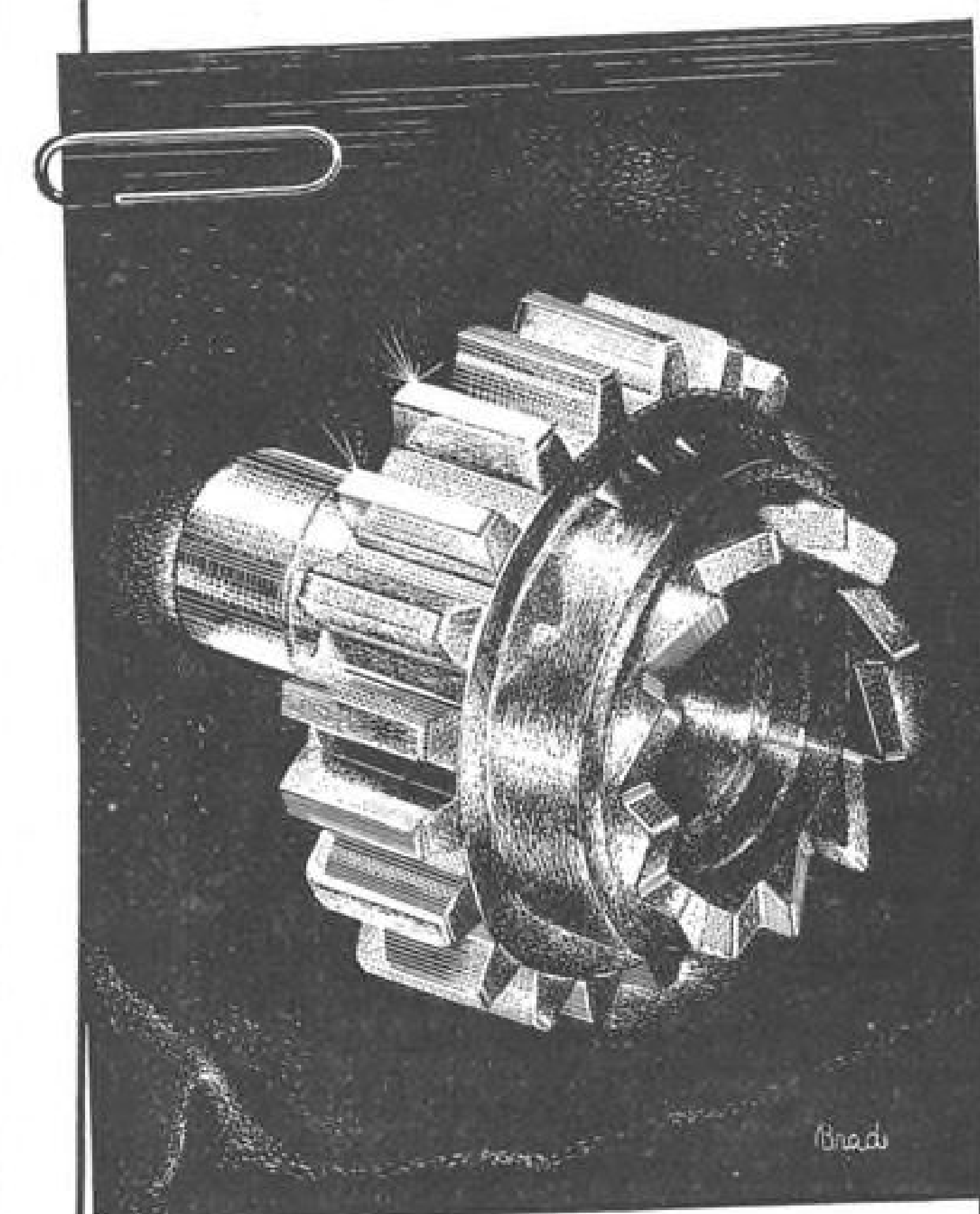
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EDITORIAL

Dangerous Exhibitionism II

A leading pilot is dead. So are a mother and her young son, trapped in their burning home after Bill Odom's racer ripped through it. Three persons are dead and aviation has another smeary blot. And for what? There is no valid reason.

The National Air Races no longer serve any useful purpose in these days of remarkable research and laboratory facilities. Some such tragedy as this was overdue. It was inevitable. The miracle is that the death toll was not larger.

As long ago as August, 1946, Aviation News (our predecessor) in an editorial, "Prepare for the Worst," said just before the 1946 event, "How many will not be able to turn tight enough for the Thompson Trophy Race, or . . . wind up crashing into crowds, motor cars, and other inhabited property you will read about in our newspapers' largest headline type the morning after."

They were lucky that year. And for several years thereafter. And the editorial brought us indignant cries from Cleveland.

This year the cries of protest coming out of Cleveland are of another kind. They are from suburban civic leaders who demand an end to such needless stunting over their homes.

There is one voice that has not yet been heard publicly in comment on the tragedy at Cleveland, and that is strange. For it is the voice of the National Aeronautic Assn. which jealously guards its power to "sanction" and approve arrangements for aviation contests of any kind.

Because of this long-recognized authority, it could well be said that the ultimate responsibility for what happened at Cleveland is NAA's. The promoters of the National Air Races have as their primary interest the promotion of trade in Cleveland and revenue for an organization that is supposed to build the city as an aviation center.

NAA has long proclaimed its right to speak for "the public in aviation." Its sole excuse for existence is to promote aviation. It is up to NAA to decide whether races such as took the life of two persons in their own home are good or bad for aviation. There would be no high-powered racing without NAA's consent. At one time in the recent history of that organization, some in NAA felt that such races as the Thompson should be discontinued. They were overruled. After all, the fees accruing to NAA from sanction of the races are a factor.

If NAA has no proposal to guard against a repetition of last week's tragedy it has forfeited its right to speak in this country for the Federation Aeronautique Internationale (the world governing body of contest aviation), and perhaps for the public interest in aviation.

Aviation's toughest problem—past, present and future—is public safety and confidence. As was pointed out here only last July 11, "One needless, spectacular accident does more harm in a minute than months of patient, intelligent education. Safety of life is the foundation of aviation and its future. Those who are willing to take a chance with human life unnecessarily are no friends of aviation."

Truth About Britain

What can you believe in all this publicity about Great Britain's remarkable achievements in jet aircraft design and construction? Is Britain ten years ahead of the United States?

Readers of AVIATION WEEK, as so often in the past, are in for some interesting copy. We have sent Robert Hotz, our news editor and Air Force and Navy observer, from Washington to join forces with Frederick Brewster, McGraw-Hill's chief correspondent in England.

We expect this team to produce some of the most important industrial and business intelligence reports you will find in print anywhere this year. The series will start shortly, with a comprehensive summary of the 1949 British Aeronautical Exhibition at Farnborough, where the latest jet fighter and transport planes have been unveiled. Later a stream of special reports will come in from London and elsewhere on the Continent, on other top priority aviation subjects.

We believe AVIATION WEEK is the only publication in the United States which has sent an editor from America to cover the Farnborough show. Mr. Hotz is fully accredited as a correspondent by both the Department of Defense and the Office of the Secretary of the Air Force. Gracious offers of special aid from foreign officials were appreciated but declined in the interest of accurate reporting, which thrives best when there are no foreign obligations.

Mr. Hotz knows without any special instructions that he is to write the truth as he finds it, in the best tradition of the free press of this country. He needs no warning about shying from those well-meaning but timid officials who wish to talk only "off the record." AVIATION WEEK's reports may prove to be unpopular or controversial in certain quarters, both here and abroad, but they will be accurate, and they will be read and heeded.

It is with some pride—pardonable, we believe—that AVIATION WEEK offers its readers this special series.

Throughout the magazine's short life of hardly more than two years, it has set one important business paper precedent after another, and has taken a commanding first place in the U. S. aviation publication field. Reader (and advertiser) response in this period has been gratifying to a hard-working staff.

Our sales department says we run monthly twice as many advertising pages as the No. 2 aviation medium. Our circulation people are happy about what they say is the fastest rising renewal rate (percentage of old subscribers who renew) in the business.

And a high percentage of our readers are not content with renewing for just one year, but are signing up for two and three years. Because the circulation still is pegged for economic reasons at close to 30,000, there is actually a waiting list of some new subscribers. Subscriptions of persons outside the business of aviation are not sought. This, we are told, makes our readership list a much more valuable audience for advertisers who are concerned about talking only to people in the industry.

Speaking of readership, surveys conducted by independent research, engineering, and airframe organizations show a remarkable trend the past year to AVIATION WEEK in votes for "first choice" magazines in this field. The last election, conducted in the engineering department of one of the largest West Coast aircraft companies, showed 84 first choices for AVIATION WEEK, against five first choices for Magazine B, the second runner.

The only answer we can think of to this response is to make AVIATION WEEK ever better. So several announcements of new editorial service will be made in the new future.

ROBERT H. WOOD



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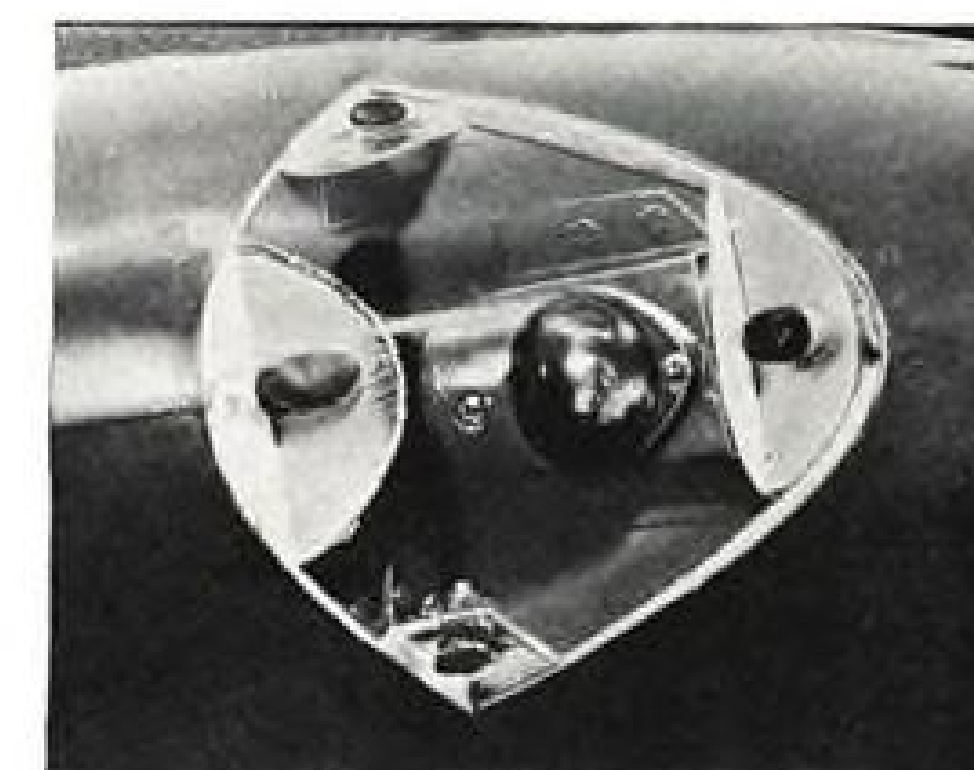
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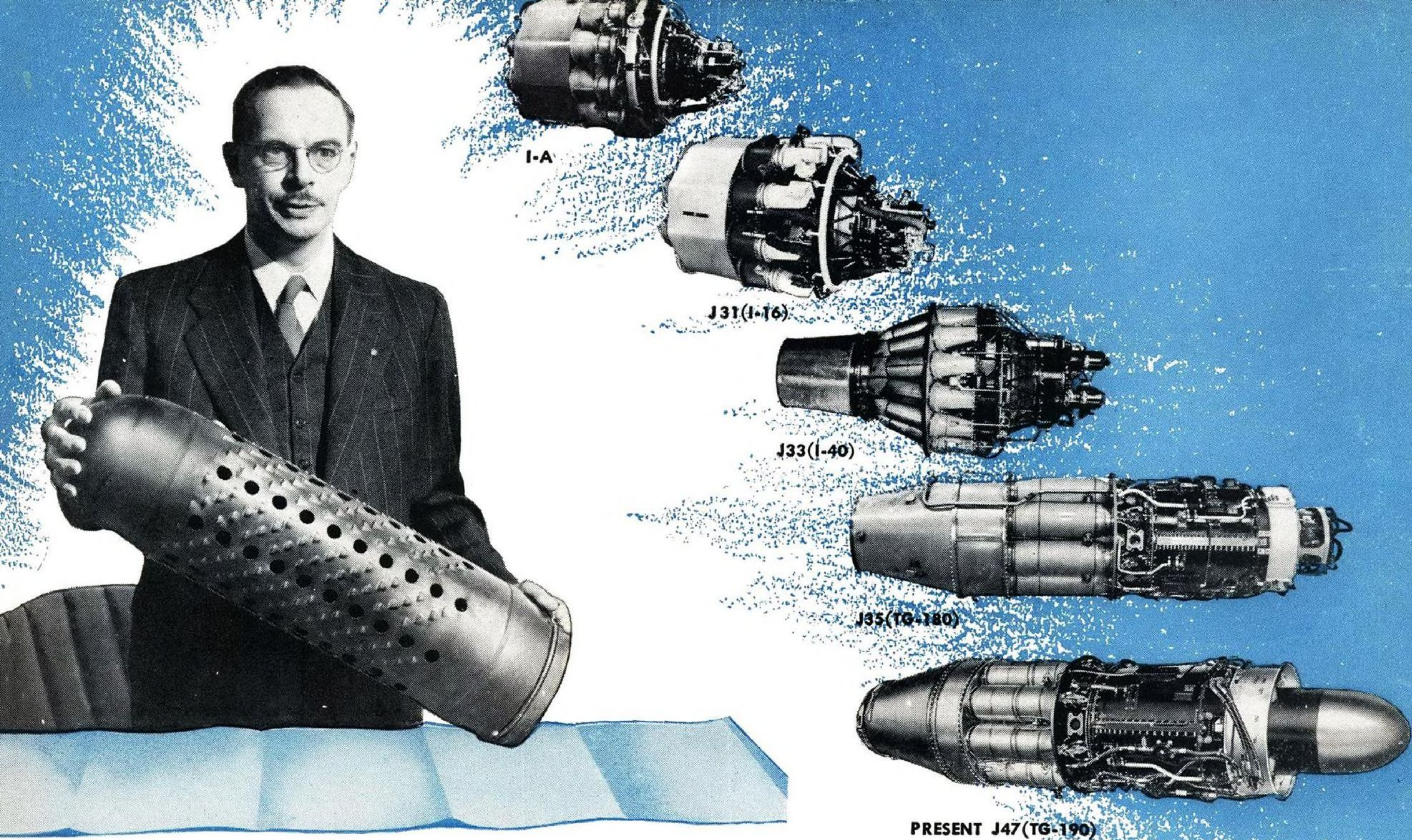
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Many G-E engineers such as "Truly" Warner are working today to provide new and better products for you and the aviation industry. Your nearest G-E representative will describe in detail the aviation products we engineer and manufacture. See him today. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

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