

# AVIATION WEEK

SEPT. 3, 1951

50 CENTS

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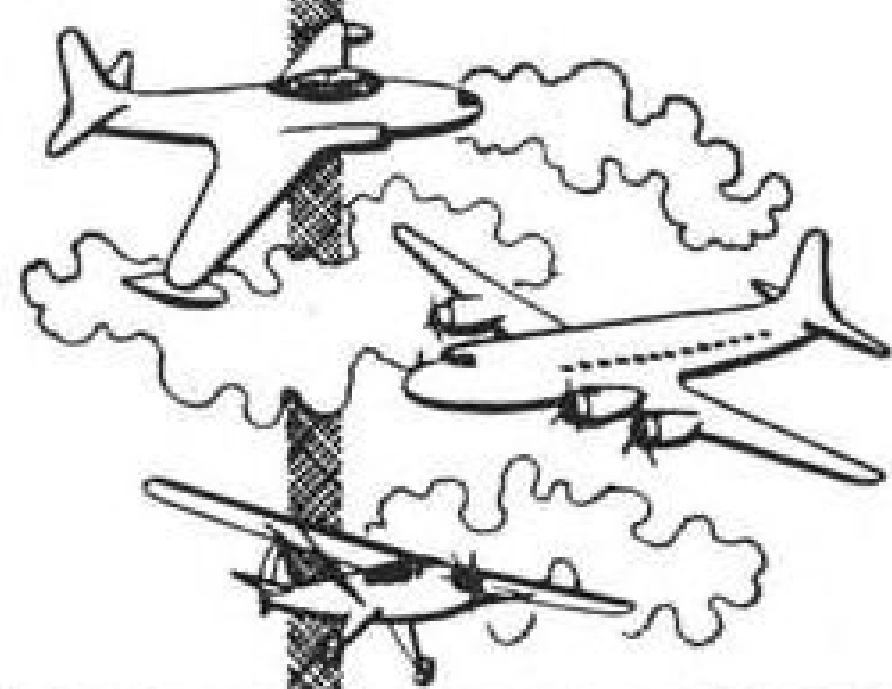
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# Aviation Week



Member



Volume 55

September 3, 1951

Number 10

## Headline News

Materials Lack Hampers Industry.... 13  
Global Jet Service..... 14  
Dispersal: A Guide for Tomorrow... 14  
Lockheed Steps Into Cargo Ring.... 16  
NAA Files Suit to Protect Name.... 16  
Maneuver Widens AF, Army Gulf.... 17  
Busy Beaver..... 18

## Aeronautical Engineering

Refinements Aid Metal Studies..... 21  
NACA Tunnel Range Boosted..... 25  
Avro 707A Study..... 27

## Avionics

Jet Trainer Parts Go Miniature..... 31

## Production

Tailored Tools Speed Ryan..... 33

## Equipment

Unit Controls Jet Starter Current.... 38

## Financial

Airline Net Climbing..... 43

## Air Transport

CAA Testing Terminal Baby Omni... 44  
Emery Sets Forwarding Pace..... 45  
Machines Ease Counter Problem.... 46  
Need Seen for Shoulder Harness.... 47  
TWA Plans More Air Coach Service.. 48  
New Services for Alaska-Northwest. 48  
Mail Pay Accounts..... 49

## Departments

News Digest..... 7  
Aviation Calendar..... 8  
Picture Page..... 9  
Who's Where..... 11  
Industry Observer..... 11  
Washington Roundup..... 12  
NACA Reports..... 28  
Letters..... 58

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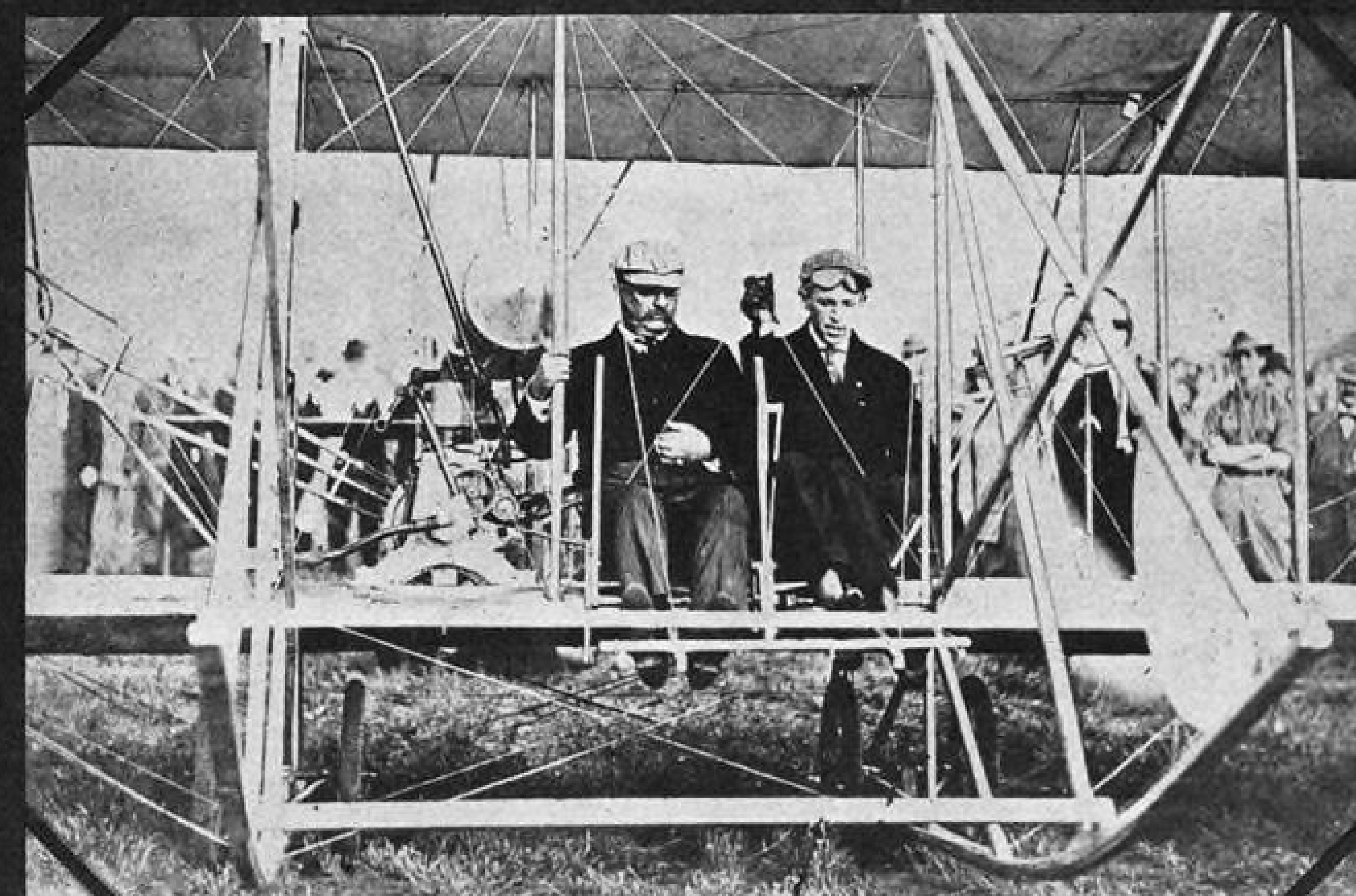
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# "T.R." TAKES TO THE AIR...



One of the earliest VIP's to fly was "Teddy" Roosevelt. In October 1910, Roosevelt flew with pioneer pilot "Arch" Hoxsey at the St. Louis Aero Club flying meet.

LEGEND says that Theodore Roosevelt asked Arch Hoxsey for permission to fly the machine himself shortly after takeoff. Perhaps he followed through on the controls briefly, but there is no record of the former Chief Executive actually flying a plane.

Hoxsey was a member of the Wright Flying Team. Piloting his 4-cylinder Wright biplane (span 39 feet, chord 6 feet 6 inches RPM 450), Hoxsey captured an altitude record at Los Angeles

in 1910. That same year he set an American record for "sustained flight" with a trip from Springfield, Illinois to Clayton, Missouri.

Daring exploits fill the pages of flying's history. And paralleling this record of adventure is another record of sober, scientific research. In one phase of this research, that of aviation fuels and lubricants, Phillips Petroleum Company has played a conspicuous part. Phillips has long been a leader in the

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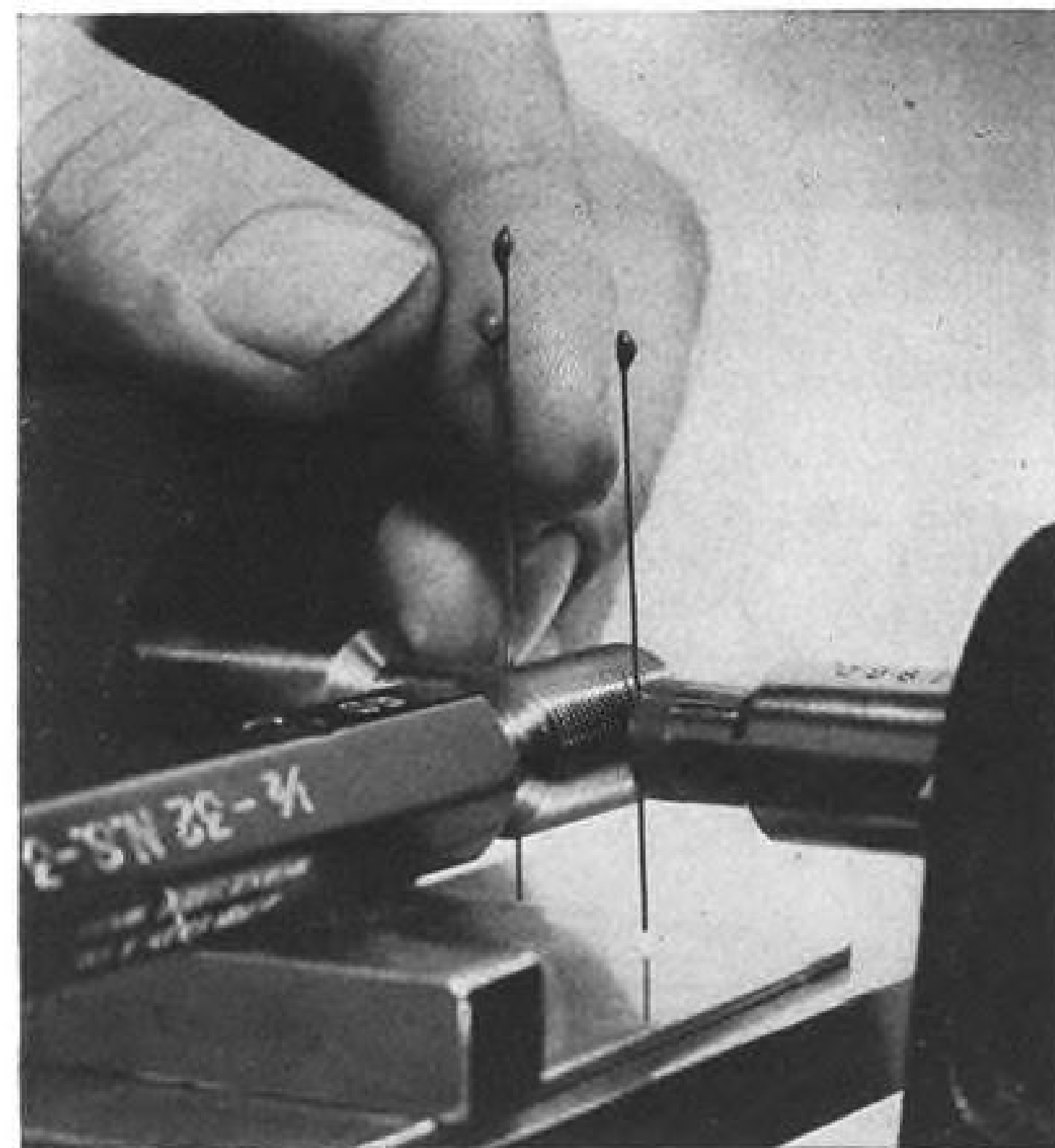
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## NEWS DIGEST

### DOMESTIC

Los Angeles Airways' mail helicopter crashed Aug. 27 killing Pilot Carl Crew and demolishing the S-51. Preliminary check indicates that a rotor blade flapping link lug gave way, permitting the blade to separate from the rotor head, while the craft was hovering 200 ft. over Lynwood-Compton heliport. The crash cuts LAA down to three copters, necessitating a temporary rearrangement of mail routes.

Lt. Gen. Kenneth B. Wolfe, who retired July 1 as USAF Deputy Chief of Staff, Materiel, has been appointed president of the new Oerlikon Tool & Arms Corp. of America, subsidiary of the Swiss Oerlikon Machine Tool Works. Gen. Wolfe has offices in the Duryea Building, 1731 L St., N.W., Washington, D. C., pending final arrangements for other facilities of the new firm.

Sikorsky and Bell helicopters have participated in more than 5,500 rescues and evacuations of personnel in the Korean theatre.

Howard Hughes has postponed scheduled launching of his big, eight-engined flying boat "because of problem concerning the powerplant (P&W R-4360 Wasp Major) which had arisen at the last minute." A spokesman for the firm said that the launching may be postponed about three months and has approval of RFC. The plane was last flown in November, 1947.

Chrysler Corp. will build P&W J-48 Turbo-Wasp jet engines for the Navy in a 1.6-million sq. ft. plant to be built in Detroit. The order is estimated at about \$400 million.

UAL pilots are free to strike at any time, now that the National Mediation Board has withdrawn from settlement efforts, says Air Line Pilots Assn. ALPA's executive committee is said to have promised to give United 72 hours notice before going out.

Col. Kenneth E. Fields has been named director of the Atomic Energy Commission's division of military application, succeeding Brig. Gen. James McCormack, Jr., assigned as a special assistant to Deputy Chief of Staff, Development, USAF.

Purchase of a 35-acre tract near Bristol, Tenn., for erection of a guided missile plant has been approved by the Senate and House committees on armed services.

UAL DC-6B crashed near Oakland, Calif., while making an approach to the airport killing all 44 passengers and six crew members. It was the first DC-6B to crash. The FBI was assisting in the investigation.

A Convair B-36 plowed into a parked sister ship at Travis AFB when its brakes failed, crumpling the hit plane's wing and stoving in its fuselage.

Maj. Gen. James F. Phillips has been appointed commanding general of the USAF research center at Cambridge, Mass.

The 81st Fighter Wing, comprising 75 NAA F-86 Sabres and 1,800 men, is the first American air unit to be based permanently in England since World War II. First squadron of the outfit has already arrived in Britain and two more are due soon. The 81st is being integrated into Western European air defenses.

### FINANCIAL

Solar Aircraft Co. net profit for the company's first fiscal quarter ending July 31 was \$248,300 on total sales of \$10,452,500 after provision for renegotiation, federal income and excess profits taxes. Backlog currently is \$78,800,000.

Northwest Airlines reports operating revenues during July totaled \$4,676,652 with earnings after provision for taxes being \$389,803. Passenger revenues during the month came to \$3,636,113 and mail revenues were \$609,576.

National Airlines has reported a record net profit of \$2,589,073 for the fiscal year ended June 30, with fiscal 1951 revenues of \$24,554,760 up 54% over the previous fiscal year.

Lockheed Aircraft Corp. voted a dividend of 30 cents per share of the new stock resulting from a 2-to-1 stock split authorized recently, payable Sept. 14 to holders of record on Aug. 24.

Northrop Aircraft, Inc., has voted a 25-cents-a-share dividend payable Sept. 14 to holders of record on Aug. 28.

### INTERNATIONAL

Handley Page H.P. 88 research jet plane, featuring wings that are swept back and then forward, exploded and crashed during a flight test.

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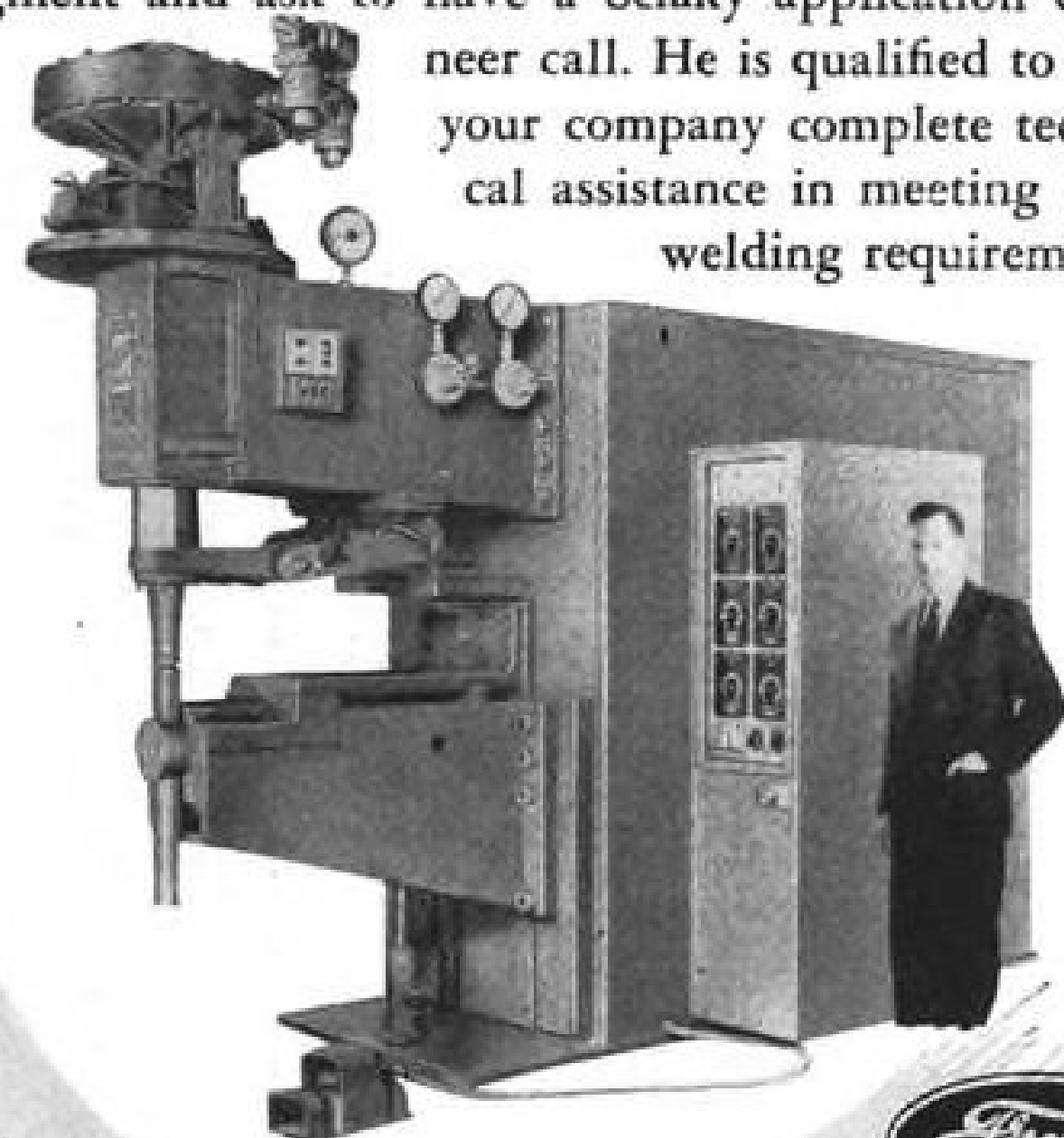


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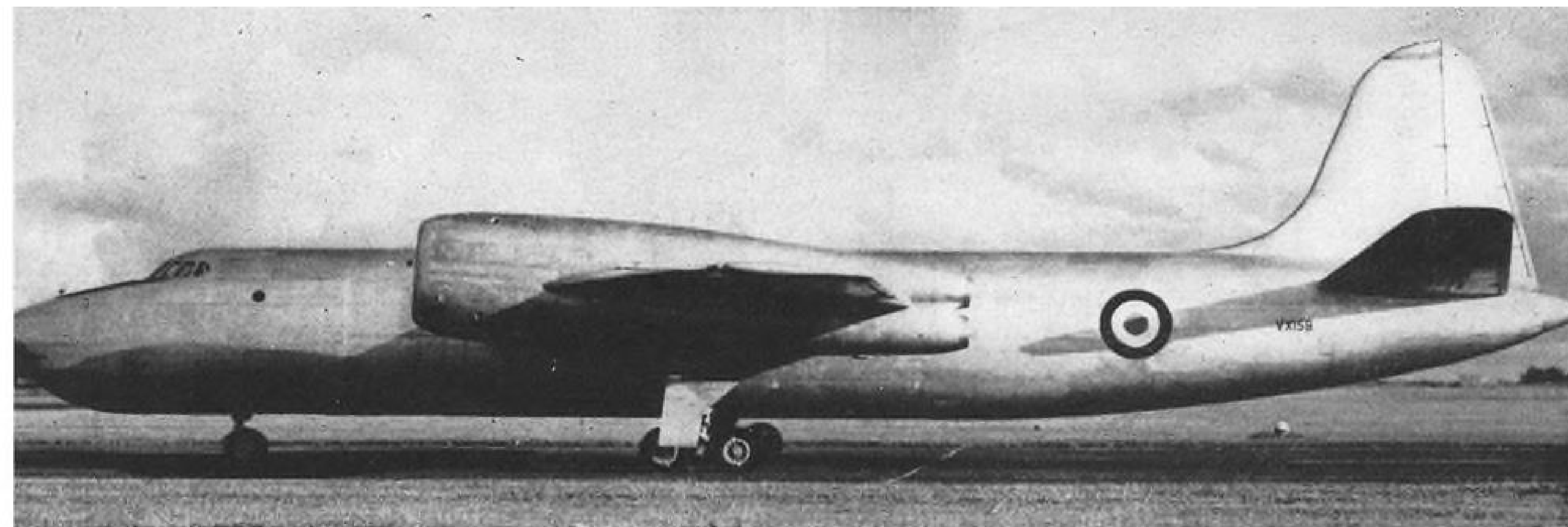
SAY "SEE-ACKY"

## AVIATION CALENDAR

- Sept. 3-7—Royal Aeronautical Society-IAS third international aeronautical conference, Brighton, Sussex, England.
- Sept. 10-14—Sixth national instrument conference and exhibit sponsored by the Instrument Society of America, Sam Houston Coliseum, Houston, Tex.
- Sept. 10-16—Seventh annual general meeting of the International Air Transport Assn., Westminster School, London, England. Program includes one-day visit to SBAC Farnborough show.
- Sept. 11-16—Twelfth flying display and exhibition of the Society of British Aircraft Constructors, Farnborough, England.
- Sept. 15—Air tour to Nantucket Island, Mass., sponsored by the Nantucket Flying Club, Nantucket Memorial Airport, Mass.
- Sept. 17-19—15th annual convention of the International Northwest Aviation Council, Jasper National Park, Alberta, Canada.
- Sept. 18-20—Meeting of the meteorology committee of the Air Transport Assn., Greystone Lodge, Denver.
- Sept. 20—Aviation Writers Assn., luncheon, with featured guest speakers. Wings Club, Hotel Biltmore, N. Y. C.
- Sept. 26-28—Fall meeting of the American Society of Mechanical Engineers, Hotel Radisson, Minneapolis.
- Oct. 2-4—Seventh annual aircraft spark plug and ignition conference sponsored by the Champion Spark Plug Co. of Toledo.
- Oct. 3-6—Annual national aeronautical and engineering display and aircraft production forum, sponsored by Society of Automotive Engineers, Biltmore Hotel, Los Angeles.
- Oct. 8-10—Special conference on aircraft electrical applications, sponsored by the air transportation committee of the American Institute of Electrical Engineers and the Los Angeles section of the Institute, Hollywood Roosevelt Hotel, Hollywood.
- Oct. 11-12—1951 conference on airport management and operation, University of Oklahoma, Norman, Okla.
- Oct. 16-17—Fourth annual New York State conference on airport development and operations, sponsored by the N. Y. State Dept. of Commerce, N. Y. Aviation Trades Assn., Assn. of Towns of the State, Conference of Mayors, County Officers' Assn. and the N. Y. State Flying Farmers, Onondaga Hotel, Syracuse, N. Y.
- Oct. 20-30—Air Industry & Transport Assn. of Canada annual general meeting, Seignior Club, Montebello, Quebec.
- Oct. 24-25—1951 annual convention of the National Assn. of State Aviation Officials, Arizona Inn, Tucson, Ariz.
- Oct. 31-Nov. 1—Society of Automatic Engineers, fuels and lubricants meeting, Drake Hotel, Chicago.
- Nov. 7—Annual Wings Club Dinner, Waldorf-Astoria, New York.

### PICTURE CREDITS

9—(S. A. 4) Keystone; (F2H-2P) McDonnell; (Swift) McGraw-Hill World News; (Sabre) Edgar Delgan; 13—Fairchild; 14—Ray Blomberg; 17—McGraw-Hill World News.



**BRITAIN'S LATEST JET BOMBER**—First photo of the new Short S.A.4 bomber powered by four Rolls-Royce Avons, mounted in pairs one above the other. Carrying a crew of five, the big new plane has a deep fuselage, and four-wheel bogie landing gear.

## New Developments in Military Aviation



**PHOTO BANSHEE**—McDonnell F2H-2P has had its nose extended and enlarged to take six different types of cameras for photo reconnaissance at 50 to 50,000-ft. altitudes.



**RAF'S NEW SWIFT**—In quantity production for RAF fighter squadrons, the new Rolls-Royce Avon-powered Supermarine Swift shows its irregular planform, sweptwing while in a bank.

**PROBE-FITTED SABRE**—Special air-to-air refueling probes are fitted on the wing tanks of this NAA F-86E, (below) indicating USAF is still interested in British probe-and-drogue system. Differences from the Boeing Flying Boom setup are that several fighters can be fueled simultaneously from one tanker, and extensive modification of the receiver plane is not required. This plane is based at Eglin AFB, Fla.





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**WHO'S WHERE**

**In the Front Office**

A. A. Rorison has been named vice president and secretary-treasurer for Vic Patushin Industries, Los Angeles. His previous post was as comptroller.

**Changes**

W. W. (Bill) Rutledge has been transferred from Seattle to Wichita plant of Boeing Airplane Co. to act as assistant factory manager on the B-47 program, and will have as his assistant J. J. (Jack) Clark.

Robert R. Allen has been appointed assistant general manager for the Revere Corp. of America. Other changes in the firm include: Joseph V. Fox to manufacturing manager, Francis D. Costello as production control superintendent, and Rear Adm. Henry G. Williams (USN, Ret.), has been designated director of customer relations.

Harlan C. Pringle has been placed in charge of Simmond Aerocessories' new branch office in Dallas.

Ned Root, formerly Lockheed publicity manager, has been made public relations manager of Consolidated Vultee Aircraft.

Leslie R. Parkinson, previously head of the mechanical and aeronautical engineering departments, Syracuse U., has joined Wright Aeronautical Corp. as staff engineer.

Clyde W. Hull has been designated assistant manager of manufacturing for Solar Aircraft at San Diego and Raymond W. Brick has been named purchasing agent. Hull's post as manager of the firm's New York office will be filled by Harry K. Erb.

James W. Shipp has been appointed deputy regional administrator of CAA's Second Regional Office at Atlanta and W. Wright Holland has been made executive assistant of the region.

Group Capt. Walter H. Sutton has been appointed senior staff officer, RAF Transport Command, with the acting rank of Air Commodore.

Maj. W. F. (Bill) Long has resumed active control and management of Love Field's Dallas Aero Service, Tex. H. B. Sutton has been made director.

Whitney Bowles, formerly international sales representative for Slick Airways, has been named supervisor of commercial sales covering entire North America for Scandinavian Airlines System.

Leendert C. Zonruiter has been designated administrative manager to Air France's general manager of the North American and Caribbean division.

**What They're Doing**

Warren E. Carey has submitted his resignation to the California Aeronautics Commission, effective Nov. 1, as state director of aeronautics. He has held the position for four years. The commission is asking industry assistance in locating a man qualified to fill the post.

**INDUSTRY OBSERVER**

► The almost intact MiG-15 fighter which was fished up July 21 by combined U. S., British and ROK navy parties out of 17 ft. of water on a mudflat near Namchon after it was shot down by a USAF F-86 is going to Cornell University aviation laboratories for engineering analysis, and possibly reconstruction. It was first discovered in photographs made by British planes from the carrier Glory. It was ordered to Cornell after a brief examination at AMC laboratories Wright-Patterson AFB.

► Watch for a possible comeback of a new and faster North American B-45 four-jet bomber with a new wing, either much thinner or swept. The airplane in its present status as a photo-reconnaissance craft was proved out in Korea, although the first loss of a B-45 in enemy territory was reported recently.

► A new version of the Douglas C-124 four-engine heavy transport now in development will have a rear cargo door arrangement 9½ ft.x11 ft. so that the airplane can be loaded from the rear as it is unloaded from the nose. Door is to be designed with elevator characteristics, able to lift a 13,000-lb. load into the plane.

► Australian National Airlines Commission has ordered cancelation of orders for six British Vickers Viscount turboprop planes, after the Australian government refused permission to import duty-free kerosene to operate the airplanes. Decision on what new equipment will replace the canceled Viscounts has not been disclosed.

► The McDonnell Banshee F2H-2 fighter now in service with Navy carriers in Korea, is described as the first service-type fighter with an initial rate of climb of 9,000 ft./min. in a recent company announcement.

► Most likely theory thus far in the investigations of an emergency landing of an Eastern Air Lines Constellation in a field south of Richmond, Va., in July, is that the storm through which the plane was flying shook open an hydraulic access door near the upper leading edge of the wing. The open door set up a vibration which shook the aircraft violently causing the pilot to decide on an immediate landing.

► An Allison J-35 turbojet engine reached the 1,000-hr. mark without major overhaul on Aug. 17 at Hamilton AFB, California. The engine, delivered to the 78th Fighter Group at Hamilton in 1949, had powered seven different F-84s, underwent six minor repairs at a total cost of \$5,500. It has been shipped to Oklahoma City AF depot for evaluation.

► Minneapolis-Honeywell is producing a highly sensitive "rate-gyro" presently used for correcting any deviations in flight of some guided missiles. Its design was an MIT theory turned down by several other manufacturers as impractical after production engineering attempts failed. Honeywell, however, still rejects one out of two from its production line. Airlines may well watch auto pilot and approach coupler development by Minneapolis-Honeywell first reported in AVIATION WEEK Jan. 1, p. 35, and subsequently placed on classified list by Navy Dept.

► Transfer of USAF parachute testing activity from Wright-Patterson AFB to the new Joint USAF-Navy Parachute Development Center at El Centro (Calif.) NAS, points toward greater centralization of procurement and standardization of chutes for both services. Evaluations will be made on parachute escape systems, aerial cargo supply systems, chute recovery systems and parachute air brakes.

► Convair's XC-99 six-engine giant cargo plane now fitted with new landing gear permitting takeoffs at gross weights up to 320,000 lb. is expected to get USAF sanction for a proposed transcontinental air mail test run or runs, if the Post Office Department will okay the experiment.

► Continental Can Corp. recently purchased the Dickerson Co. of Coffeyville, Kan., a small subcontractor on the Boeing B-47 program. This is one of the can company's first moves to get into the growing aviation production field, as its civilian business begins to feel the effects of materials shortages.



## Washington Roundup

### Race for Atomic Weapons

Competition among the three services for application of the atomic tactical weapons that probably hold the key to future military strategy is sharpening.

Air Force last week put itself squarely in the race. Major addresses by USAF's Secretary Thomas Finletter and Chief of Staff, Gen. Hoyt Vandenberg overlooked the long-range bomber and the annihilating atomic bomb, significantly. Their subject: USAF's new role of wiping out mass armies through thrusts of atomic artillery and missiles from tactical aircraft.

Army's Chief of Staff, Gen. J. Lawton Collins, was first, last January, to acclaim the future of atomic tactical weapons. His slant: Atomic artillery and radioactive dust for frontal attack and atomic-tipped missiles for advance thrusts will minimize the need of tactical air support for ground actions.

The looming strategy of wiping out mass armies holds these two fundamental advantages over strategic bombing tactics:

- It doesn't raise the moral issue of slaughtering non-combatants.
- It opens the way for "holding" territory—lessening the prospect for the reconstruction burdens that come from "bombing out" enemy homelands. This dovetails with U. S.'s foreign policy aim of winning allies—other nations want assurance that their territories won't be over-run.

Finletter commented: Air Force is planning new atomic weapons of tremendous striking power that could "bring atomic power to bear directly on the enemy's ground forces. Here we are entering into a new terrain and we shall use all the imagination we possess to see to it that effective use will be made of atomic weapons against profitable targets in the ground battle area."

Vandenberg explained: Atomic tests have "created a new mission for the air—retardation on the battlefield."

### Air Power Build-Up Postponed

A boost in air power goals is out for another year. But an increase in present air power targets—a 95-wing Air Force and 15 carrier group Naval air arm during 1953 fiscal year—which starts next July 1—is a virtual certainty.

This is the word top Defense Department officials have passed on to the Senate Appropriations Committee.

Reason for the postponement: Makers of planes, parts and equipment can't handle the additional production load, Senate Appropriations committee members say. Administration has "dilly-dallied" in getting mobilization underway and smoothly rolling, they complain.

Capacity is already being strained to meet orders under the 95-wing program, defense chiefs report. Deliveries are lagging, and with them, USAF and Navy expenditures for plane buying. Senate Appropriations Committee is going to convert a substantial part of the \$10 billion for USAF and the \$3 billion for Navy aircraft procurement in the \$60 billion 1952 fiscal year budget from cash to contract authorization.

One committee member explained: "What's the point of appropriating more money and letting orders to gather dust in files for another year? What we're going to be doing between now and next July is expand the productive capacity to build the planes for a 150- or 163-

wing Air Force and bigger Naval air arm—not build the planes for 150 wings."

The administration is expected to ask for \$5 billion more for the services shortly—largely to step up industrial production.

But don't look for additional funds this year for aircraft procurement unless international developments change Administration plans.

### Senate Fight?

As the time for decision on the future military program draws near, inter-service rivalry is percolating in three quarters. This is the outlook:

First showdown is due this week in the Senate. Sen. Henry Cabot Lodge wants to tack funds for a 150-wing Air Force program onto this year's \$60-billion budget and, in effect, shove the USAF build-up down the Pentagon's throat.

But, Lodge's move will probably fizzle. Administration leaders will point out: Military chiefs are reviewing the defense program, including the air power build-up, so let them decide it. Most senators, uneasy over swelling federal spending, are likely to follow.

Sen. Robert Taft's campaign for an all-out build-up of strategic air power in lieu of a "ground war" operation in Europe has undergone a fadeout. Taft and his lieutenants aren't going to try to slash Army funds and channel them into USAF as they urged months back.

Taft's military policy now is: Since the Administration has committed the U. S. to defend Europe, Congress should support Gen. Dwight Eisenhower's efforts.

### Pentagon Fight?

The Joint Chiefs of Staff and Secretary of Defense are scheduled to decide over-all policy questions and arrive at a 1953 fiscal year military program on Sept. 10. The program then goes to the Administration for review.

The crux of inter-service differences: Navy wants USAF's ceiling at around 110 wings, more emphasis on expansion of Naval air. And Army and USAF are at odds over tactical aviation.

### Open Fight?

A curtain-raising on all the defense facets by House Armed Services Committee seems inevitable shortly after members return from vacation Sept. 12.

The time is long past due to change the statute that sets USAF's strength at "not to exceed 70 groups." And committee chairman Carl Vinson wants to grab the ball from the Administration in determining the new air power dimensions.

Department of Defense has asked a simple repeal of the strength provision. This would leave USAF's size to Administration decision.

Vinson wants authorization for 163 wings, including 138 combatant wings—more modest than the Lodge proposal for 150 combatant wings—spelled out in law.

Committee members, led by Rep. Sterling Cole, want two issues at the heart of service differences packaged into the hearings on USAF's future composition:

- A comparative evaluation of Navy, Marine, and USAF tactical air techniques.
- Transfer of USAF's tactical air arm to Army control.

—Katherine Johnsen

# AVIATION WEEK

## Materials Lack Hampers Plane Industry

### Civilian production continues to bite into scarce supply while aircraft plants wait.

By Alexander McSurely

The U. S. aircraft industry is beginning to find out about its materials shortages—the hard way.

Controlled Materials Plan, as was anticipated, is spinning its wheels in getting started. The builders of U. S. air power are definitely feeling the pinch of scarce materials and will continue to feel it through the fourth quarter of this year and well into 1952, before additional materials capacity eases the situation.

► **Production Facts**—Despite any urgency for increased air power which the Department of Defense may voice, the facts are:

- **Civil production.** The continuing high rate of civilian production is taking a large share of available materials.
- **Aircraft production,** along with other defense production, is not getting what it is asking for.

Meanwhile, on Capitol Hill, there is a paradoxical situation. (See Washington Roundup). Congressional sentiment is to cut back proposed increases in air power funds on the theory that production cannot be increased to use up the additional funds, if they were provided.

► **Structural Steel**—One of the most direct blocks on early growth of aircraft productive capacity is the shortage in structural steel. Allotments for structural steel are being made on a basis of the importance of construction to the defense picture. The military services are looking out for their own new base expansions and construction and such groups as the Atomic Energy Commission have the highest priority ratings. Then too, there is high priority for construction of additional machine tool facilities and for construction of additional facilities for production of steel and aluminum.

That leaves aircraft plant programs (although they are for direct military aircraft production, in many cases) well down the priority list.

For example, Lockheed and Northrop, builders of radar-equipped night fighter interceptors, vital to our air defense setup, find their proposed new buildings that are well down on Plant

Expansion Group Lists No. 2 and 3.

In a number of cases, U. S. aircraft plant expansion is shorted on structural steel by preference given foreign building programs, it is reported.

► **CMP Allotments**—Some Pentagon sources describe the across-the-board slash which the Aircraft Production Resources Agency had made on requested aircraft CMP allotments for the third quarter, as a "necessary solution to a bad problem that had to be solved too quickly." It is understood that virtually all the aircraft manufacturers have filed for restoration of allotment cuts but that very few restorations could be made under the total amount of controlled materials which were slated to be allotted for aircraft.

While virtually all the manufacturers also have filed for increased allotments in the fourth quarter, chances look equally dim for increased aircraft materials allotments then.

► **Machine Tools**—Sources close to the machine tool bottleneck forecast that tooling capacity problems are on their way to solution, with the promised adjustment of pricing levels and with high priority on building requirements going to the machine tool plant expansion.

But the recent statement of Clay P.

Bedford, Deputy Defense Production Administrator for procurement and production, is probably too rosy, aircraft people believe, when he says: "The road is now clear, the machine tool industry is steadily increasing its output and we will get the machine tools we need without further delay."

Some other relief steps that are being contemplated by government would involve fuller utilization of Navy machine tools now available in Navy facilities for new defense production. One suggestion is to take the tools from the facilities, but another which the Navy prefers, is to have them utilized on the spot.

► **Forging Situation**—A critical temporary situation in aircraft forgings continues as a result of after effects of the Alcoa forge plant strike in Cleveland. A reactivated forge plant which Willys Overland is operating at Erie, Pa., is not yet getting any high rate of production due to shortage of skilled workers, principally die sinkers and hammer men.

Carrying the brunt of the forgings load currently are the Cleveland plant and the Wyman-Gordon Co. at Worcester, Mass. While Alcan (Aluminum Co. of Canada Ltd.) is coming increasingly into the forgings picture in this country, despite opposition of some American producers.

► **APB a Bright Spot**—Seen as a bright spot in the overall scene is the advent of Harold (Bill) Boyer, Aircraft Pro-



**WHEN THE BOTTOM IS LOWERED**

Fairchild XC-120 Pack Plane was among Detroit. Interesting shot shows belly construction when pack is detached.



duction Board chairman, as a new voice at policy making levels, to make the aircraft industry's problems heard. Boyer gets a large share of credit among aviation industry people for getting the increasingly serious machine tool problem on its way to solution, as his first job after he moved in. They liked it and are anxious to see more of it.

► **Warehousing Materials**—Action is being taken to remedy the oversight which left aircraft materials for warehouses out of CMP. The aircraft industry has long depended on these "private" stockpiles for thousands of requirements because of the relatively small scale orders which any one aircraft builder can place at one time. Practice has been for the warehouses to buy mill runs of various stocks, which are too large for any one plane builder to use, singly, and then sell them in less than mill run lots to the aircraft companies. A typical aircraft company may stock as many as 36,000 separate items of materials, many of them ordered in this manner, from warehouses.

► **Titanium**—Advent of greater quantity production of titanium is looked forward to, next year, as an approaching relief to some of the critical alloy steel problems. Production rate is expected to be stepped up to around 600 tons a year, by the end of this year.

It should go to about five times that figure, by the end of 1952, after a Titanium Metals Co. plant in Nevada gets rolling.

While the airframe makers have their problems too, probably the hardest pressed manufacturers in aviation, as regards tooling shortages, scarce materials and forging shortages are the engine companies. An effort to use single-purpose machine tools in order to get around tooling shortages is proving effective to a limited extent, but it is obviously upping the production costs over what they would be if the same work was done with more modern and complex tooling especially adapted to the job.

## Global Jet Service

Britain is moving fast toward forging a commercial jet-transport ring around the globe.

Latest move: preliminary conferences at Sydney, Australia, planning 20-hr. Sydney-Honolulu service by de Havilland Comet the end of next year. Each Comet would carry 42 passengers.

This would be provided by British Commonwealth Pacific Airways, using two Comets.

Meanwhile, British Overseas Airways is breaking in the Comet on the London-Cairo run, with London-Sydney next on the list. And Canadian Pacific Air Lines, with a Vancouver-San Francisco-Honolulu run, has two on order.

## Dispersal: A Guide for Tomorrow

While future construction may be away from crowded areas, present aircraft plants appear to be set.

Major U.S. aircraft manufacturers, even those in exposed coastal areas, need not expect their present plants to be affected materially by the recent renewal of public policy emphasis on plant dispersal for protection against enemy attack.

Air Force Undersecretary John A. McCone has stated, in reply to an AVIATION WEEK inquiry, that he considers the principal plants furnishing the planes and equipment for the 95-wing Air Force are already set.

And he does not expect the directive issued by Defense Mobilizer Charles E. Wilson calling for a 60-day suspension of tax amortization concessions on war plant expansions to affect seriously further expansion needed for USAF programs, even on the 163-wing level recently proposed by Rep. Carl A. Vinson.

► **Presidential Call**—President Truman's call upon all government agencies to do what they can to direct dispersal of industry away from heavily populated areas is not interpreted as a demand to move away existing modern plants. It is seen more as a directive to avoid further concentration in areas where much concentration already exists.

Meanwhile Congressional attacks on the Truman plant dispersal policy as "opposing the will of Congress" may

further delay any concrete action as to dispersal of industrial centers.

Sen. Edward Martin has introduced a bill to amend the Defense Production Act, prohibiting the executive departments and agencies from putting into effect the dispersal program called for. Martin denounced the NSRB dispersal plan as a "long term economic and social program which could disrupt the successful pattern of American industry," and called it "absolute power to impose a death sentence on any American industry—all in the name of national defense."

The Truman message to government agencies said that in the years since 1945 more than \$18 billion had been spent in new plants and equipment, but that during that time, except for a few instances, there has been no pronounced trend away from the heavily populated centers.

"Although we are increasing our defense efforts," he said, "the danger of atomic attack grows and demands that new and more positive policies be put into effect to obtain added security for our industrial establishment without jeopardizing its industrial efficiency.... Our policy, therefore, must be directed toward the dispersal of new and expanding industries."

► **Write-Off Slow-Down**—Defense Mobilizer Wilson directed Manly Fleischmann, Defense Production Administrator, to call a 60-day moratorium of the program under which the government allows defense manufacturers to amortize costs of construction of new facilities over a period of five years instead of the usual method followed up to and through World War II of 20 to 25 years.

The Wilson directive provided that defense DPA shall assure that the need for the dispersal of facilities, in accord with the new pattern established by the National Security Resources Board and approved by the President, is adequately recognized when certificates are granted.

Presumably this meant that future applications for certificates would stand a better chance for approval if they were made for plants located at a distance from other industrial concentrations, than if they were annexes to, or enlargements of, existing factories in already crowded zones.

Wilson in Defense Mobilization Order No. 11 declared a 60-day suspension order was necessary to review the entire rapid write-off tax amortization program offered to induce industry expansion.

"To assure consistency between the

granting of necessity certificates and the determination of expansion goals," Wilson said, "certificates shall be granted only for facilities that are included within expansion goal determined by the Defense Production Administration to be necessary to meet established requirements."

Because of the extremely tight situation in the availability of critical materials, he told Manly Fleischmann in a letter explaining his action, it is most unlikely that new facility construction can proceed beyond that now planned for several months, except for the most urgent projects. "In the light of this situation I am hereby requesting you to effect a general moratorium on the granting of additional tax amortization certificates for a period of at least 60 days, beginning Aug. 18."

► **Five Exceptions**—Exceptions to the general moratorium should be held to a minimum, he said. He cited five exceptions that could be made in urgent cases:

- Requests for amortization which expire Sept. 23 in accordance with provisions of the act.
- Amortization of facilities urgently required for production of specific military end items.
- Amortization of facilities urgently needed for expansion of critical raw material production.
- Amortization of facilities required to round out urgently needed expansion projects now under way.
- Amortization which will not require amounts of critical materials in excess of standards recently prescribed for facility construction.

► **Time for Review**—Wilson said the moratorium will afford opportunity for review of administrative procedures and criteria on which certificates are granted and percentages determined.

During early stages of mobilization it was essential to get expansion of facilities under way as rapidly as possible, and material shortages were not then a factor.

"As we move closer to the realization of expansion goals within specific categories," Wilson explained, "we should tighten our standards and adhere to specific rules wherever possible." This will result in lower percentages of amortization although there will be specific instances which will not fit the pattern, he said.

► **Dispersal**—Mechanics of dispersal is so knotty that few persons in government of industry have had the temerity to tackle it, a Defense Department spokesman declared. Idealistically, he said, industry, labor and government favor it. From point of practicality, however, it is not ideal economically.

In the case of the aircraft industry, as with others, manufacturers with government backing have expended huge

sums building permanent plants in present locations. Their personnel have become firmly entrenched socially and economically. In most instances the manufacturer has built near heavily populated areas that he can draw on for personnel. To move any industry from one geographic location to another would seriously damage the economic conditions of the company, its personnel and in a good many instances the city in which the plant is located.

Air Force and Navy, in broadening the U.S. industrial base, are asking for major production of end equipment in at least two separate geographic locations for each item. For example, production of the Boeing B-47 is under way at Wichita, at Tulsa and at Marietta. Navy on the other hand is building the North American F2J jet fighter at Columbus, Ohio, while the Air Force builds its counterpart F-86E at North American's Los Angeles plant.

Dispersal of major components, electronic systems and engines is also handled much in the same fashion, both by Air Force and Navy.

► **Your Plant a Target?**—Meanwhile, Jack Gorrie, acting chairman of National Security Resources Board issued a booklet entitled "Is Your Plant A Target?" explaining NSRB's stand on industrial dispersion, designed to minimize the effects of any atomic bombing attack on the United States.

In a foreword issued simultaneously with President Truman's policy letter on plant dispersal, Gorrie said, "The risk of an all-out atomic attack on the United States grows greater every day, since we are no longer the sole possessor

of the secret of the atomic bomb. This means that no industrial area in the nation can be considered safe from attack."

Industry can qualify for federal incentives by locating new plants within local marketing areas, the booklet emphasizes. These incentives are certificates for accelerated tax amortization, allocation of critical materials for construction, defense loans and defense contracts.

Gorrie outlined a four-point program to accomplish the hoped-for industrial dispersion:

- **Disperse new industry** and expanding industry, do not move established industry.
- **Do not build up one region** of the country at the expense of another region.
- **Industrial dispersion** can be carried out if deployment is confined to each local marketing area.
- **State and local governments**, in cooperation with private enterprise, will be called upon to take the initiative in this defense objective.

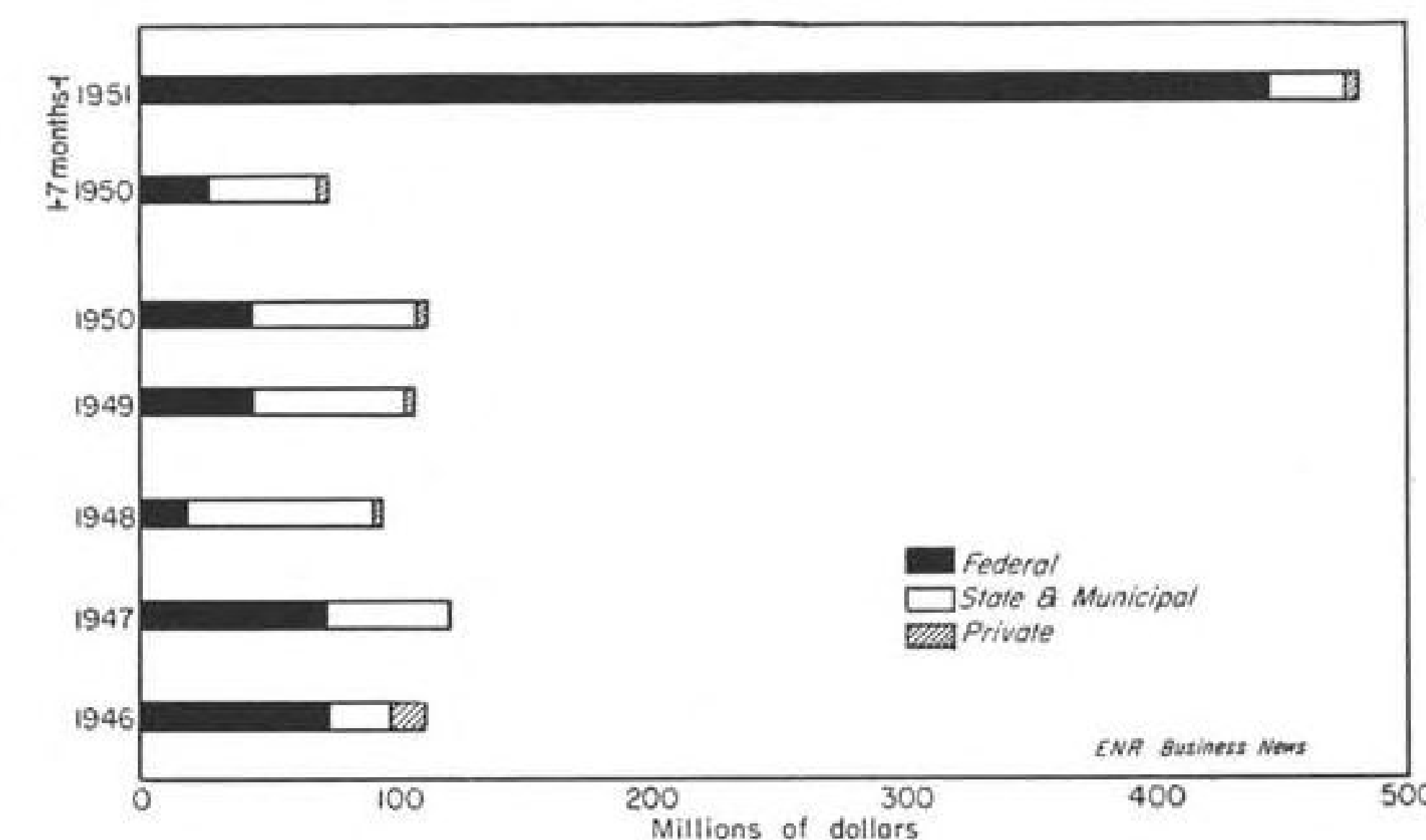
## Bell X-1D Destroyed In Mid-Air Mishap

A Bell X-1D research plane suffered a mishap just prior to launching from a B-50 over Edwards AFB on Aug. 23 and was jettisoned at 10,000 ft., exploding and catching fire in mid-air. The tiny research plane's pilot, Lt. Col. Frank K. Everett, scrambled to safety aboard the B-50 just before the X-1D was released.



**AIRBORNE TRAFFIC LIGHTS**

Installation of these plastic pilot directory systems on belly of Boeing KB-29 and KC-97 tankers has greatly reduced the number of aborts in refueling operations, particularly at night. The lights are automatically triggered by contact. Green center panel remains lit during proper contact.

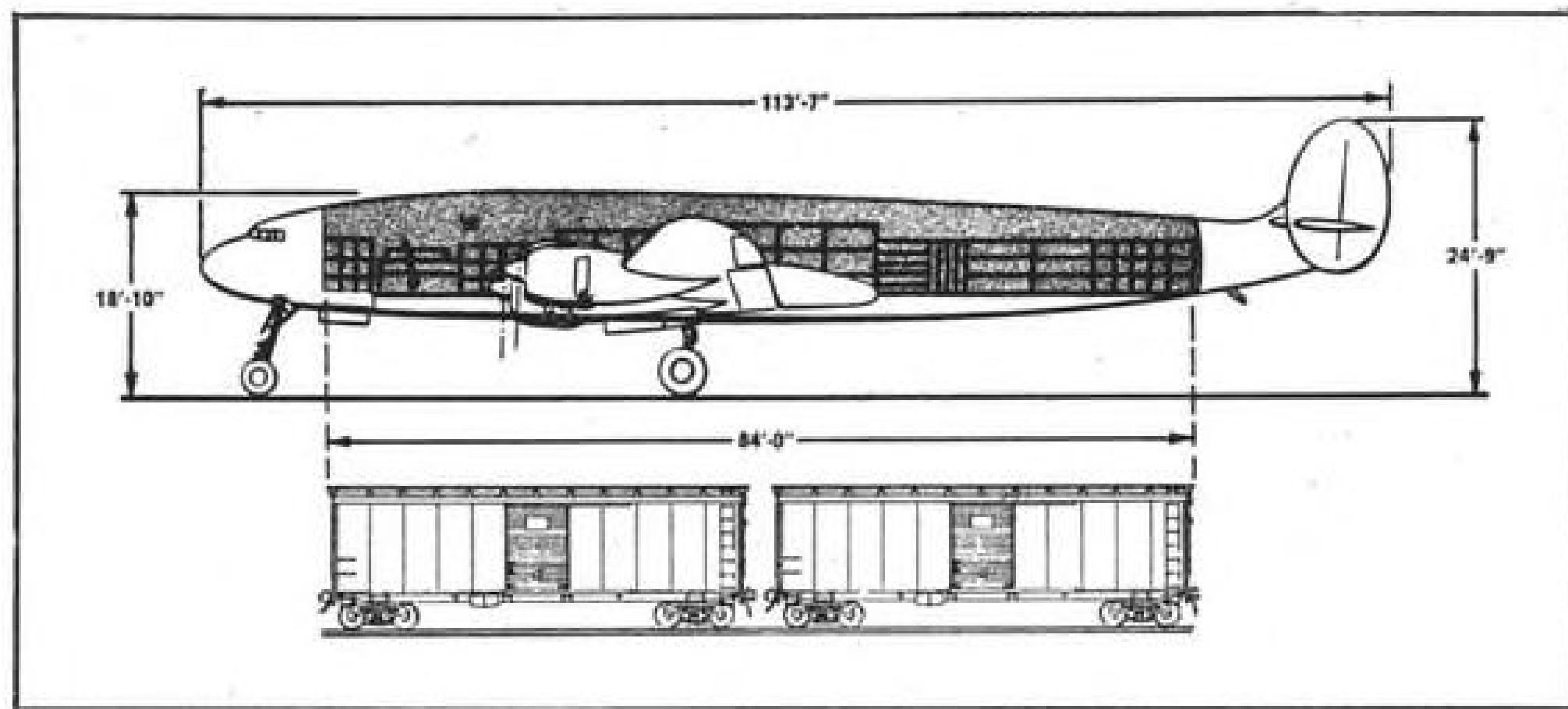


### FEDERAL AIRPORT WORK SOARS

Sharp increase in military airport construction volume is graphically shown above. Federal airport climbed 1,500% the first seven months of this year, compared with like period in 1950, to \$477 million and accounted for 93% of all airport work let. Federal contracts are being given for more airbases and expansion of present ones, with

emphasis shifted from hangars and buildings to runway extension and taxiways. Civilian airport work has dropped sharply, state and municipal fields getting only \$31 million, and private airports only less than one percent of the total thus far this year. The survey was compiled by Engineering News-Record, a McGraw-Hill magazine.





SUPER CONNIE FREIGHTER'S cargo space would exceed length of two box cars.

## Lockheed Steps Into Cargo Ring

Lockheed Aircraft has moved solidly into the growing air freight picture by offering to build on demand a new Super Constellation 1049B freighter capable of hauling cargoes coast-to-coast at a direct cost of 4.92 cents per ton mile using piston engines or at 3.5 cents for a 1049D turboprop version.

► **Heavyweight Contender**—The veteran West Coast transport builder unveiled a wooden mockup of its new contender for the world's heavyweight freight championship to 100 officials of 20 leading domestic and foreign airlines at an air cargo symposium at Burbank, Calif.

Although the company hadn't been talking air freight very much, it was evident that it had been waiting for the day when it had something to show, and with this display felt that now it could air its views. Lockheed Vice President-Chief Engineer Hall L. Hibbard keyed the company's optimism by telling the potential customers that cargo business would surpass passenger business in volume "before very long." He said further that Lockheed was thinking of future cargo planes which would bring the direct cost operating figure down to 2 cents a ton mile, but refused to guess the probable date of availability.

Lockheed studies, he said, show that air freight volume, exclusive of mail and express, can be expected to grow from 186 million ton miles last year to at least 445 million ton miles by 1955.

Airline people at the demonstration shared Hibbard's enthusiasm. One official stated his feelings bluntly, thus: "We have adopted entirely too lackadaisical an attitude toward freight. But the Flying Tigers and Slick have made us sit up and take notice."

► **When?**—When can commercial operators get their hands on some of the new freighters? They can be in production by 1953, says Lockheed President Robert E. Gross, if orders are placed soon. Military versions will be in full production months earlier. Turboprop

1049Ds would take longer, maybe not being ready before 1956.

From the exterior, the new 1049B Super Connie freighter will closely resemble the passenger version except for installation of a large 9 ft. 4½ in. x 6 ft. 2½ in. cargo door aft and a 5 ft. 1½ in. x 6 ft. 4¾ in. cargo door forward, also omission of windows. But internally, engineers report, it is a different airplane, with special reinforcement and extra-sturdy fittings to take harsh treatment and big loads.

The main cargo compartment, 84 ft. long, will exceed the length of two standard box cars, and will be capable of taking packages 73 ft. long. Total cargo volume will be 5,568 cu. ft.

Special cargo features will include watertight flooring of lightweight magnesium capable of taking loads up to 300 lb. sq. ft. or 1,000 lb. per lineal foot; an optional electric-powered conveyor chain built into the floor to facilitate stowing items up to approximately 12,000 lb. with maximum full load speed of 18 fpm.; steel ring cargo tie-downs of 3,680 lb. ultimate capacity on floor and 6,000 lb. on the wall; watertight cabin with extra thick plastic-impregnated fiberglass wall surfacing permitting hosedown cleaning.

In addition, the plane will have balance characteristics permitting 18-to-32% center of gravity travel. The cargo cabin will be pressurized to maintain a 5,000-ft. altitude at 20,000 ft.

An air conditioning system will keep the interior at 75 degrees F. when outside temperature is -45 F., or keep it to 80 F. when outside temperature is 100 F.

► **1049B Specs**—Operational highlights of 1049B:

- **Payload** will be approximately 40,000-43,000 lb. maximum; the average domestically will be 38,600 lb., and 36,300 lb. trans-Atlantic.

- **Maximum speed** will be 372 mph., with cruising speed running from 300 to 336 mph. depending on load and range.

- **Gross weight** will be 105,000 lb., maximum, zero fuel; maximum landing gross, 110,000 lb.; maximum takeoff gross, 130,000 lb.

These characteristics are based on installation of 3,250-hp. Wright Turbo Cyclone compound engines. Minimum takeoff run, 130,000 lb. weight, would take 1,930 ft.; to clear a 50 ft. obstacle, 4,300 ft. to land over a 50 ft. obstacle and stop would take 3,180 ft. at 110,000 lb.

► **Turboprop Specs**—The turboprop version, 1049D, would be capable of operating at the following:

- **Takeoff and landing weights** would be similar to the 1049B, but payload maximum would be 40,918 lb.

- **Maximum cruising speed** at 25,000 ft. at 130,000 lb. would be 372 mph.; 397 mph. at 110,000 lb. Minimum takeoff run would be 1,850 ft.; to clear a 50 ft. obstacle, 3,690 ft.; to land over a 50-ft. obstacle and stop would take the 1049D 3,180 ft.

Lockheed's guests were also shown through the recently completed Super Constellation passenger plane, now being flight tested. Several models of this type are in the works: Luxury overseas type seating 54 with lounge, or a 50-passenger sleeper—both seating four abreast; a high density 103-passenger model for long-haul coach or short-haul first class; a double-duty, 50-passenger version also having 1,140 cu. ft. of cargo space; and all-cargo military model having 5,715 cu. ft. of cargo space or seating for 110 passengers.

The company will combine turboprop engines and cargo facilities in still another plane, the XC-130 (1-206), which recently won an Air Force competition for a new medium cargo plane design.

## NAA Files Suit to Protect Its Name

North American Aviation, Inc., last week filed a complaint for an injunction to protect the name "North American."

Defendants in the action are listed as North American Aircoach Systems, Inc. (also known as North American Airlines Agency Corp. and North America Airlines Agency Corp.). Twentieth Century Air Lines, Inc., James Fischgrund, Jack B. Lewin and Stanley D. Weiss. The individuals are alleged to operate and control the two companies. Action was brought in the District Court of the United States for the Southern District of California, Central Division.

The aircoach company is alleged to be acting as a ticket-selling agency for nonscheduled flights of Twentieth Century, which is also alleged to have filed a certificate of conducting an airlines business under the firm name of North American Air Lines, in Los Angeles County.

## Maneuver Widens AF, Army Gulf

USAF hits 'penny packet' assignment of tactical air:  
Army wants ground control of ground support craft.

By Ben S. Lee

Ft. Bragg, N. C.—Exercise Southern Pines, which concluded last week in the Carolinas, provided both Army and Air Force with much valuable data on training and technique but widened the gulf between these services' concepts of tactical air power in support of ground troops.

Sharp differences of opinion between top Army and Air Force commanders over the application of air power, where command control should be headquartered, and what types of planes are best suited for support of ground troops were apparent during the 110,000-man Southern Pines war games.

► **Air Support Planes**—Air Force argued that tactical support planes should be commanded by theater Air Force commander or task force commander while Army held adamantly that control of the air support planes should be much further down the line—at least to the Army commander level.

This is three notches in command below where Air Force would hold tactical support control. In Army organization, there is first a theater headquarters which exercises overall military command. Next lower is Army group which is composed of two or more armies. Army would place tactical support under commanders of the various armies comprising the group.

► **"Shoestring" AF**—The feeling that USAF is operating a "shoestring" force was voiced by members of the press and official observers watching the establishment and maintenance of an airhead in the final problems of the joint maneuver Exercise Southern Pines near Ft. Bragg.

Total aircraft mustered by USAF for the largest war games since World War II numbered less than 500 of all types and most of these were obsolete or obsolescent.

The only postwar transports USAF had available for troop carrier were 16 Fairchild C-119s and five Chase YC-122 light transports. The remainder were obsolete Curtiss C-46 Commandos and obsolescent Fairchild C-82 Packets.

Fighter aircraft for both friendly and aggressor forces was no better in terms of quantity or quality. Postwar jet equipment was represented by a few Republic F-84s, Lockheed RF-80s and a North American B-45 light bomber. These latter are not in production. The remainder of fighter and bomber craft were World War II F-51 Mustangs and RB-26s.

► **Piston Engine Passing**—Maj. Gen.

W. R. Wolfenbarger, at the critique following conclusion of the maneuvers, declared that the day of the piston engine fighter and bomber for interception, interdiction, escort and virtually all phases of tactical support was waning.

In "mosquito" tactics (ground support, artillery spotting, etc.) the jet has proven its mettle in battle, the Tactical Air Command chief said. Battle reports from Korea have proven the North American T-6 and F-51 to be not wholly satisfactory. While both types have been able to roam the battle fronts at will because of lack of enemy air, they cannot compete with the Lockheed F-80 in that mission, from point of weapons carrier, platform, or utility of purpose, Wolfenbarger declared.

► **Assault Transport**—Successfully tried for the first time in maneuvers and receiving the plaudits of top Army and Air Force brass were techniques of bringing equipment, men and supplies into the airhead by powered plane.

Five Chase YC-122 assault transports in simulated missions flew in full equipment for a combat equipment and performed air evacuation of the "wounded" with dispatch. The 16th Troop Carrier Squadron at Smyrna, Tenn., flew the small 8,000-lb. payload transport on two missions each in simulation of a full squadron in delivery and evacuation. Time on ground for each plane was four and one-half minutes.

Fairchild C-119 cargo transports airlifted 80 jeeps, 14 105-mm. cannon, eight ¾-ton trucks, 25 platforms each carrying a total of three tons of supplies, seven 40-mm. guns and quantities of lesser battle equipment totalling 616,800 lb. Of the equipment dropped, only one jeep and one 105-mm. cannon were lost. Both pieces broke away

from their parachutes and plummeted to earth and were shattered on impact.

The Curtiss C-46 Commandos provided airlift for the 4,000 paratroopers during the four major air drops conducted during a two-day period. Although there were some 80 casualties of varying degree during the drops, only one was fatal. Main parachute of one trooper failed to open and his emergency parachute did not open until he was about 50 ft. above the ground. It failed to slow his descent in time to save him.

► **Para Drop Casualties**—General Mark Clark, Commander Army Field Forces, expressed himself as completely satisfied with the "extremely low casualty rate" of the para drops but pointed out that continued development of the assault transport and ultimately the assault helicopter would go far towards eliminating "accident hazard of para drops." Delivery potential of the assault transport is far better, the general said.

There were no large assault-type helicopters used in the exercise although for the first time Army was able to study development technique of its recently organized helicopter companies.

During the para drops the Sixth Helicopter Company, one of two experimental units, operated 10 Hiller H-23 helicopters. Job of the Sixth was to fly in emergency supplies and small equipment to forward ground units and to evacuate casualties. Eventually each helicopter company will operate 21 aircraft.

► **Tactical Support Battle**—Air Force cannot adopt the close support tactics of the Marine Corps and does not plan to do so, General Wolfenbarger said. The Air Force mission is at variance with that of Marine Corps and must be performed on a far greater scale than Marine air, he emphasized.

He feels that small size of the Marine Corps permits far greater coordination of ground and air than is permissible for Army and Air Force. "I do not wish to leave an impression that I am in any way critical of Marine tactical air. They



## FIRST TURBOPROP FREIGHT SERVICE

British European Airway's Douglas Dakota fitted with Rolls-Royce Dart turboprop engines takes off from Northolt Airport, England, en route to Hanover, Germany,

with a load of mail and newspapers. This plane is one of two BEA is using on this route to gain experience with the Dart engines.



are the best in the business in close support tactics, as is their mission. But it is not the same mission as a large land air force with an incomparably greater mission," Wolfenbarger explained.

There are some, Wolfenbarger continued, who believe that USAF tactical aviation should be broken up into "penny packets" and controlled at division headquarters and corps headquarters levels. This is fine from the "fox-hole" point of view, he commented, but would injure the overall mobility of tactical aviation for which the Air Force is responsible.

► **Marine, AF Missions**—Marine Corps aviation, it was pointed out, was set up specifically for support of its combat troops and is less than one-tenth the size of USAF. The Air Force, at the same time, has four prime missions of which tactical support for ground troops is one. Strategic and defense air carry priority over tactical air, one spokesman explained. "Saturation of enemy ground troops through vast quantities and types of tactical aircraft would be ideal. We would like to provide it for our troops but unfortunately Air Force battle economics forbid it," he said.

General Clark was very outspoken in his demands for complete air mobility of his troops and the need for their close tactical support by USAF. He declared "we are going to get the best close air support we can obtain for the infantrymen, and I'm positive we'll get it before we're through!"

He admitted that there were considerable issues at which Army and Air Force were at odds on policy-making levels but he said that he felt sure that these would be resolved shortly. The main issue, he said, was that of operational control.

Informed of General Wolfenbarger's statements in reference to "penny packet" tactical air support, Clark said, "I know of no responsible person in the United States Army who wants it or seeks it! I do believe," he said, "that operational control of tactical air support should be given over to the ground commander during the conduct of ground battle."

Later in summation of Exercise Southern Pine, one Air Force officer described the vast war game as a completely successful maneuver training-wise for Army troops, but wholly inadequate from Air Force point of view. "We are so short of aircraft—even obsolescent types—that most of our participation has had to be simulated. The boys have done some wonderful flying during the past week. But the equipment? Well it's like riding a burro in the last race at Hialeah. . . . General Van was sure right when he said we had a shoestring Air Force."

► **The Shoestring**—Vandenberg was recently taken to task in Congress for



AMBULANCE SERVICE is one of the uses to which de Havilland Beaver can be put.

## Busy Beaver

Army, AF will share in procurement of 185 light transports.

Army and Air Force will share procurement costs of approximately 185 Canadian-built de Havilland Beaver light transports, it was disclosed recently. Under an agreement between the two services USAF will waive Army aircraft weight limitation to permit Army to secure some sorely needed air transport.

Neither service would reveal exact number of planes each would receive, but an Army spokesman said the division of planes would be almost equal, with Army getting a slightly larger share. Dollar content of the contract was not disclosed, although an industry source in Washington indicated that production costs of the planes including spares would approximate \$25,000 each. This would place total joint procurement at about \$5 million.

• **Army Beaver:** The Army is procuring the Beaver primarily for use as a multi-place personnel transport, although undoubtedly the plane would be used variously as a light-utility transport and in field liaison, including courier and messenger service, light supply dropping, aerial evacuation, visual reconnaissance, troop column control, aerial wire laying and camouflage checking.

• **Air Force Beaver:** While some Beavers will probably find their way into various headquarter commands for liaison work, the bulk of the USAF planes are scheduled for delivery to Air Rescue Service.

ARS officers have long sought procurement of the Beaver for activities in

published remarks attributed to him declaring that USAF was operating a "shoestring" force.

Air Force units taking part in the joint Army-Air Force maneuver were: 9th Air Force; 507th Tactical Control Group; units of the 20th Fighter-Bomb

the Far North, having watched its performance by both Canadian military and civilian users in the Canadian Northwest and in Alaska.

Design of the plane as a Canadian bush plane was based upon results of a survey conducted among almost 100 bush operators from coast to coast who operated craft under greatly varying climates and geographical conditions. The first prototype flew in August, 1947.

Wingspan of the Beaver is 48 ft., length is 30 ft. 3 in., height is 10 ft. 7 in. Powered by a single Pratt & Whitney R-985 Wasp Junior developing 450 hp., the Beaver weighs 2,775 lb. empty and 4,650 lb. loaded.

► **Procurement Background**—Late last year Air Force agreed to an evaluation of various liaison-type aircraft including the Aero Commander, Ryan Navion, Cessna 195, Atlas H-10, Bellanca Skyrocket and the de Havilland Beaver (AVIATION WEEK Dec. 18, p.15).

Military requirements for the competition included that the competing planes be able to take off over a 50-ft. obstacle (without assist) within 800 ft., and land over a 50-ft. obstacle within 800 ft. The planes also had to have a rate of climb, sea level, of at least 1,000 ft. the first minute; a maximum endurance of at least 5 hr.; a cruising speed of at least 110 knots, plus a hovering speed with full control of not more than 50 knots; a service ceiling of 15,000 ft.; and a radius of action of at least 220 nautical miles.

Air Force specifications further included that the planes must be operable in temperature ranges from -20F to 120F, and with procurement of modification kits to extend this to -65F.

The competition was completed in two weeks during December, 1950, and won by the Beaver.

Wing; 262nd Tactical Reconnaissance Wing, 137th Fighter Bomb Wing, 140th Fighter Bomb Wing, 123rd Fighter Bomb Wing, 117th Tactical Reconnaissance Wing, and 8th Bomb Squadron. Troop carrier detail was performed by the 18th Air Force.



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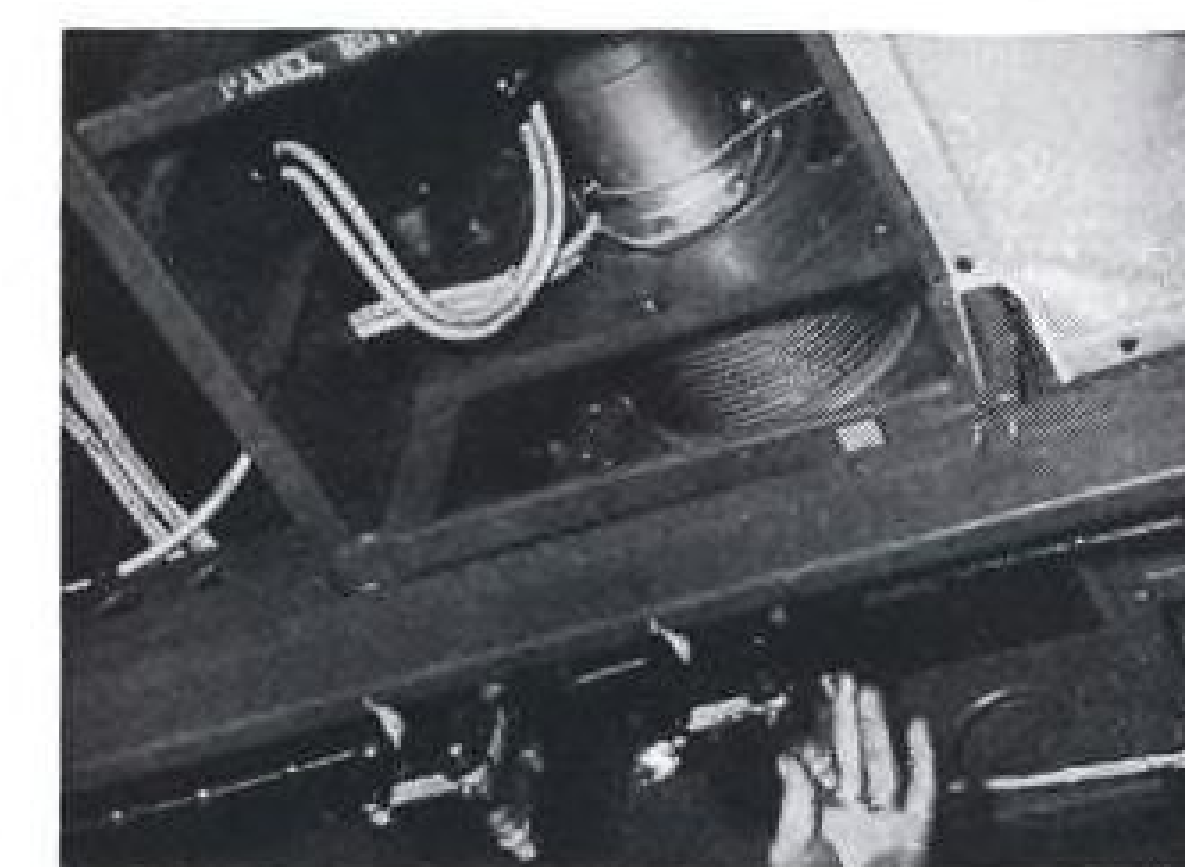
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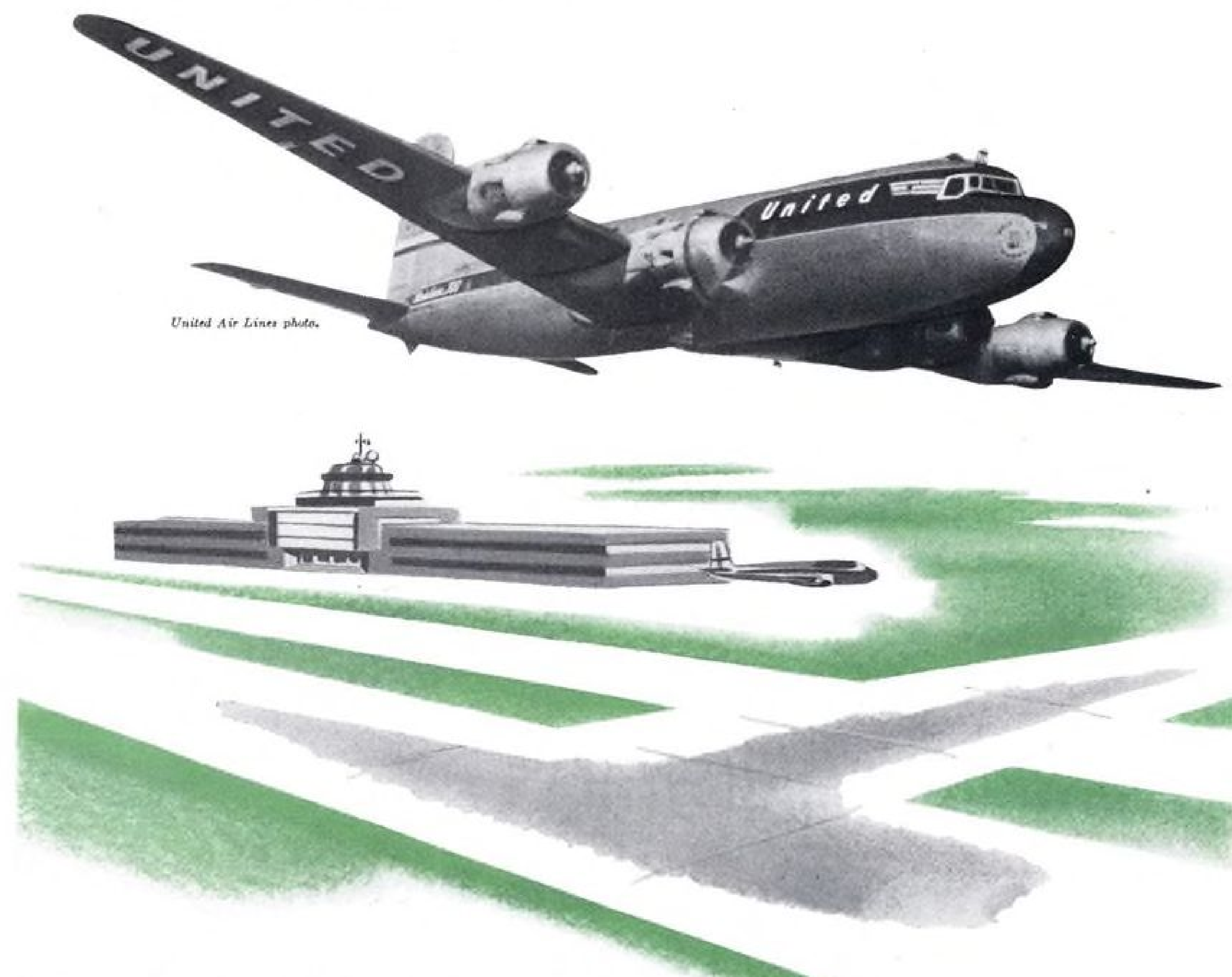


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of fires due to broken hydraulic lines, thus protecting passengers, personnel and the multimillion-dollar investment in aircraft.

Skydrol now is used by every domestic air line flying DC-6's and in numerous ships plying overseas airways. Why not look into the advantages Skydrol offers you? For information and a copy of the Monsanto booklet, "More Safety in the Air with Monsanto's Skydrol," write MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

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## AERONAUTICAL ENGINEERING

### Refinements Aid Metal Fatigue Studies

Special testing units developed at National Bureau of Standards afford better control and more speed.

Fatigue testing of aircraft metals will be facilitated with new refinements developed at the National Bureau of Standards.

These new test auxiliaries include devices for stopping the testing machine when a small crack forms in the specimen, apparatus for uniform polishing of specimens, and a machine for testing thin-sheet in bending. All were developed by NBS technicians John A. Bennett and James L. Baker.

► **Stoppage Control**—Fatigue fracture occurs in two stages: In the first stage the metal is subjected to fluctuating stress until a small crack forms. In the second stage, the crack grows until the member's remaining cross-section is too small to support the applied load, and complete fracture takes place.

In fatigue studies it usually is desirable to determine the number of cycles of stress required to start the crack, as well as the number to complete the fracture. These determinations are facilitated if the testing machine can be stopped automatically when a small crack forms. The two stopping devices for this purpose already have been put into operation at NBS.

In a typical testing machine the 0.25-in.-minimum-dia. specimen is drawn into spindles in bearing boxes supported at the ends away from the specimen and loaded at the ends near the specimen by weights hung on shackles.

This loading results in a deflection of the bearing boxes, and the deflection increases when a crack forms in the specimen. If the crack is only on one side of the specimen, the deflection will vary periodically with each revolution of the specimen—the box will vibrate.

Both the deflection and the vibration are used to actuate the NBS stopping devices. One device is deflection-responsive, the other is vibration-responsive. The two are used simultaneously, with their circuits connected in parallel. Sometimes one will respond first, sometimes the other, depending on the peculiarities of the particular incipient crack.

► **Deflection Stop**—The deflection-responsive stopping device consists of a Micro-Switch operated by a lever fastened rigidly to one of the bearing boxes, the other end carrying an adjusting screw which bears on the Micro-Switch's actuating leaf.

After the machine has run long enough to reach temperature equilibrium, the adjusting screw is advanced until a very small change in the position of the lever will trip the Micro-Switch and shut off the machine. With careful adjustment, the arrangement is sensitive to cracks having a length of as little as 5 to 10% of the specimen's circumference.

► **Vibration Stop**—The vibration-responsive stopping device, also fastened rigidly to one of the bearing boxes, consists of a steel ball poised on a three-pronged pedestal. Vibration resulting from an incipient crack in one side of the specimen shakes the ball from its perch. In falling, the ball closes an electrical circuit that shuts off the machine.

Sensitivity of the device may be adjusted by varying the separation distances of the pedestal prongs.

► **Polishing Refinements**—The surface condition of test specimens has an important effect on fatigue, hence must be made as uniform as possible. Two pieces of apparatus developed by NBS, both entirely automatic, make possible close duplication of the polishing operation from one specimen to the next.



CYCLOPEAN EYE

Production Fairchild C-119 mounts new flush installation of glide path antenna, part of ILS gear. Nose cap, removed by loosening four clamps, mounts antenna which formerly was carried on external mast.

In finishing specimens it is important that the direction of polishing be parallel to the direction of the stress to be applied in the fatigue test. This avoids stress concentration at the roots of the scratches. It also is important that abrasive pressure be light to avoid excessive surface cold-working. If these requirements are met, the surface need not be extremely smooth or highly polished.

Two types of specimens, smooth and notched, are used in NBS fatigue tests. The smooth specimens have test sections of 4-in. contour radius. The notched specimens, used when stress concentration is desired, have either a fillet of definite radius at each end of a cylindrical reduced section, or a circumferential groove with a semi-circular root.

If results with smooth and with notched specimens are to be compared, it is essential that the surface preparation of the two specimens be as much alike as possible.

► **Smooth Specimen Handled**—The machine for finishing smooth specimens consists essentially of three parts—a wheel carrying an abrasive belt, a means for supporting and rotating the specimen during the polishing operation, and a means for moving the specimen across the belt during polishing.

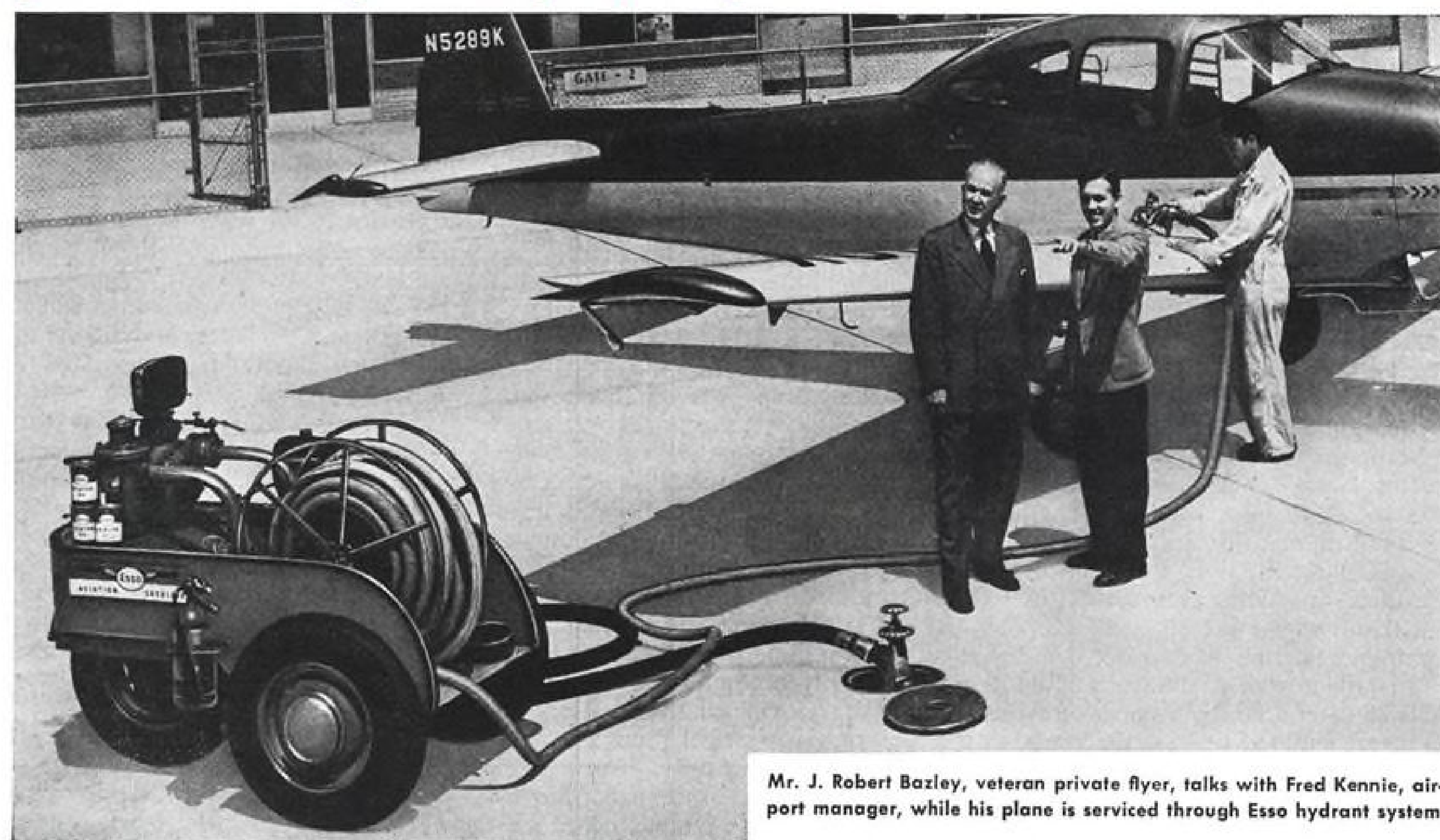
The wheel consists of a large number of metal spring leaves, radiating outward from a hub, which press against the abrasive belt. This arrangement conforms the abrasive belt to the contour of the specimen and assures uniform pressure. The specimen is rotated at a rate which bears a constant relation (1 to 100) to the rotation of the abrasive wheel. Because the specimen is moved slowly across the abrasive belt, fresh abrasive is continually brought into use, resulting in a cutting, rather than a rubbing, action. A rubbing action should be avoided, since it tends to produce more cold work in the specimen surface.

► **Notched Specimens Finished**—The apparatus for finishing notched (filleted or grooved) specimens is new only in a few details. It consists essentially of an abrasive-charged wire which rotates against the bottom of the notch while the specimen is slowly rotated.

The specimen is held in a small bench lathe. A series motor, mounted on the crossfeed guide with its axis of rotation perpendicular to the axis of the specimen, drives the polishing wire

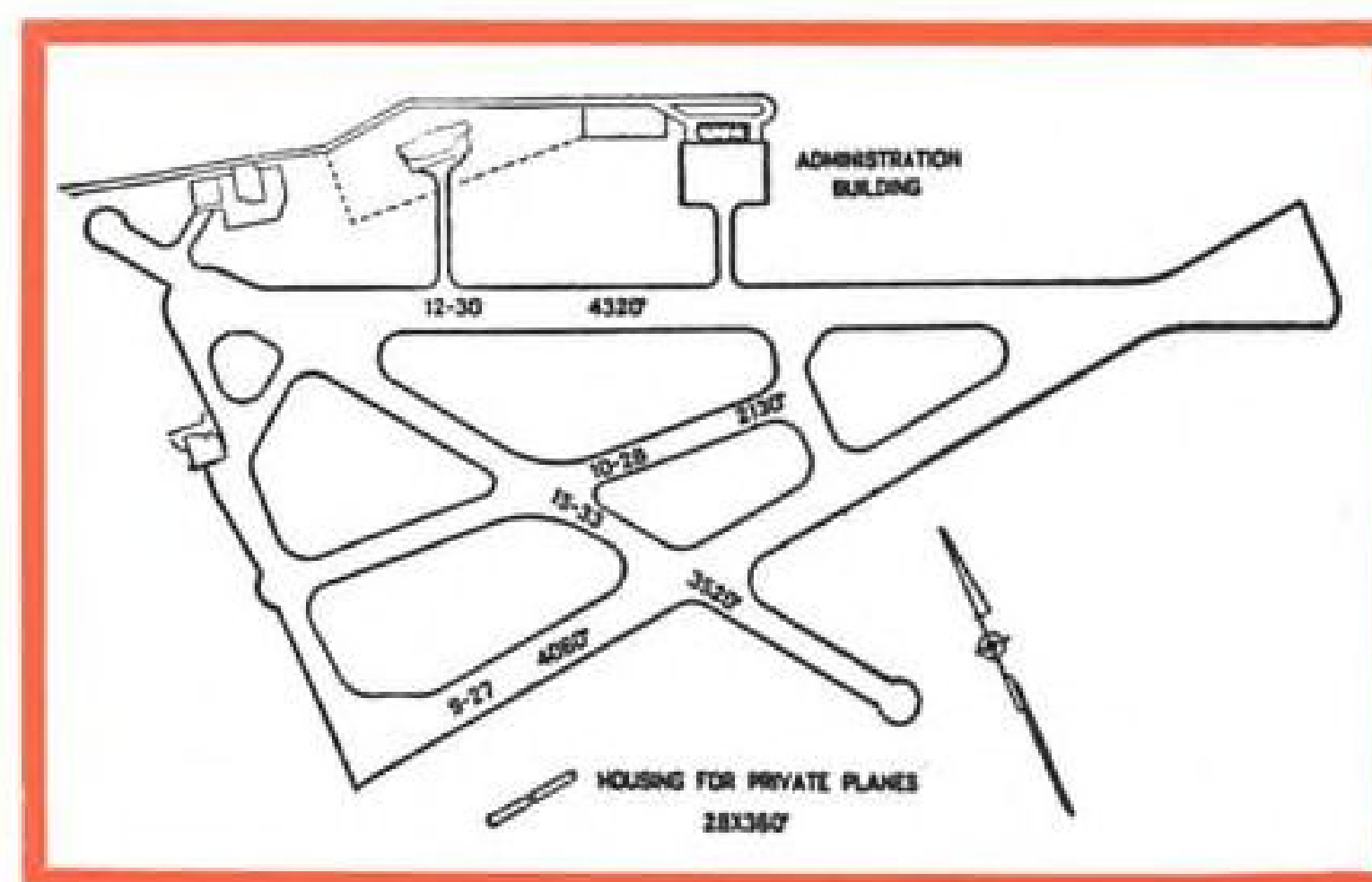


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Mr. J. Robert Bazley, veteran private flyer, talks with Fred Kennie, airport manager, while his plane is serviced through Esso hydrant system.

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The new Administration Building has 15000 feet of floor space and houses airline passenger, airmail, freight and express facilities, and a complete restaurant. The Interstate Airway Communications (call letters IPT) and the United States Weather Bureau also maintain stations in this building.

Mr. Bazley, pictured above at the new Williamsport Administration Building, has been an Esso user for nearly 20 years. In addition to having his plane serviced with Esso Aviation Products, Mr. Bazley, as one of the country's largest anthracite stripping and highway contractors, uses Esso Products exclusively for his trucks and other machinery. In the skyway or on the highway, Mr. Bazley knows he can depend on the products that carry the Esso trade-mark.

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through a short rubber coupling. A guide for the polishing wire is supported by a pivoted assembly above the working area, so that the weight of the guide holds the wire against the specimen. The abrasive, a thin air-agitated mixture of emery and water, is fed to the wire from a reservoir through a valve-controlled tube.

The motor that drives the polishing wire also drives the headstock of the lathe through a 100-to-1 reducing gear. By keeping motor speed and polishing time constant, as well as the ratio of wire speed to specimen speed, high uniformity of finish is assured.

And the finish is very similar to that produced by the machine for finishing smooth specimens.

► **Thin-Sheet Arrangement**—Because of the large deflection required, sheet metal of less than about 0.015-in. thickness cannot be fatigue-tested in bending on commercially available testing machines of the cantilever type.

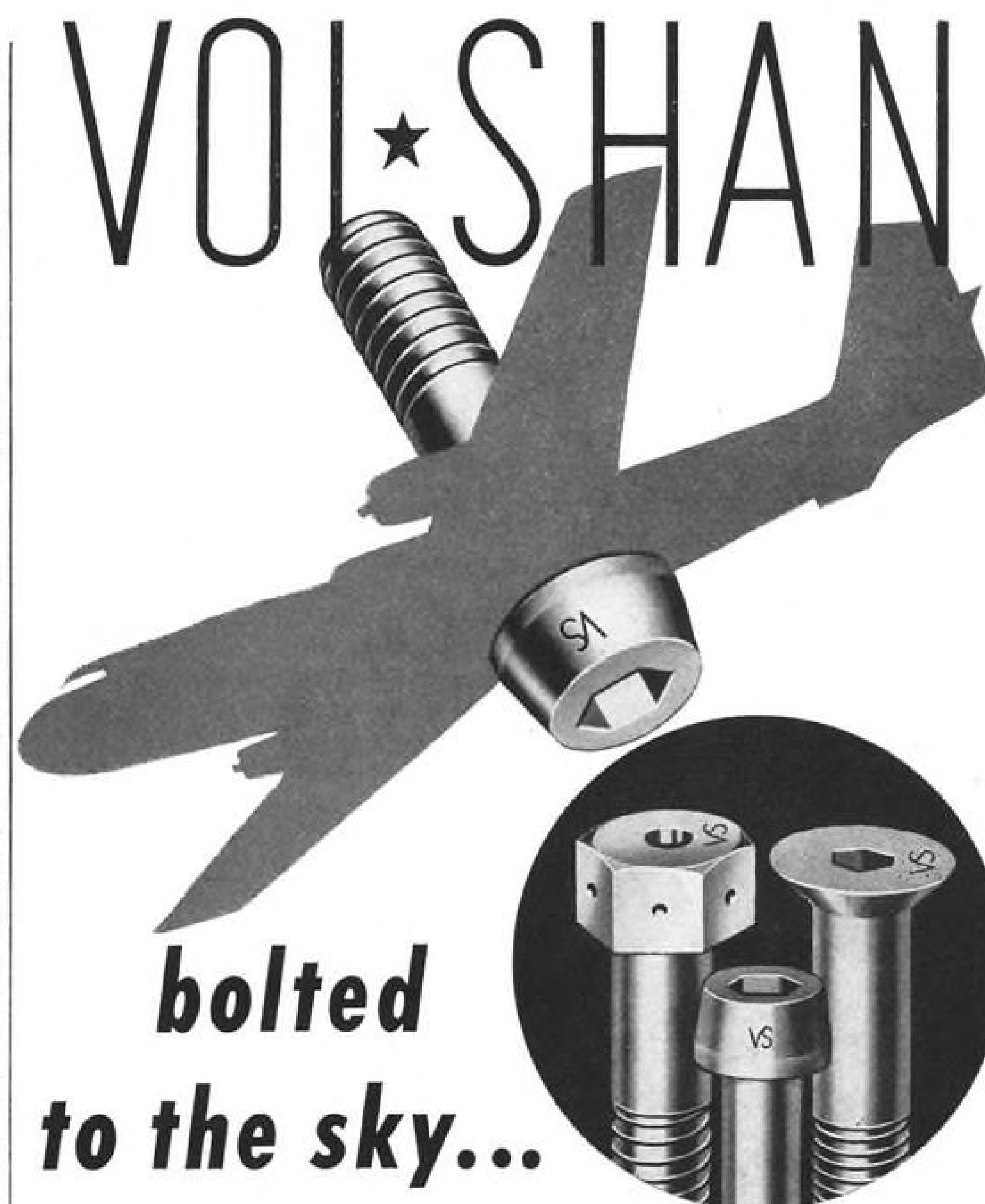
By deflecting the specimen as a column, a newly-developed NBS fatigue-testing machine makes possible the bending of specimens to a small radius of curvature without large amplitudes of motion in the driving mechanism. Because the machine holds several specimens at once, considerable testing time may be saved.

The new thin-sheet fatigue tester was adapted from a Krouse plate bending fatigue machine. Specimens 1 in. high by 1/2 in. wide are held in place by grooves in two horizontal arms. While the lower arm remains stationary the upper arm, pivoted at one end, is moved up and down at the other end by a crank arm and adjustable eccentric. At the top of the crank-throw the arms are parallel, and the distance between the grooves equals the length of the specimens. When the upper arm is moved down by the crank, the specimens are loaded as columns and assume bowed positions. Bending is greatest, of course, for the specimen nearest the crank.

An automatic stopping device used with the machine takes advantage of the fact that after a crack forms, the specimen no longer deflects in a smooth curve. An adjustable contact assembly is clamped to the lower arm of the machine and adjusted so that the intact specimen nearest the crank just fails to touch the contact disk at its maximum deflection.

Cracks tend to form near the center of the specimen, and when a crack starts, a "hinge effect" causes the middle of the specimen to deflect more and make contact with the disk. This contact operates an electronic relay, stopping the machine.

When a group of identical specimens are set up in the machine, the one nearest the crank, since it is subjected to



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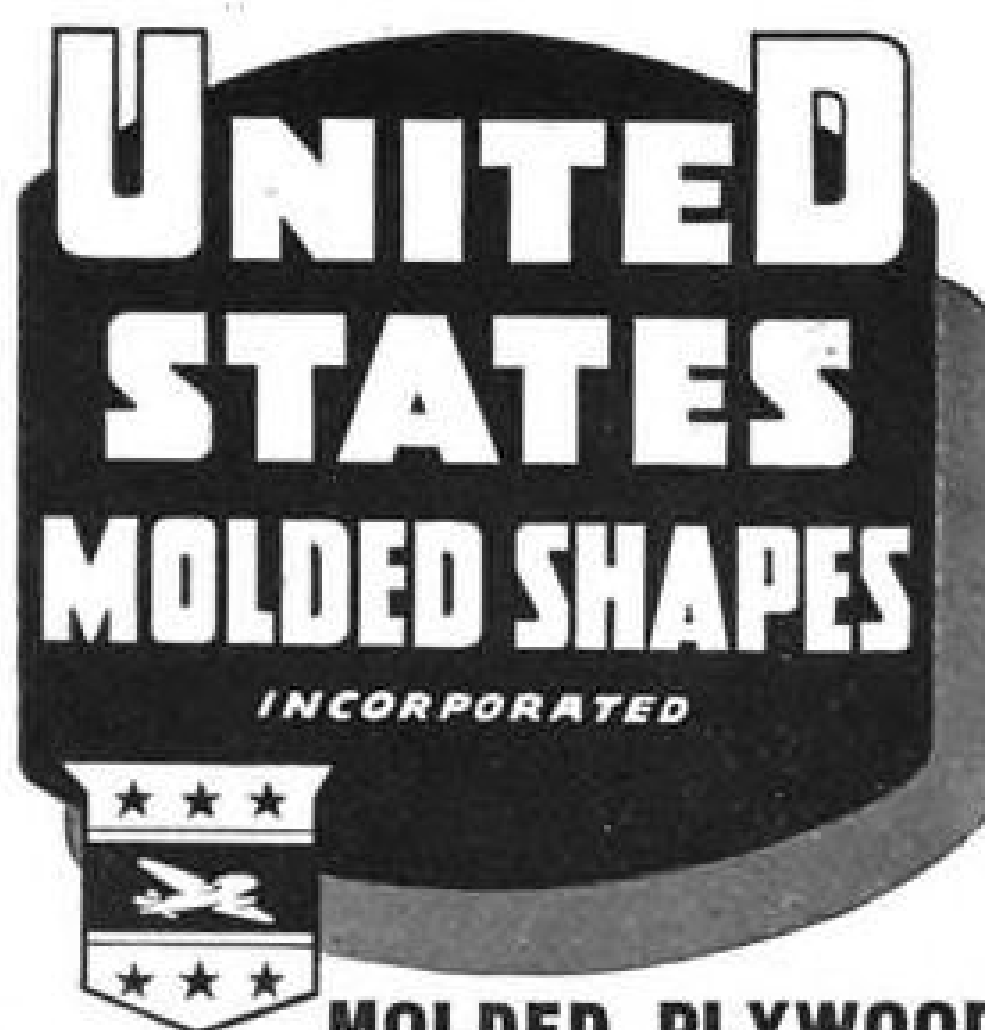
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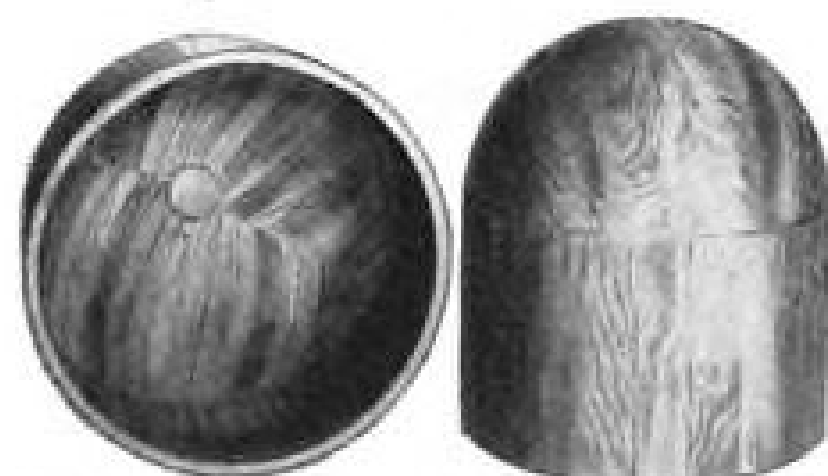
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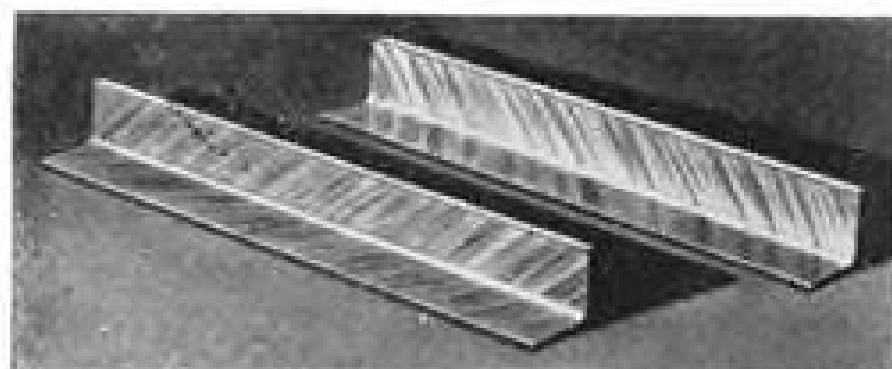




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the highest range of stress, will break first. After this specimen has been removed and the number of cycles recorded, the contact assembly is moved to the next specimen and the machine restarted.

Because as many as seven specimens can be tested at once, the fatigue properties of a material can be determined over a wide range of maximum strain values in a relatively short time.

## SBAC Exhibit to Show New Stars

(McGraw-Hill World News)

London—More than 50 aircraft will be shown at the 12th Society of British Aircraft Constructors' flying display and exhibition, Sept. 11-16 at Farnborough.

Top drawing cards will be Britain's two brand-new fighters, the Hawker P. 1067 (AVIATION WEEK Aug. 6, p. 14) and the production model of the

Vickers Supermarine Swift, both powered by Rolls-Royce Avon engines.

The Vickers Valiant, four-engined, Avon-powered bomber, which greatly impressed General Hoyt Vandenberg will also be shown.

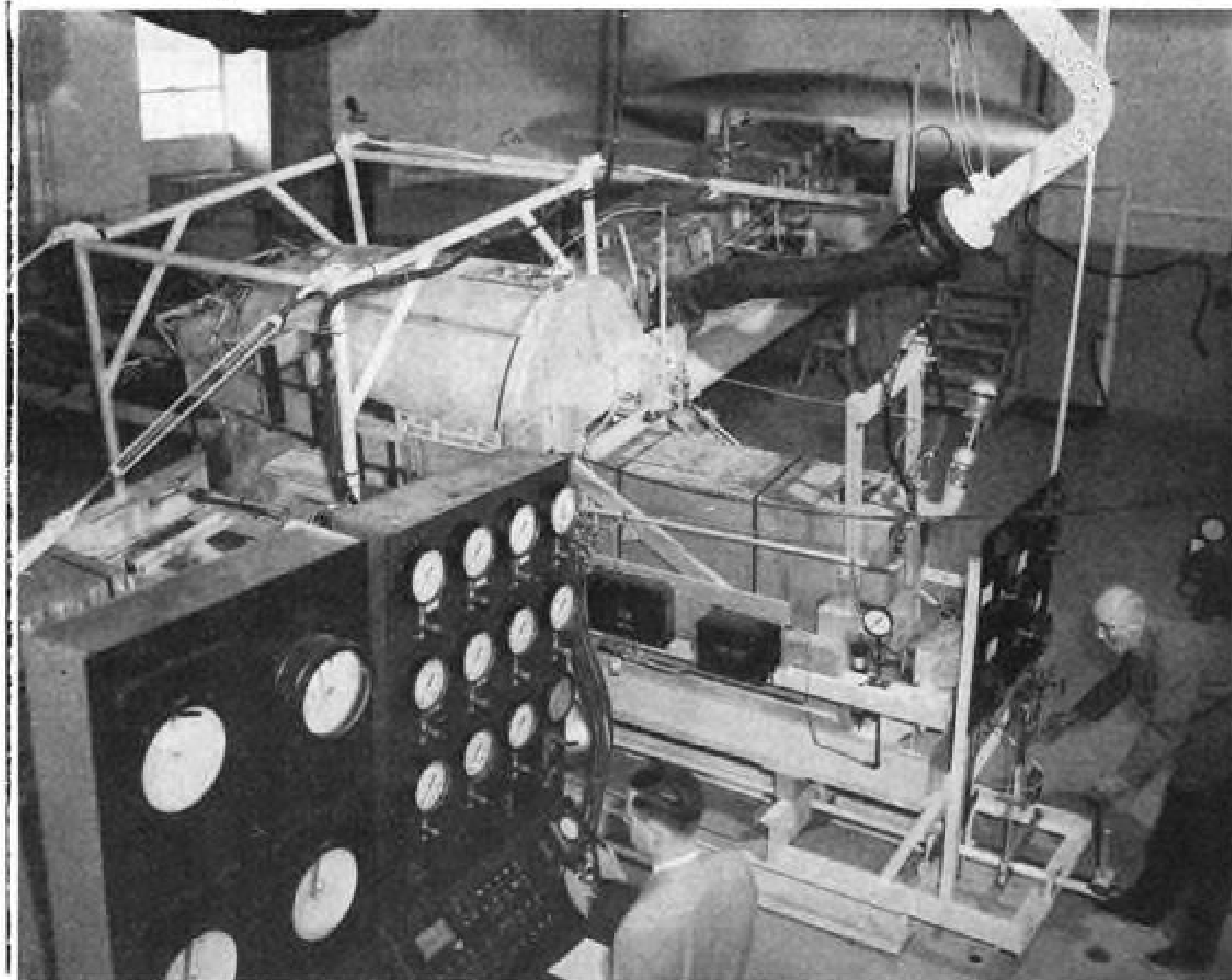
SBAC hopes that another two or three "heavy" fighters, still on the secret list, will complete their test flights in time to make the show.

The English Electric Canberra will be on display in some new roles.

All of Britain's delta-wing aircraft will be on hand—the new Avro 707A, the older Avro 707B, the Boulton Paul P. 111, and the Fairey F. D. 1. The world's largest aircraft—the Bristol Brabazon, MK1—will also appear.

In the engine line, most interest will center around the Napier Nomad, a compound engine designed for long-range transports or bombers.

Flying test-bed displays of the Armstrong Siddeley Sapphire will also be made at the show.



FUEL SYSTEM for jet fighter is studied in lab facility that gives flight simulation.

## Fuel Action Studied In Lab 'Flight'

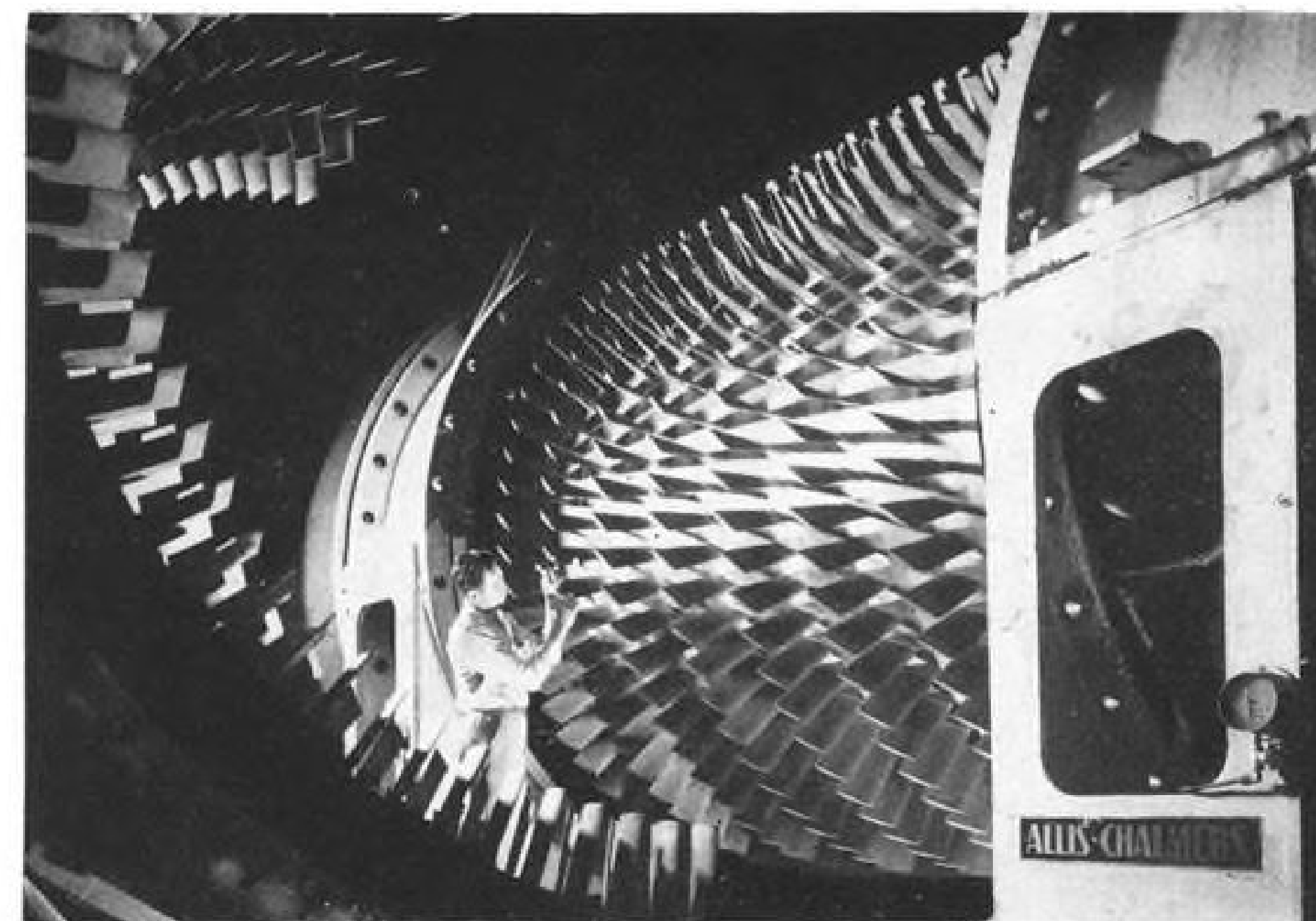
Jet fighter fuel system research and development is being sped at Republic Aviation Corp. with a special test setup simulating an aircraft installation in flight.

This fuel system arrangement, complete with provisions for external tanks, is installed on a carriage which can be positioned by hydraulic controls for several attitudes of flight.

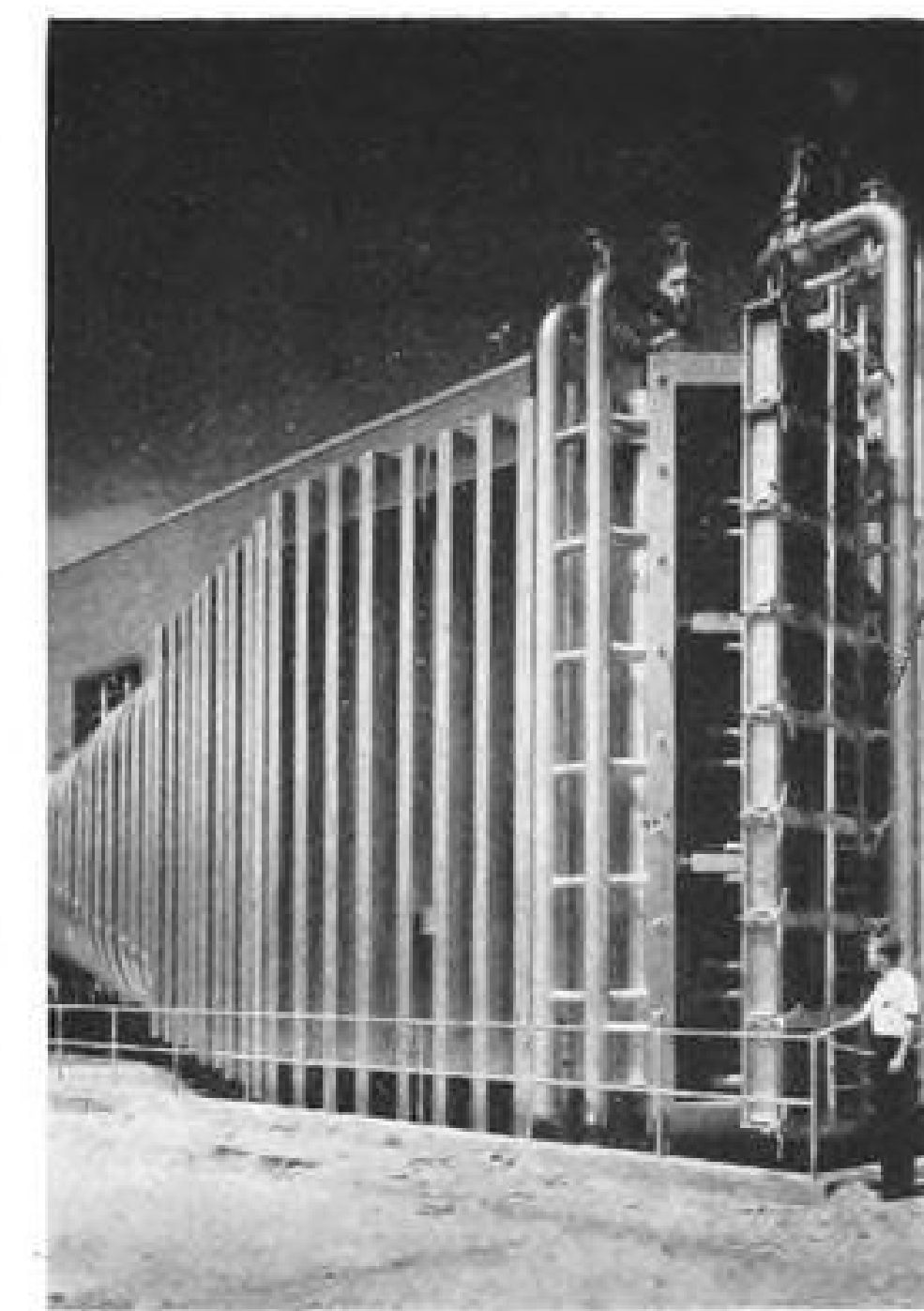
Fuel can be pumped into the system at several hundred gallons per minute from a 10,000-gal. reservoir, and flow, temperature and pressure can be measured at about 25 locations.

Runs have been made to study the effects of roll and pitch of the plane under various combinations of altitude, speed and temperature during "tanker fuel transfer operations." Effects of contaminated fuel have been studied and procedures for cutting off portions of the system which become inoperative as a result of battle damage.

Considerable work was done in the facility with Republic's F-84G installation. This is the AF's first operation jet fighter equipped with an in-flight refueling system (AVIATION WEEK June 18).



COMPRESSOR of Langley 4x4 ft. supersonic tunnel is seven-stage, axial-flow type, rated at 860,000 cfm. at a pressure ratio of 2. Rotor weighs 55 tons, spins at 1,300 rpm., is 114-ft. diameter, has 1,137 blades. A finger will turn it.



COOLERS are located across one elbow of NACA 4x4-ft. tunnel. Repowering required increase in capacity of cooling plant.

## New Power Extends Tunnel Data Range

About three years after its first runs, the NACA's 4-x 4-ft. supersonic wind-tunnel has been repowered by its permanent motors. Operating temporarily on 6,000 hp., the tunnel now has two electric motors capable of delivering 45,000 hp. continuously, or 60,000 hp. for 30-min. periods.

The additional power has not been used to increase the present speed range (Mach 1.25 to Mach 2.2) but rather to

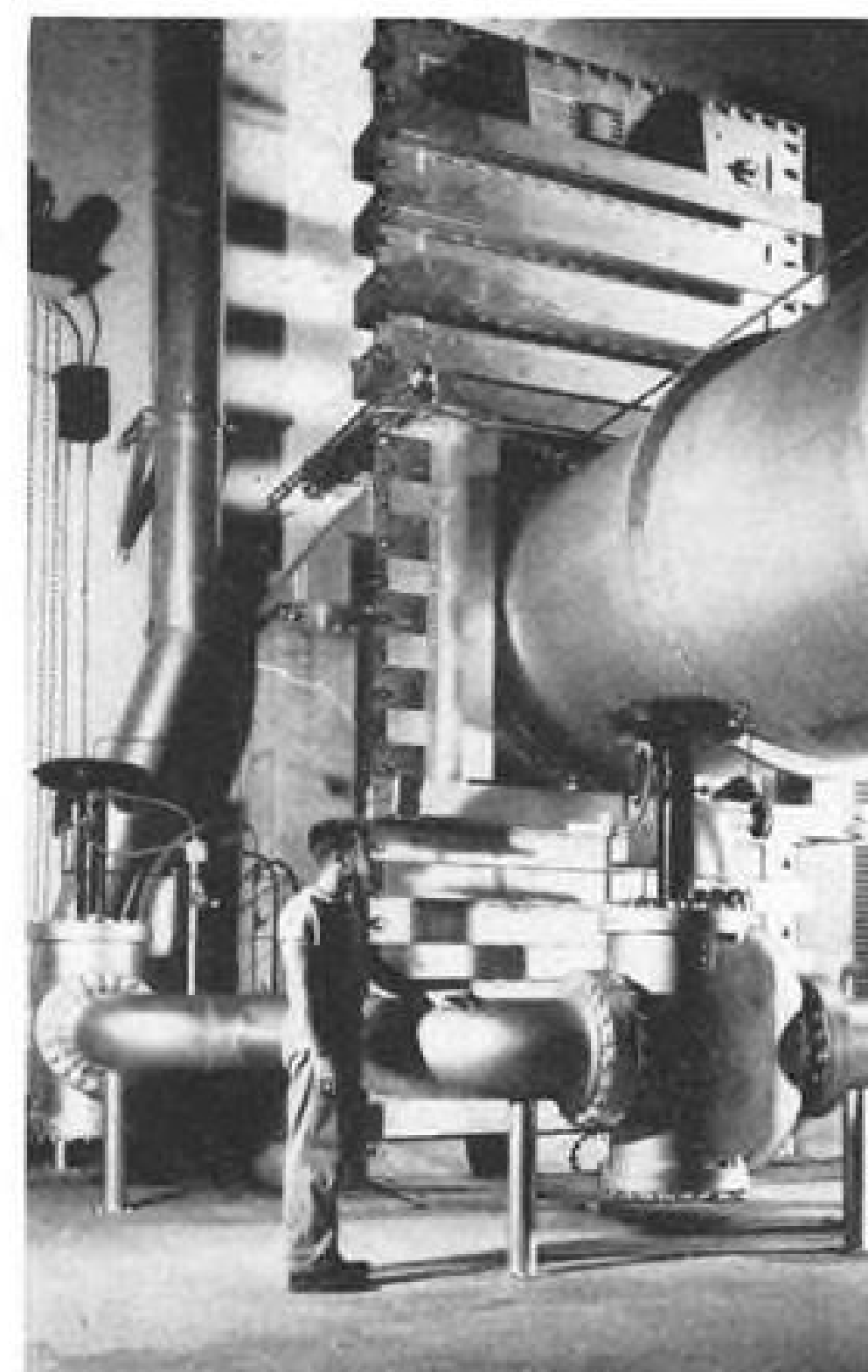
boost pressures in the test section.

Originally, tunnel operated at test section stagnation pressure of 4 atmospheres; repowering has made it possible to go from there to 2 atm. This wide available range of test section pressures means that a large variation in test Reynolds number can be obtained.

Repowering of the tunnel meant added complications in tunnel control systems; so NACA took advantage of

the situation and redesigned the entire control panel. It was planned as a completely functional unit, with controls tied to the appropriate location on a large display relief of the tunnel itself. Color-coded lines connect the location of air valves and other controls.

The new panel is expected to reduce errors in operations of the tunnel and to reduce the time required to train operators.



AIR LOCK, (above left), a guillotine-type valve, seals windtunnel test section so that technicians can work under normal pressure. Remainder of dry air stays at different pressure in rest of tunnel. Pneumatically operated valves bleed or add air, are part of pressure control system, and not related to air lock. Donald D. Baals (right) head of 4- by 4-ft. supersonic tunnel, crouches in test section housing missile model.







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THUNDERJETS...**

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- Fastening Methods for Aluminum
- Finishes for Aluminum
- Forming Aluminum (about Dec. 1)
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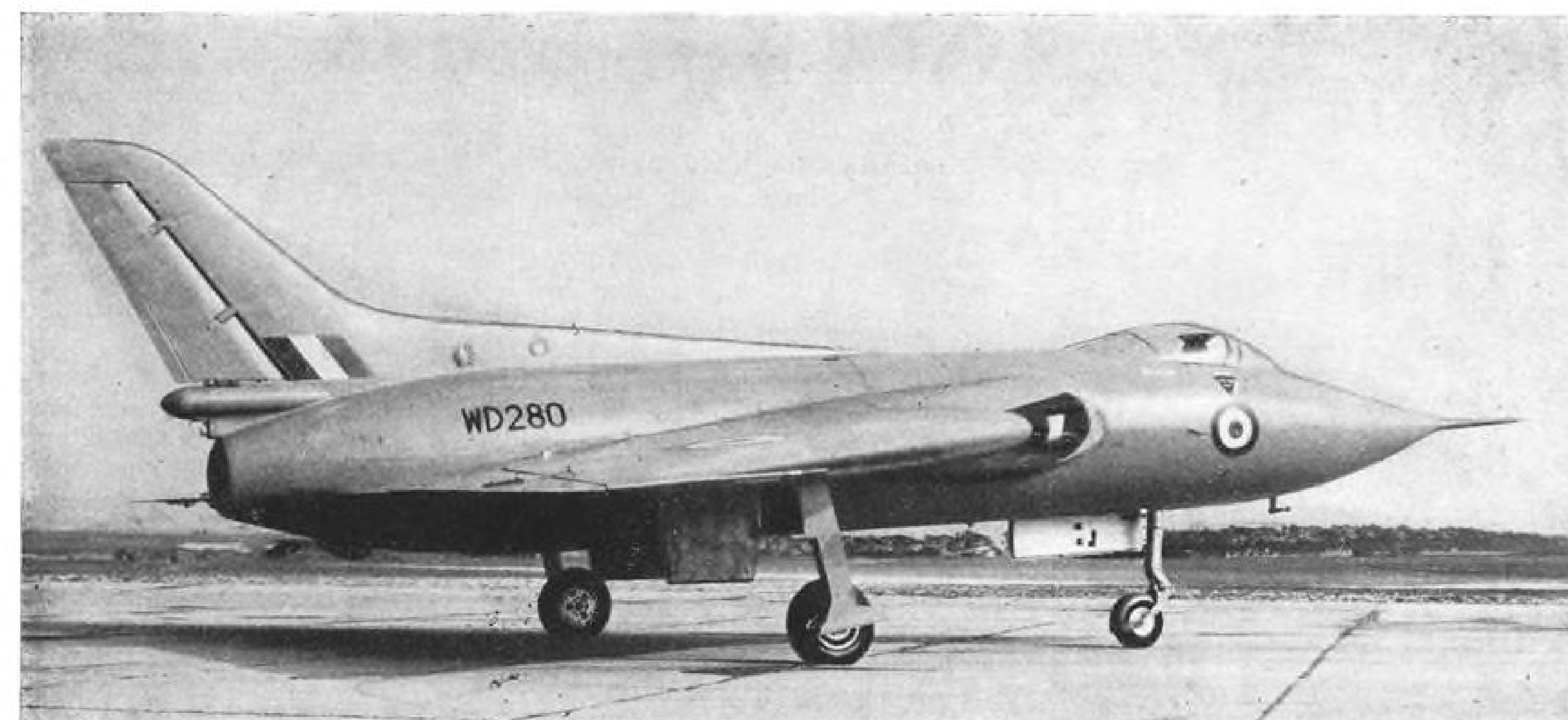
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# REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND



NEW DELTA CONFIGURATION, British Avro 707A, has a high, sweptwing; wide landing gear tread and sharply tipped wing.

## Avro 707A

New aircraft features wing root inlets and boundary layer fence.

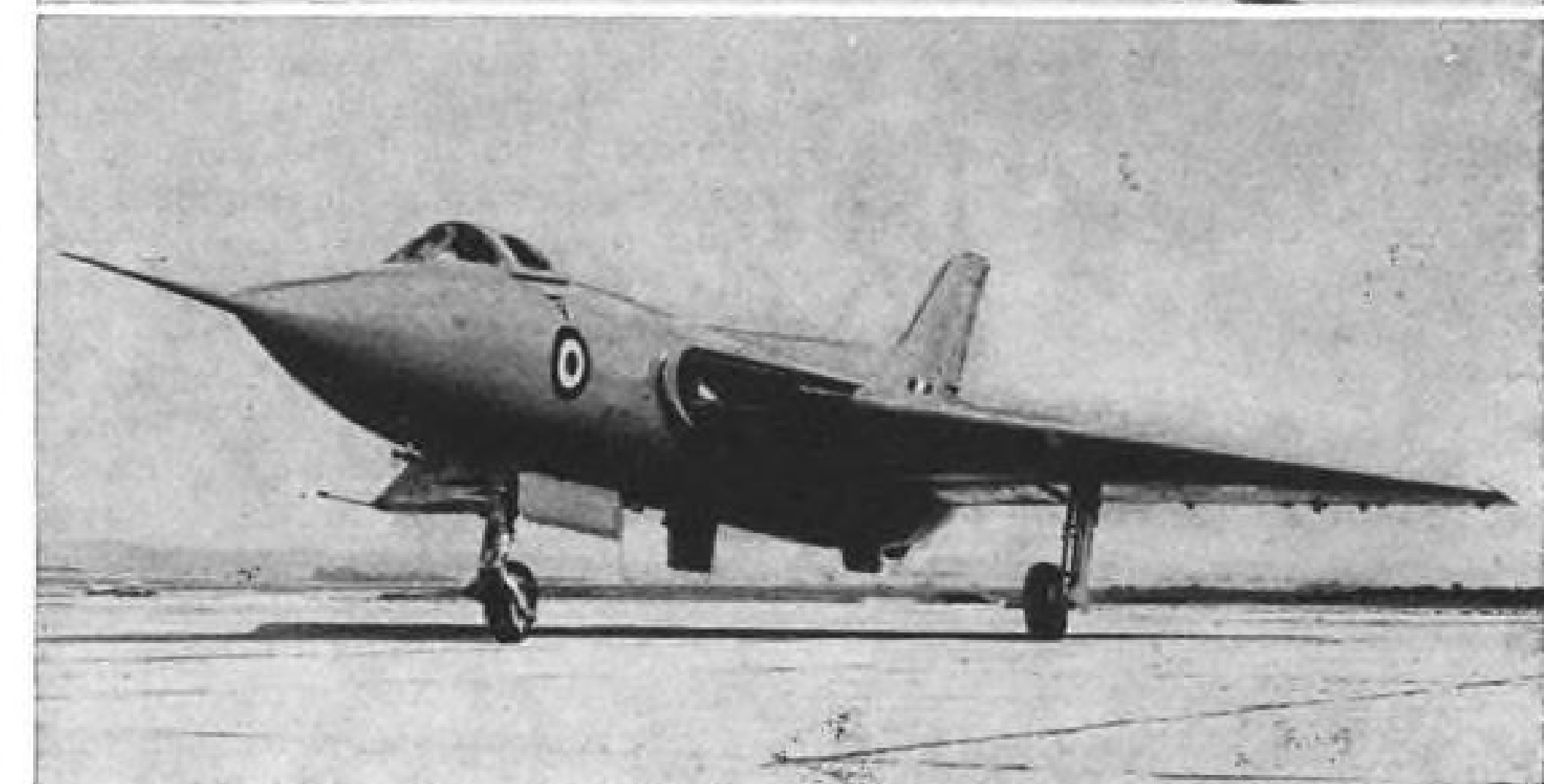
For the third year in a row, A. V. Roe & Co. Ltd., Manchester, England, has revealed a new delta-winged aircraft just before the Sept. 11-16 show of the Society of British Aircraft Constructors. This year's model is designated the 707A, and differs from its predecessors in having wing root inlets for the turbojet engine instead of a dorsal fuselage inlet.

First 707 crashed shortly after the 1949 SBAC show; the second—the B model—was in the static display at the 1950 show (AVIATION WEEK Oct. 9, 1950, p. 20).

► Air Intakes—The series of deltas built by Avro has been powered by Rolls-Royce Derwent engines. In the 707 and the 707B, air for the engine was taken on board through a dorsally mounted air inlet of obviously low efficiency. The reason for such a location was that at the time there just wasn't any other place to take air in.

But the later 707A uses rather conventional wing inlets with a boundary-layer fence between the inlet and the fuselage. Those inlets appear to be the only difference between the A and its older sisters.

Apparently Avro has done something about the intakes on the 707B as well. That company's latest advertisement in the Aeroplane, July 27, shows considerable rework on the form of the air intake. In its current form, the inlet resembles some of the NACA's so-called high-speed inlets which were



developed here some years back and tested, notably on the Ryan F2R and a special Lockheed F-80. Ramps have been fitted and the upper line of the scoop protrudes more into the airstream than the earlier form did. It also appears that the intake face is forward of its previous location.

These modifications should increase

the pressure at the engine inlet (which is another way of saying that it improves the ram) and perhaps hold the recovery versus angle-of-attack curve up through another few degrees.

The 707A is painted salmon pink, the 707B bright blue.

Span of the 707A is 34 ft. 2 in; length without pitot head, 34 ft. 4 in.



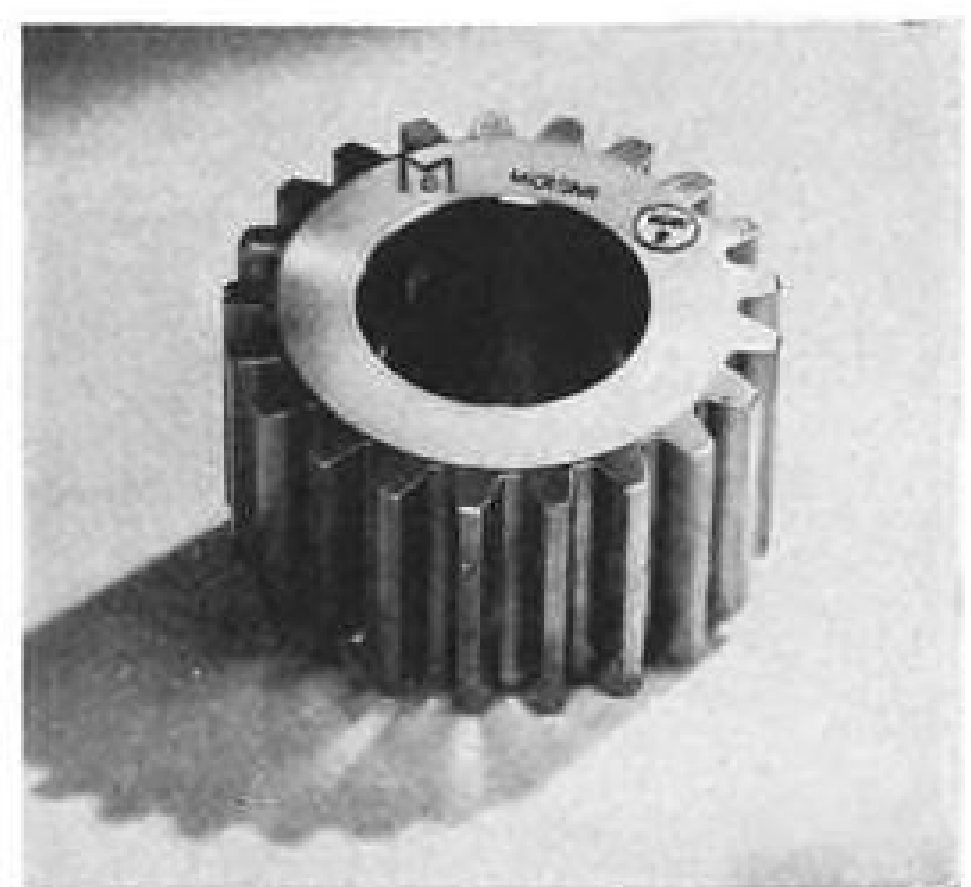
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—and we know what  
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Result...  
...you like it—and you know what caused it.



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\*PATENT PENDING



## NACA Reports

► **Fluctuations in a Spray Formed by Two Impinging Jets (TN 2349)**—by Marcus F. Heidmann and Jack C. Humphrey.

The rocket motor, as any experimenter will tell you, continually straddles the fence between rational and irrational behavior. Under certain conditions, it will exhibit instability characterized by sustained oscillations. These oscillations occur at frequencies that vary from approximately 20 up to several thousand cycles per second.

The low frequency oscillation may be explained by resonance in a circuit where the propellant feed system and the rocket chamber are dynamically coupled. No such statement readily explains the instability at higher frequencies, however.

In the high frequency range, combustion instability appears to originate in the injection and mixing process. Because of this relation, NACA has investigated the flow characteristics and the spray pattern formed by the impingement of two liquid jets.

The apparatus used provided for control of the liquid supply pressure and also permitted variations in the impingement angle and the length of jet before impingement. Water was used as a liquid for all investigations; weight flow was determined from rotameter readings.

The spray was studied by visual, photographic, and photoelectric techniques. High-speed motion pictures and micro-flash photographs were taken of the spray pattern.

Interesting results were obtained from this investigation. Upon impingement of the jets, a ruffled sheet of liquid was formed perpendicular to the plane of the two jets. This sheet disintegrated intermittently, forming a group of drops that appears as waves propagating from the point of impingement. This disintegration of the liquid sheet resulted in irregular spacing between waves, and invariable wave intensity. There was a large number of small waves.

Under constant operating conditions, the frequency of wave formation was constant over a finite time interval. Increasing the jet velocity increased the wave frequency, in a relation which approached a direct proportionality. Increasing the impingement angle decreased the wave frequency for impingement angles between 50 and 100 degrees.

Doubling the diameter of the jet had a negligible effect on wave frequency compared to the effect of jet velocity and impingement angle. Changing the jet length from 10 to 80 diameters before impingement produced negligible

effect on the frequency of the waves. Analysis of the photographic and frequency data obtained shows that the ruffling of the liquid sheet persists to the point of disintegration of the sheet. Furthermore, the ruffling determines the frequency of the wave formation. As a final note, irregularities in the jets before impingement may be as instrumental in controlling the ruffling of the liquid sheets as is the friction of the air.

► **Effect of Aspect Ratio on the Low-Speed Lateral Control Characteristics of Unswept Untapered Low-Aspect-Ratio Wings (TN 2348)**—by Rodger L. Naeseth and William M. O'Hare.

This report is intended to add to the work which has been done to determine lateral control characteristics of wings with aspect ratios of less than 6. These windtunnel tests were made on a series of unswept, untapered wings of aspect ratios 1.13, 2.13, 4.13, and 6.13. The wings were fitted with sealed ailerons of 25% chord with various spans and various spanwise locations.

The results of this test indicated the following conclusions:

- The variation of experimental aileron effectiveness with aspect ratio could not be accurately predicted, for all spans of ailerons, by any one of three theoretical methods with which comparison was made.
- Problems associated with adverse yawing moments became serious well below maximum lift coefficient, for unswept wings of moderately low aspect ratio. This holds if partial flow separation is characteristic of the wings in the linear lift range.
- Aileron effectiveness decreased as aileron span or wing aspect ratio was decreased.

► **Effect of Tail Surfaces on the Base Drag of a Body of Revolution at Mach Numbers of 1.5 and 2.0 (TN 2360)**—by J. Richard Spahr and Robert R. Dickey.

This report summarizes the results of windtunnel tests performed at Mach numbers of 1.5 and 2.0 to investigate the influence of tail surfaces on the base drag of the body of revolution. Geometrically, the body of revolution was without boattailing (tail taper); the tail surfaces were of rectangular plan form with aspect ratio 2.33 and of a symmetrical, circular-arc airfoil section. The boundary layer of the body was turbulent.

The addition of these tail surfaces with trailing edges at or near the body base caused a large increase in the base-drag coefficient. For 10%-thick sections, this increase was about 70% with a Mach number of 1.5 and 35% at a Mach number of 2.0. By moving the trailing edge of the tail forward or rearward of the base by about 1 chord

length, the base-drag increment was reduced to nearly 0. Increments due to the presence of a 10%-thick tail were generally twice those for 5% thick tail. Base-drag increments due to the presence of a cruciform tail were less than twice those for a plane tail.

Superposition of the airfoil-pressure field on to the base-pressure field behind the body was used to estimate the change in base pressure. Comparing this estimation with the experimental values indicated in most cases that the trend in the variation of the base drag could be predicted by this approximate method. However, in most tail locations, the quantitative agreement was poor.

Two numerical methods have been developed using operations tables. They are used to calculate the buckling load of a monocoque cylinder subjected to pure bending. The basic assumption is that of a simplified structure which includes only the most highly compressed portion of the cylinder. The first of the two methods uses a 14-row determinant, and the second method requires the solution of a single 10-row determinant. The buckling loads of 3 cylinders with widely different characteristics were calculated by these methods, and reasonable agreement was obtained with experiment.

A procedure similar to the first method was developed for calculating the buckling load of a cylinder with a cutout. A limited experimental check was obtained for this procedure.

This work was carried on at the Polytechnic Institute of Brooklyn, sponsored by and conducted with financial aid from NACA.

► **On the Second-Order Tunnel-Wall Construction Correction in Two-Dimensional Compressible Flow (TN 2350)**—by E. B. Klunker and Keith C. Harder.

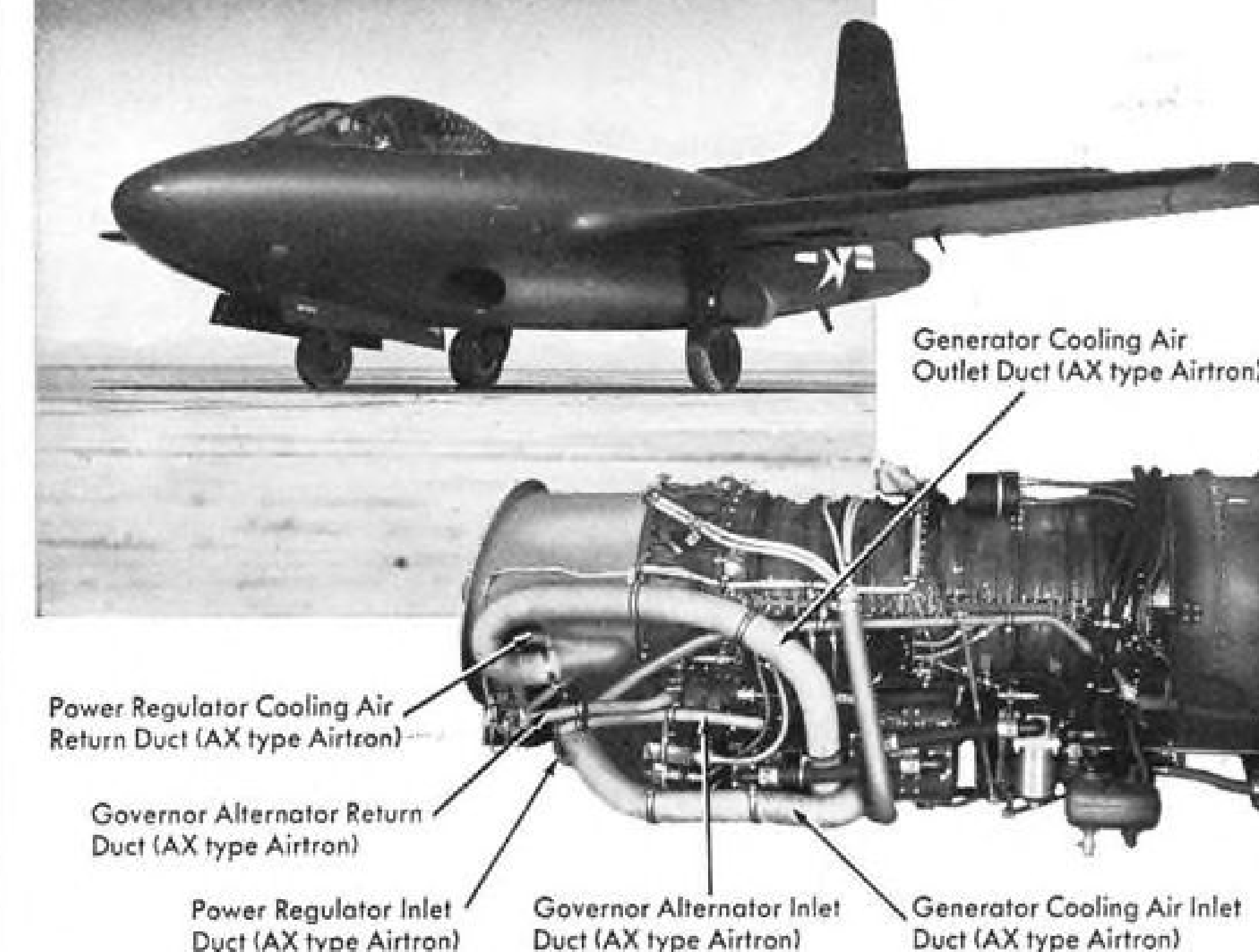
This report re-examines the question of tunnel-wall corrections in the solution of aerodynamic problems in the high-subsonic speed range by the use of wind tunnels.

The flow past thin, sharp-nosed, symmetric, two-dimensional bodies in closed channels is solved by means of the first- and second-order Prandtl-Busemann iteration equations. An expression is derived for the tunnel wall interference with the use of these solutions.

For a parabolic-arc airfoil, the tunnel wall corrections are calculated to indicate the effect of compressibility, ratio of the tunnel height to the airfoil chord, and airfoil thickness coefficient.

It appears that for cases where the tunnel wall corrections are significant, both second order effects and the variation of the correction along the chord should be considered.

## AIRTRON® Fiberglass ducting used on the twin-jet DOUGLAS SKYKNIGHT



Designed as a Navy fighter, the powerful F3D Skyknight is an advanced high-performance ship capable of many uses. "Electronic feelers" provide the means for seeking out distant targets under all weather conditions at high, jet-driven speeds.

Douglas engineers had sound reasons for selecting Airtron in designing the ducting installation on the Skyknight's twin jet engines. Extremely light in weight, Airtron combines the desirable qualities of fire resistance, excellent flexibility, and the ability to withstand high pressures and extremes of temperature. Airtron's remarkable ruggedness and its resistance to fluids and corrosion reduce replacement to a minimum. Ease of installation saves time and costs; quick disconnect feature (standard hose clamp) facilitates maintenance. And design engineers readily appreciate the advantages of ducting which actually eliminates vibration problems.

Airtron ducting is available in 130 standard types and constructions, affording designers a wide choice from which to select the ducting which meets exactly the particular requirement for flexibility, working pressure, temperature range and other characteristics. For special applications, Airtron can be designed to meet practically any specification, and it can be custom-fabricated in any conceivable shape.

Versatile Airtron ducting, designed for aircraft use, manufactured to rigid aircraft standards, has demonstrated its advantages in nearly every U. S. commercial and military aircraft of recent design in the air today.



A DIVISION OF NATIONAL MOTOR BEARING CO., INC.

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Gives comprehensive engineering design and application data on Airtron, with illustrations and descriptions of types. Write Dept. AR-14.

Arrowhead Rubber Company is the originator and world's foremost manufacturer of rubber-impregnated fiberglass ducting, one of the pioneers in the field of silicone rubber fabrication, and a principal manufacturer of precision molded "O" ring seals.







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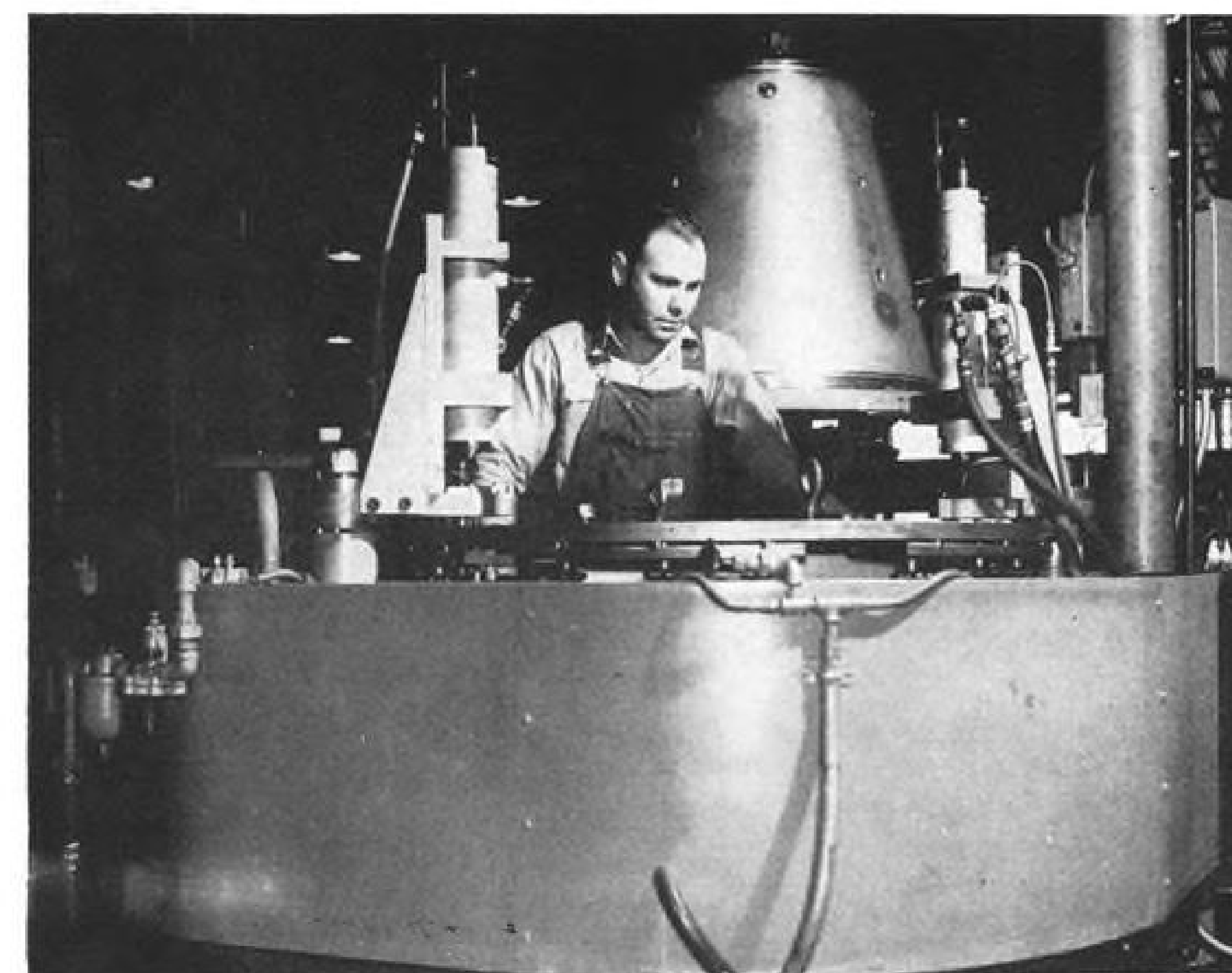
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CUSTOM DRILL JIG holds J-47 exhaust cone while two Keller Airfeeddrills accurately cut 160 bolt holes through one-half-inch stainless steel flange in just 80 min.



RYAN-BUILT SEAM ROLLER flattens Heliarc welded seams in a matter of seconds.

## Tailored Tools Speed Ryan Engine Work

Special modifications make for a smoother production stream.

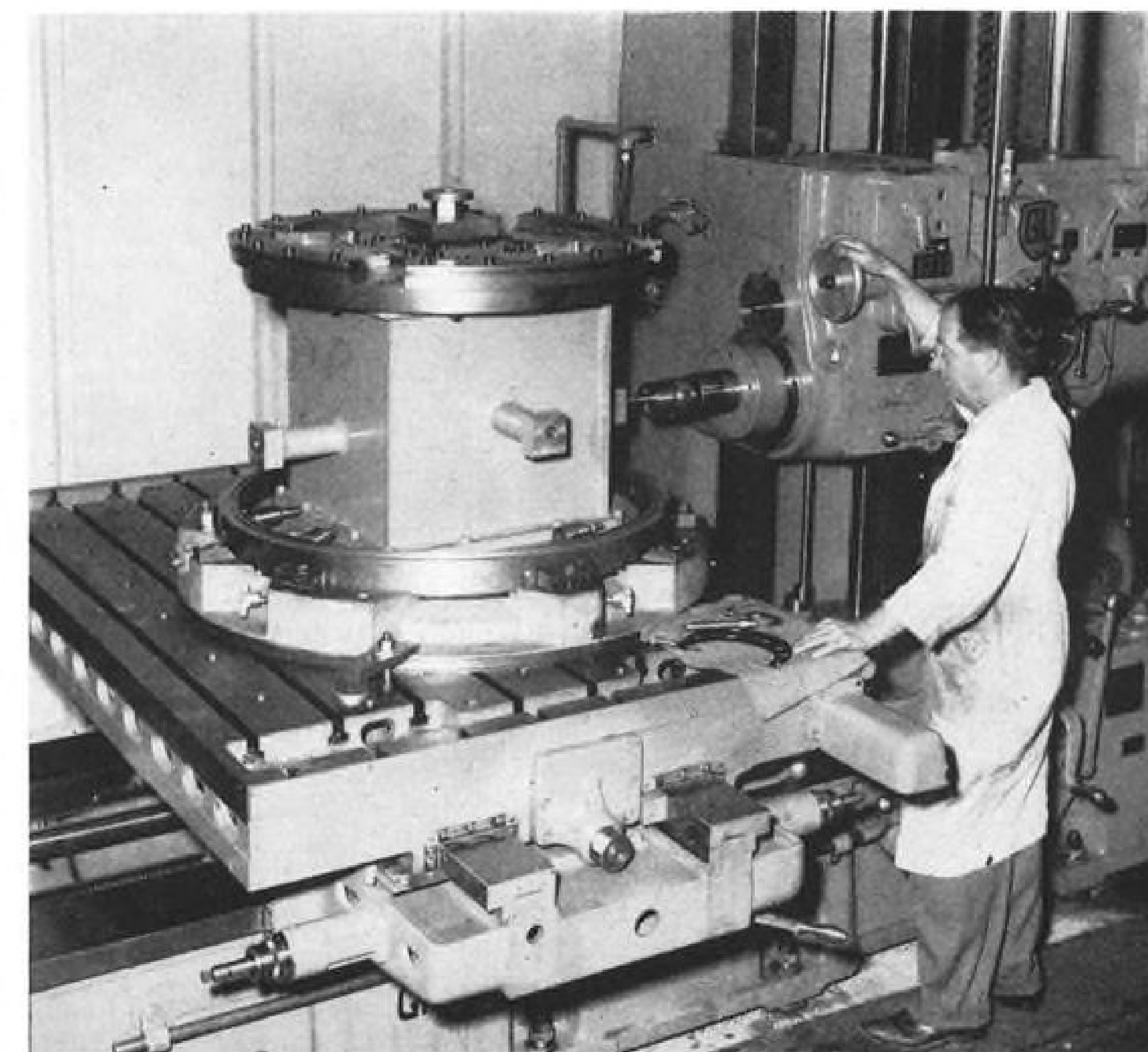
Ryan Aeronautical Corp. is getting new production gains from its engine-component fabrication line with more efficient tooling.

Some of this tooling is Ryan-designed, others the creation of tool manufacturers.

► **Drill Jig**—Ryan's plant engineers wanted to pare sharply the time required for precision drilling of the 160 bolt holes in the flanges of General Electric's J-47 exhaust cones. They came up with an answer in a company-designed-and-built drill jig that gives accuracy and a speed of two holes per minute.

The drill jig—a steel tool that rigidly holds the J-47 component—has a hole pattern that is accurate within .01 in. radially. Hole size tolerance is plus .004 in. and minus .001 in.

After the cone assembly is locked in the jig, a pair of Keller Airfeeddrills are pivoted into position so that the bits are located according to engineering specifications. A single valve pressed by the operator starts the drills simultaneously and they cut through the ½-in.

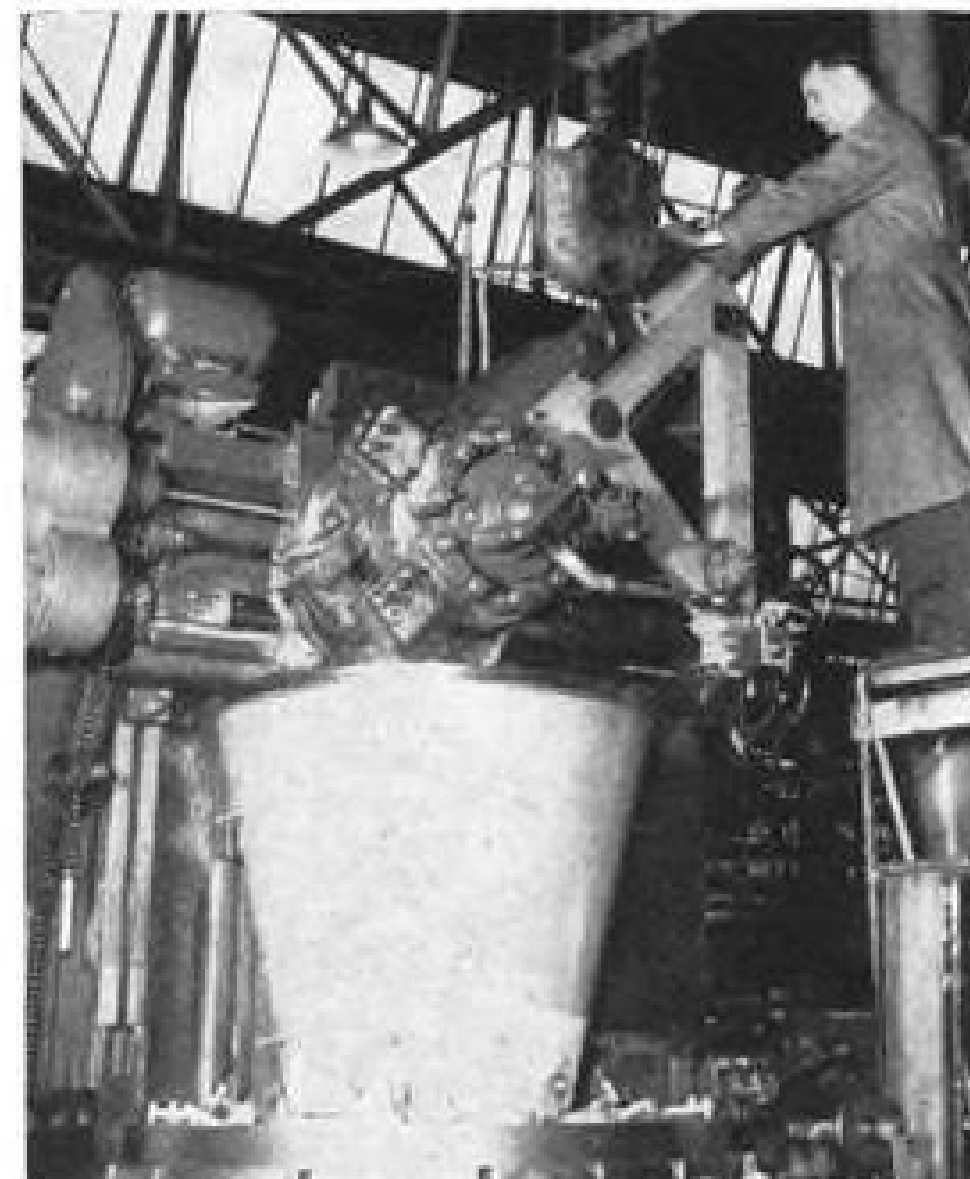


GIDDING & LEWIS horizontal boring, drilling and milling machine is suited for handling large, unwieldy and odd-shaped castings and fabrications. It cost \$31,500.





**BULLARD VERTICAL TURRET LATHE** (left) features high boring mill with raised bed; Turchan hydraulic duplicator (right) converts Bullard vertical turret lathe into an automatic production tool.



stainless steel flange and return to starting position without supervision. This automatic return is controlled by pre-set air valves which function when drill bits have gone required distance.

The entire jig is immersed in a steel tank. A motor-driven pump sprays the cutting area with a water-soluble lubricant, which is collected in the tank for recirculation.

After drilling, the jet cone is placed in a Ryan-built deburrer to remove any roughness without undercutting the flange.

► **Seam Roller**—Another Ryan-designed machine—a special seam roller—is sharply speeding up the job of smoothing Heliarc welded seams on tubular stainless steel exhaust sections.

Formerly, these parts were welded with filler rod added, and the resultant bulge of metal at the seam was ground away by hand, with a power-driven grinder. This operation consumed substantial time to remove the excess metal for a smooth finish.

With the new seam roller, it is now possible to weld the sections by Heliarc without filler metal. The welded sections are placed between the roller's two steel wheels, which exert heavy pressure to flatten the weld seam, improving the weld quality by refining the grain structure. Only a few seconds are required to run each section through.

The roller requires but ½-hp. motor. The operator simply places the section between the two wheels and depresses a foot switch. This actuates an air cylinder which brings the upper roll against the part and the lower roll. A pressure-operated switch in the air line automatically starts the motor and upper roll, to draw the section between the two wheels.

► **Handles Large Pieces**—Ryan's tool manufacturing department has added a horizontal borer, driller and miller unit

to its complement of machine tools. Made by Giddings and Lewis Machine Tool Co., the massive multi-purpose unit has an unusually large bed and open type structure, specially suited for handling large, unwieldy and odd-shaped castings or fabrications. It has wide flexibility for efficient use with single pieces, short runs or quantity production.

Paul Sauter, Ryan's tool manufacturing supervisor, says that the unit affords a new opportunity to reduce costs substantially on machining large tools. He reports that formerly it required about 40 hr. to drill and bore the exacting positioning holes in the J-47 jet engine tools for the tailcone. Drill points had to be located by hand, using temporary templates and a calibrated scale because of the large size of the tooling.

Now, the J-47 tool is placed in the new machine and the holes located and drilled using the machine's precision scales. This arrangement cuts the time for the operation to 8 hr.

Typical production-type jobs performed on the machine are combination boring and milling of large case and duct weldments for large jet engines.

Weighing 19,000 lb., the machine incorporates sufficient mass and size to insure precision work over a large area. It costs \$31,500, but labor savings should return that amount many times.

► **Tall Lathe**—Ryan is now using a vertical turret lathe with the highest boring mill with raised bed reportedly ever installed on the West Coast. This new machine—a 32-ton, 13-ft.-high Bullard Cut Master—has 24 in. of extra height for its bed as compared to the standard vertical Bullard.

This higher bed places the 64-in.-diameter turning table in the most advantageous position for specialized milling on unusually tall parts. Metal sections measuring from ½ to just under 84 in.

high are easily turned on the lathe.

With this machine, production of the 48-in. external fuel tank rings should be stepped up 25% over previous methods. And production rates should be boosted for steel cones, aft frames and other jet engine parts.

One man operates the lathe's gear-control arm to set off solenoids which in turn hydraulically actuate gear changes for rotational speeds up to 160 rpm. on the table or chuck.

► **Duplicator on Lathe**—Ryan has taken another Bullard vertical turret lathe and fitted it with a Turchan hydraulic duplicator—a high-production machine, reported capable of stepping up machining speeds, simplifying set-up procedure and improving surface finish. This combination converts the vertical turret lathe into an automatic production tool with considerable time savings.

The attachment consists of a motor-driven hydraulic pump supplying uniform pressure of 500 psi. to a sensitive valve and master control cylinder. The valve is actuated by a tracer point which feels the pattern's outline, and meters oil directly to the control cylinder. The cylinder's piston moves the tool slide supporting the cutting tool.

A typical application of the hookup is in machining exhaust cone flanges for the J-47 jet. A template conforming to the flange contour is clamped to the tracer table. The tracer point is located on the template and the cutting tool positioned on the flange in exact relationship by means of a micrometer-dial locating control. With the duplicator operating, the cutting tool instantly and faithfully follows the direction of the tracer. Accuracies in duplication within variations of .002 in. are obtained with this equipment.

Ryan reports that this method of generating work shapes from a model has many advantages over conventional methods. The smooth, continuous operation of the turret lathe's power feed coupled with the duplicator's floating action produces work of "unsurpassed" smoothness. Also, it eliminates the use of costly form tools and permits use of conventional tools which are simple to set up.

The duplicator adds \$5,000 to the cost of the \$21,000 Bullard, but improved work and time savings, Ryan says, more than compensate for the investment. And because of its automatic features, the tool allows any operator to handle intricate, high-quality jobs.

## Mammoth Press

A new giant machine tool will soon begin operation at Lockheed Aircraft Corp.

This latest addition to Lockheed's production might is an 8,000-ton-capac-

ity hydraulic forming press weighing 2.7 million lb. It was designed by company engineers for fabrication of integrally stiffened aircraft structures. It was built by Birdsboro Steel Foundry & Machine Co. and represents an investment of \$750,000.

The press will make possible the production of wing sections and other parts in solid pieces as large as 10 x 30 ft. It can be used for forming work requiring mating dies, stretch-forming and for rubber pad work.

Operation will be by a single attendant, although controls will be placed at all four corners for safety.

The new mammoth will take a 38-ft.-diameter foundation 6 ft. thick, requiring 270 cu. yd. of concrete and 18 tons of reinforcing steel. Floor will be separated from surrounding area to isolate impact shock.

## USAF CONTRACTS

Recent Air Force contracts announced by Air Materiel Command have included awards for photographic supplies and equipment, machine tools, electronic equipment and for training programs at various schools. Some recent contracts:

**Abrams Instrument Corp.**, Lansing, CE-1 counters & case; spare parts, Cl. AF 10A, 1,000 ea., \$33,412.

**ACF Brill Motors Co.**, Philadelphia, powerplant, Cl. 19F, over \$250,000.

**AC Sparkplug**, div. of General Motors, Flint, Mich., spark plugs cleaners, Cl. 17A, 100 ea., \$32,604.

**Acushnet Process Co.**, New Bedford, Mass., mask-oxygen pressure, Cl. 13C, over \$250,000.

**Aero Ind. Technical Institute**, West Coast Univ., Oakland, furnishing of necessary facilities and training for 300 AF military personnel for 36 weeks airplane maintenance fund, over \$250,000.

**Avildsen Tools & Machines, Inc.**, Chicago, drill, Cl. 17B, over \$250,000.

**Bachman Wholesale Co.**, Rochester, aircraft parts & equipment, Cl. 11E, 600 ea., \$75,000.

**Badger Northland Inc.**, Kaukauna, Wis., dolly type A-3 spare parts, over \$250,000.

**Bausch & Lomb Optical Co.**, Rochester, purchase of 36" accumulator & platinum, \$60,000; misc. photo equipment, Cl. AF 10A, over \$250,000.

**Bell & Howell**, Chicago, projector and spare parts, Cl. AF 10D, over \$250,000.

**Belmont Radio Corp.**, Chicago, radio direction finder, AN/CRD-6, over \$250,000.

**Cherry Rivet Co.**, div. of Townsend Co., Los Angeles, gun-riveting, Cl. 17A, 141 ea., \$36,473.

**Chicago Aerial Survey Co.**, Chicago, magazines, spare parts, Cl. AF 10A, over \$250,000.

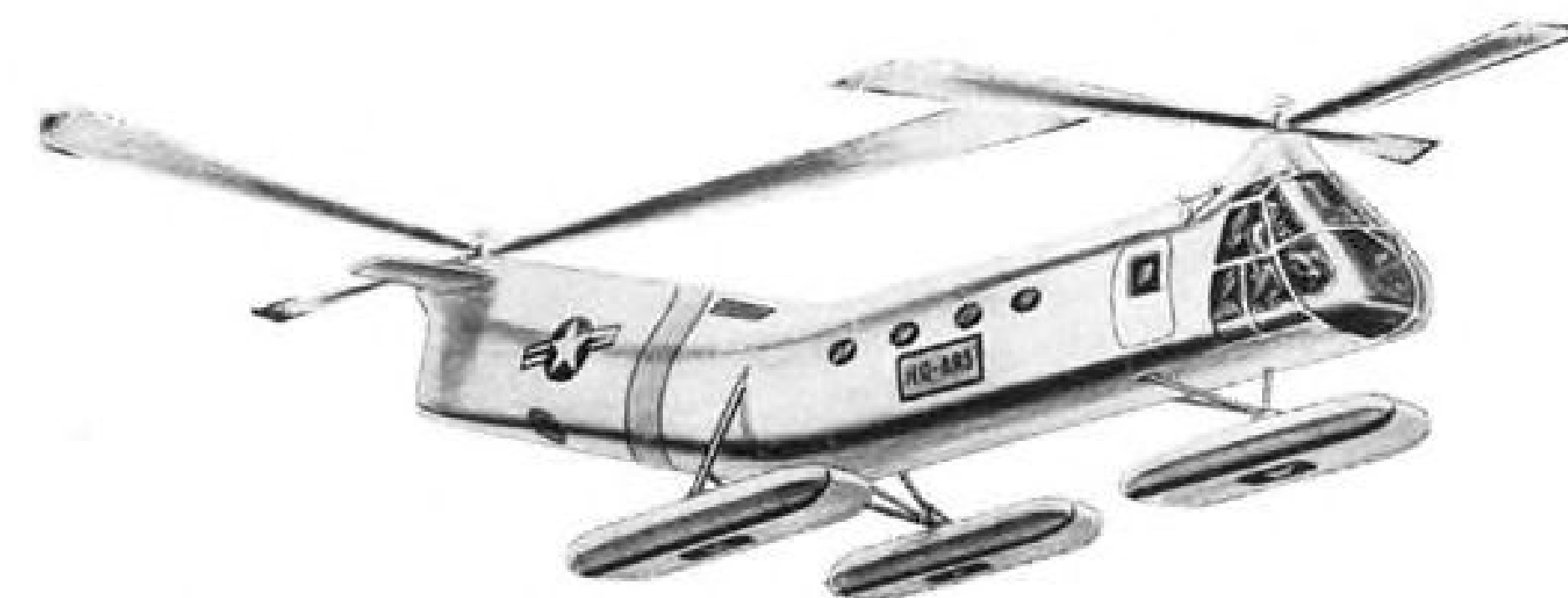
**Chicago Pneumatic Tool Co.**, Detroit, compressor, Cl. 17A, over \$250,000; riveting hammers pneumatic, Cl. 17A, over \$250,000; riveting hammers pneumatic, Cl. 17A, over \$250,000.

**Chillicothe Business College**, Chillicothe, Mo., furnishing of necessary facilities and training for 575 AF personnel as clerk-typists for 12 weeks, \$22,500.

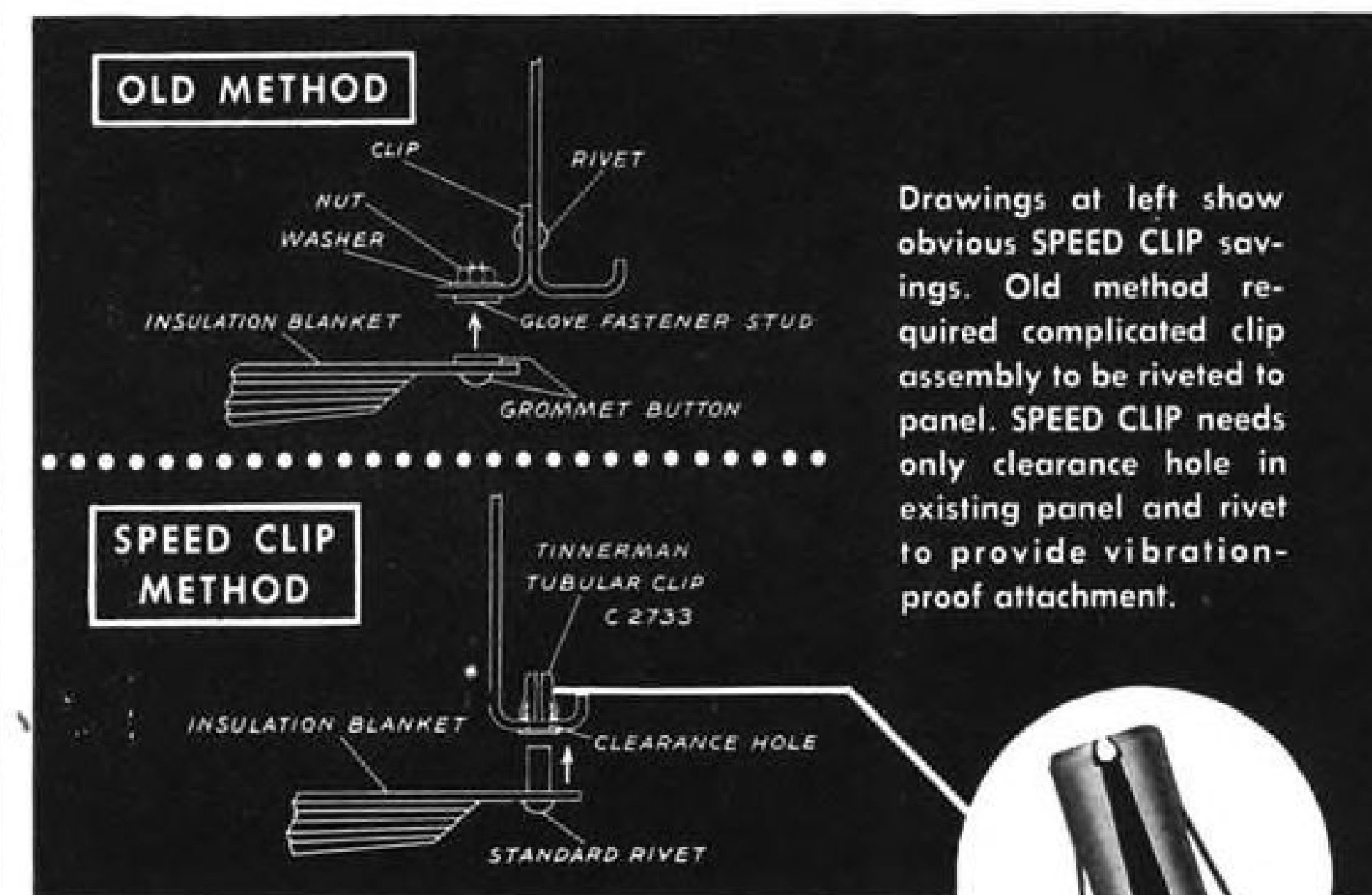
**Deluxe Laboratories**, New York, continuous processing photographic equipment, EO-SR-1, 1 job, \$187,233.

**Despatch Oven Co.**, Minneapolis, horizontal electric heat treating, Cl. 17A, 4 ea., \$57,016.

**Doehler Metal Furniture Co.**, N. Y., furniture, Cl. 40A, over \$250,000.



**"Flying Workhorse" picks up 71% assembly savings... 73% weight savings**



Drawings at left show obvious SPEED CLIP savings. Old method required complicated clip assembly to be riveted to panel. SPEED CLIP needs only clearance hole in existing panel and rivet to provide vibration-proof attachment.

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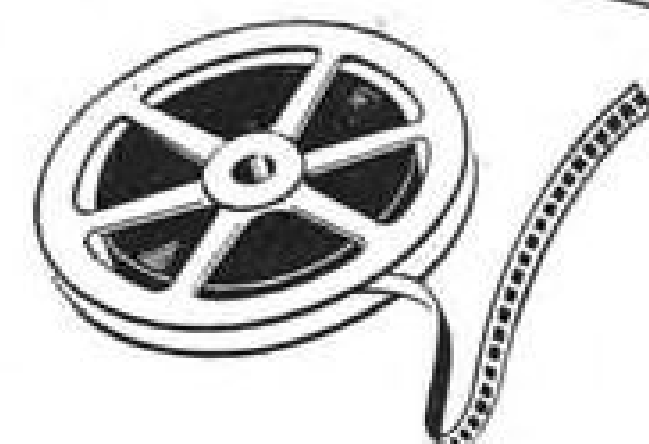
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178 pages.

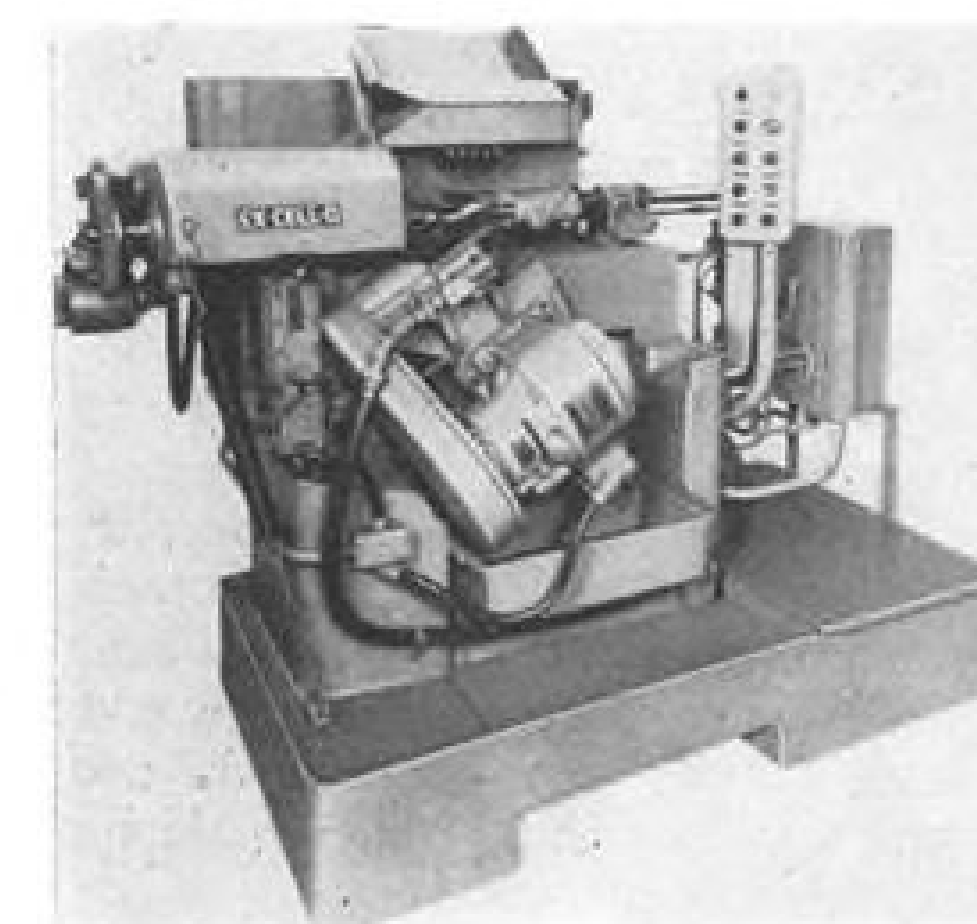
**Designing for Alcoa Forgings.** Covers types of forgings, applications, alloys, design and production details.  
171 pages.



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## NEW PRODUCTION TOOLS



### Jet Blade Miller

A standard machine for milling the airfoil form on jet aircraft compressor blades now is available from Ex-Cell-O.

This tool (Style 86 Precision Profile Miller) mills the complete airfoil form, including leading and trailing edges. Accuracy of the airfoil form is assured, says Ex-Cell-O, by use of master cams made from engineers' glass layouts.

Except for loading and unloading the work and pressing a start button, the machining cycle is completely automatic. The finished root form of the compressor blade (previously ground on the Style 85 Two Wheel Form Grinder) is utilized to position the work at one end in the machine, while a center holds the blade at the other end. Work is supported rigidly by back rests throughout the cutting stroke, an outstanding feature, says the firm. This helps prevent distortion of the blade from cutting pressure.

Work moves lengthwise across the cutter at an adjustable rate of feed. At the end of each cutting stroke, the headstock, tailstock and back rests are unclamped and the work indexed. The amount of movement during indexing and number of indexes are determined by pins in an index plate.

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

### Rocket Tapper

Rocket bodies (the 3.5 mm. type) are tapped at the rate of 100 pieces per hour with the fully automatic tapper developed recently.

A number of these machines already are in use at various munition plants, the maker reports. It is fully automatic except for loading and unloading. The fixture is the shuttle type and is air operated as are chucks for holding the part. A cutting speed of about 34 ft. min. is used. The material worked is 4140 seamless steel tubing, hardened to

35 to 37 Rockwell. The thread is a 1 25/32-16 pitch buttress. The tool is designated Model E-4U Cleveland Lead Screw Production Machine.

Cleveland Tapping Machine Co., Canton, Ohio.

### Strut Grinder

A grinding machine, especially designed for work on aircraft components has been developed by the Norton Co.

Aim of this new tool is to grind struts and components of irregular shape which cannot be accommodated in standard size cylindrical grinders. It has a swing over the table of 26 or 36 in. dia. and is available in work length capacities of 72 and 96 in. By means of a gap, a swing capacity of 80 and 86 in. can be provided. This gap is adjustable in width by moving a pedestal on which the headstock rests. It may be set to any width up to 26 in.

The machine is the traveling wheel head type and a convenient means of wheel head travel control is provided on the adjustable dog on a large wheel placed in front of the machine. A swivel table permits grinding of tapers. An auxiliary spindle for use on parts with projections also is available.

Norton Co., Worcester 6, Mass.



### Sheet Floater

Sheets of steel for feeding into stamping presses are practically "served up" to the operator by a "Magnetic Sheet Floater," recently placed on the market.

Stacked sheets are held apart at the ends by magnetic action, so they can be picked up quickly by the operator and fed into the stamping press. The device removes difficulties encountered in trying to separate sheets with gloved hands, speeds handling, and reduces chances of injury to the worker.

Verson Allsteel Press Co., 9311 S. Kenwood Ave., Chicago, 19.

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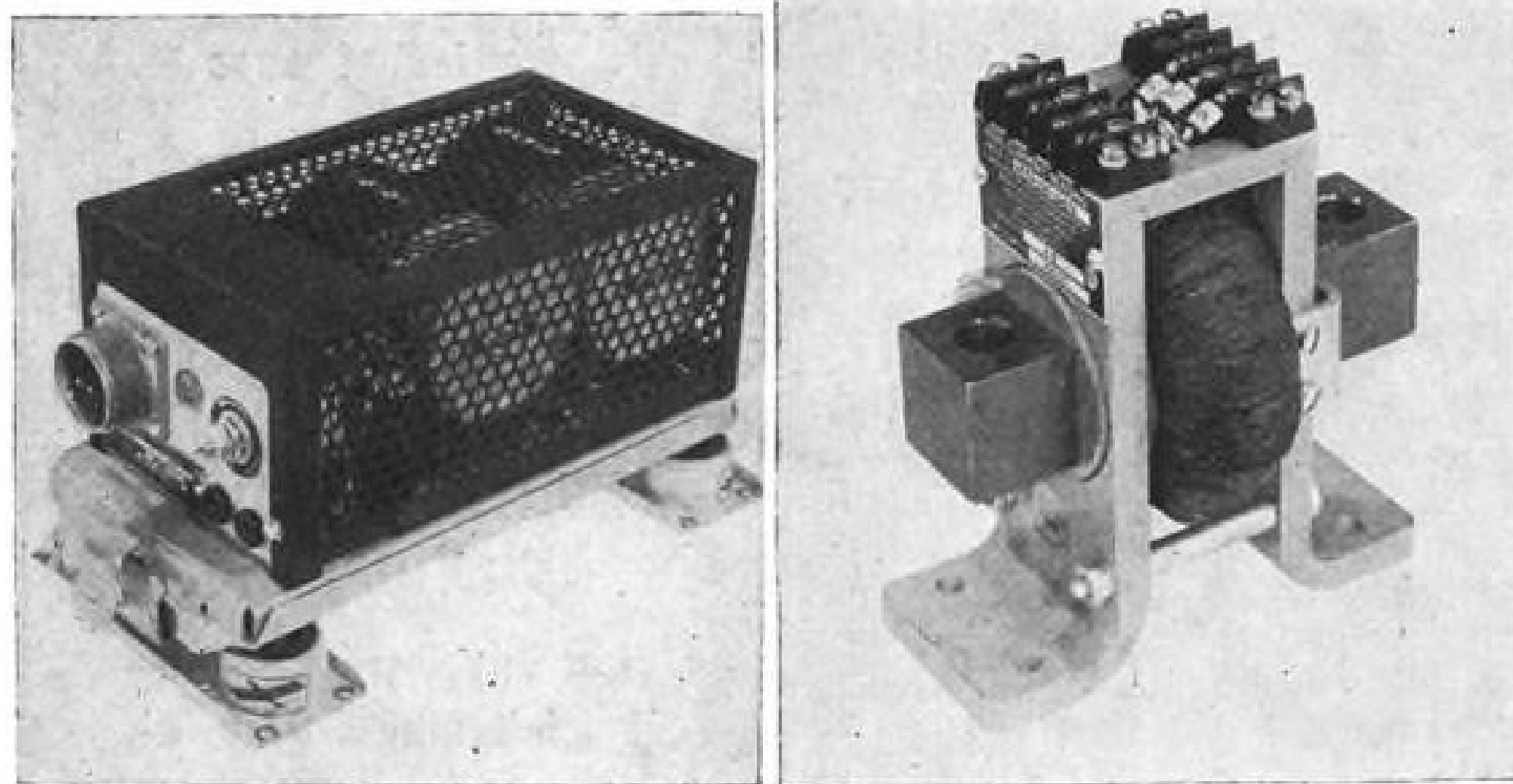
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## EQUIPMENT



GROUND POWER supply unit control panel (left) contains voltage and current regulators and associated circuits. Toroid (right) is current sensing element.

### Unit Controls Jet Starter Current

Eclipse-Pioneer contemplating production of device developed to hold torque steady with low amp. loss.

The problem of excessive wear on brushes of jet engine starters, due to the great heat built up by uncontrolled current input, has been overcome, according to Eclipse-Pioneer, with a newly developed ground power supply unit.

With a flick of a switch, the new device automatically limits to a predetermined value the current and voltage supplied to the starter, avoiding the rapid temperature increase in the brushes and wastage of up to 1,000 amperes—equivalent to approximately 3-4 hp. at 28 v. The recently developed unit requires only 50 watts to operate, while the present system demand 750.

► **What It Does**—Speaking in round figures, this is what the device will do: Suppose 1,000 amp. has been selected (by setting this limit on the maximum current control) as the maximum amperage to be supplied to the generator. When the starter button is pushed, 1,000 amp. are furnished the starter, no more. The initial 28 v. drops to 8 v. As starter gathers speed, 1,000 amp. are continuously maintained because the control unit gradually raises the voltage supplied in direct proportion to the needs of the starter. When the full 28 v. reach the starter, a voltage regulator takes over. Normally, the engine has caught by this time.

An important feature is that the torque imposed by the starter on the engine remains constant throughout the entire starting sequence. This automatic

torque limiting means that no sudden, uncontrollable, loads twist the gearing and shafting of the engine with resultant possible failures. Engine life should therefore be improved.

Tentatively called "Ground Power Supply Generator and Control," the unit is under development at the Eclipse-Pioneer division, Bendix Aviation Corp., Teterboro, N. J. Only a few pilot models have been built to date but production quantities are contemplated. At present, 500 and 1,000 amp. systems are under consideration.

Heart of the power supply's control system is a toroid. This doughnut-shaped magnetic amplifier, the element

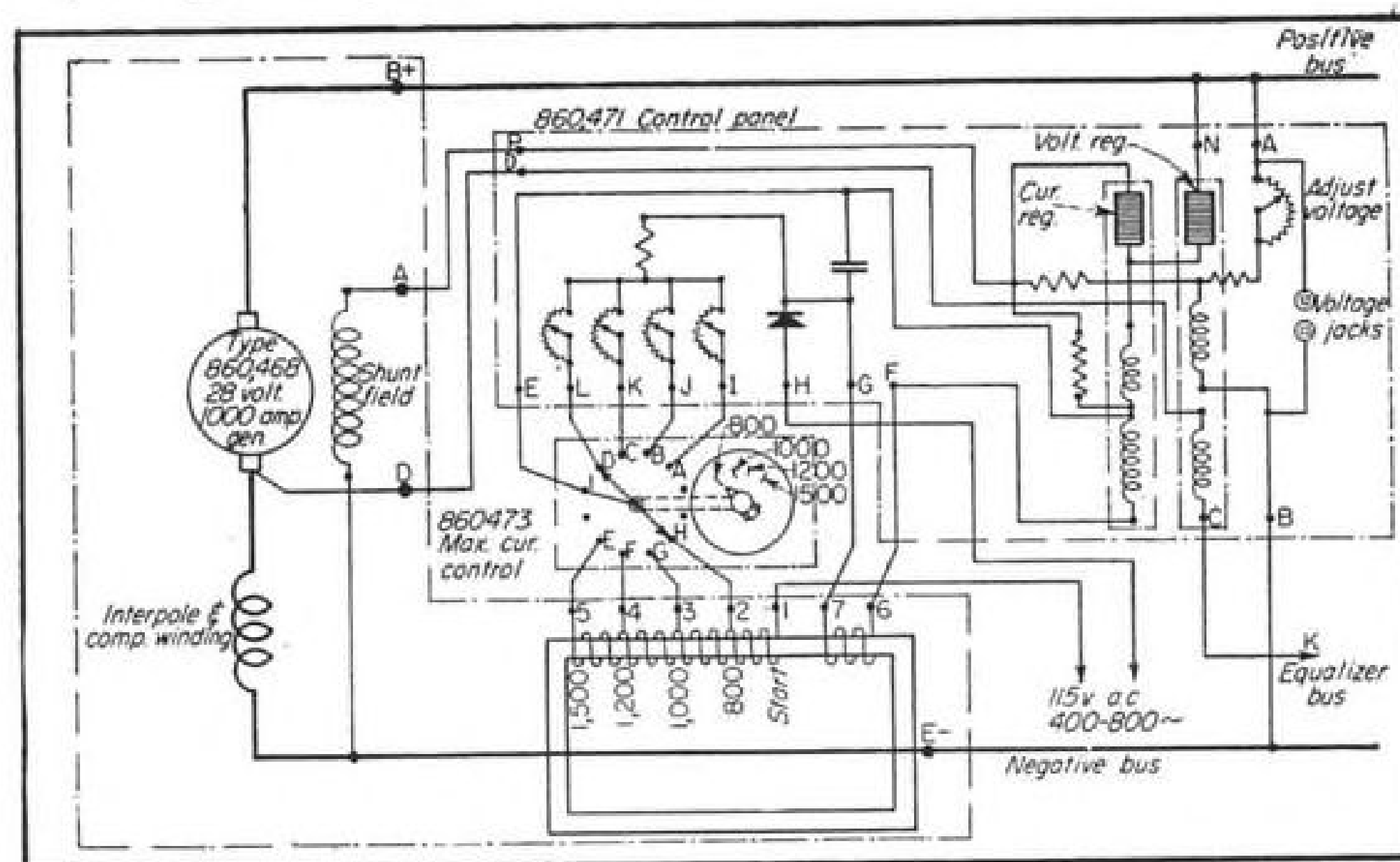
sensing current produced by the generator, is made up of two windings on a ring having special magnetic properties.

Purpose of one, the current sensing winding, is to determine magnetically the amount of current being generated, and through a carbon pile regulator to limit this current to whatever value has been selected. The other coil, termed the bias winding, prevents a true no-load condition from ever occurring to the magnetic amplifier "since the bias winding carries the same d.c. current as the regulator coil." This is necessary because, when there is no load on the generator, the coil current would increase sharply to a point where the current regulator carbon pile would be held open.

► **How It Works**—One side of a 120 v. 400-800 cycle a.c. current supply is fed through the current sensing winding of the toroid, through a half-wave rectifier, the current regulator, the bias winding on the magnetic amplifier then to the other side of the a.c. supply. A standard inverter is recommended as source of the a.c. if alternating current is not already available on the power unit. A condenser is connected across the regulator and bias coils to smooth out the pulsating direct current output of the half-wave rectifier and thus improve performance of the carbon pile regulator. Also connected across these coils is a fixed resistor and a rheostat; adjustment of the latter permits trimming for maximum amperage setting by by-passing current around current regulator coil.

Thus the magnetic amplifier, sensing current output of the generator, signals the carbon pile current regulator how much current is flowing. Instantaneously, the regulator commands the generator, through its shunt field, to limit current output to a given amperage by lowering its terminal voltage.

► **Tough Toroid**—Unique feature of the



WIRING DIAGRAM shows Eclipse-Pioneer ground power supply control circuit layout.

ground power supply control system is the toroid. This wiry doughnut is mounted between two supporting brackets. A single copper bar is inserted through its center. Both ends have terminals to make external connections. Since the bar carries full output of the generator, it has a large cross-sectional area and is short so that the IR drop or power loss is equal to or less than an equivalent length of cable. Connections for the current sensing and bias windings are made through a terminal board mounted on top of the unit.

Features of the toroid are:

- Ruggedness of construction eliminates need for shock mounting the unit.
- Simplicity and ease of maintenance are indicated by the complete lack of moving parts.
- Economy of current consumption (approximately 20 watts are dissipated in its windings) means that no special provisions need be made for ventilation or cooling the toroid. Moreover, since control currents are measured in milliamperes, the unit may be remotely mounted without special consideration for lead length.

Polarity is important and all terminals are marked to insure that they are properly connected.

Complete weight of the unit is 4 lb.

Other components of the ground power supply unit are:

- **Maximum current control**—This is a selector switch with which an operator may choose any one of several maximum starting ampere values. One unit seen at Eclipse's plant offers four choices: 800, 1,000, 1,200 and 1,500 amp. Amperage supplied the starter will not rise above the predetermined value set into this control. Weight is one lb.

- **Control panel**—This component is made up of two parts—a tray assembly containing the current and voltage regulators plus associate circuits and a shock mounted base from which the tray is quickly detached. This permits easy removal of the unit for maintenance or inspection without having to disturb the base. Total weight is eight lb.

R. G. Adams, Eclipse assistant senior accessory electrical engineer, told AVIATION WEEK he felt confident that the compact, light weight, and robust ground supply and generator control would perform a useful and needed job in making jet engine starting easier with less wear on starter and engine alike.

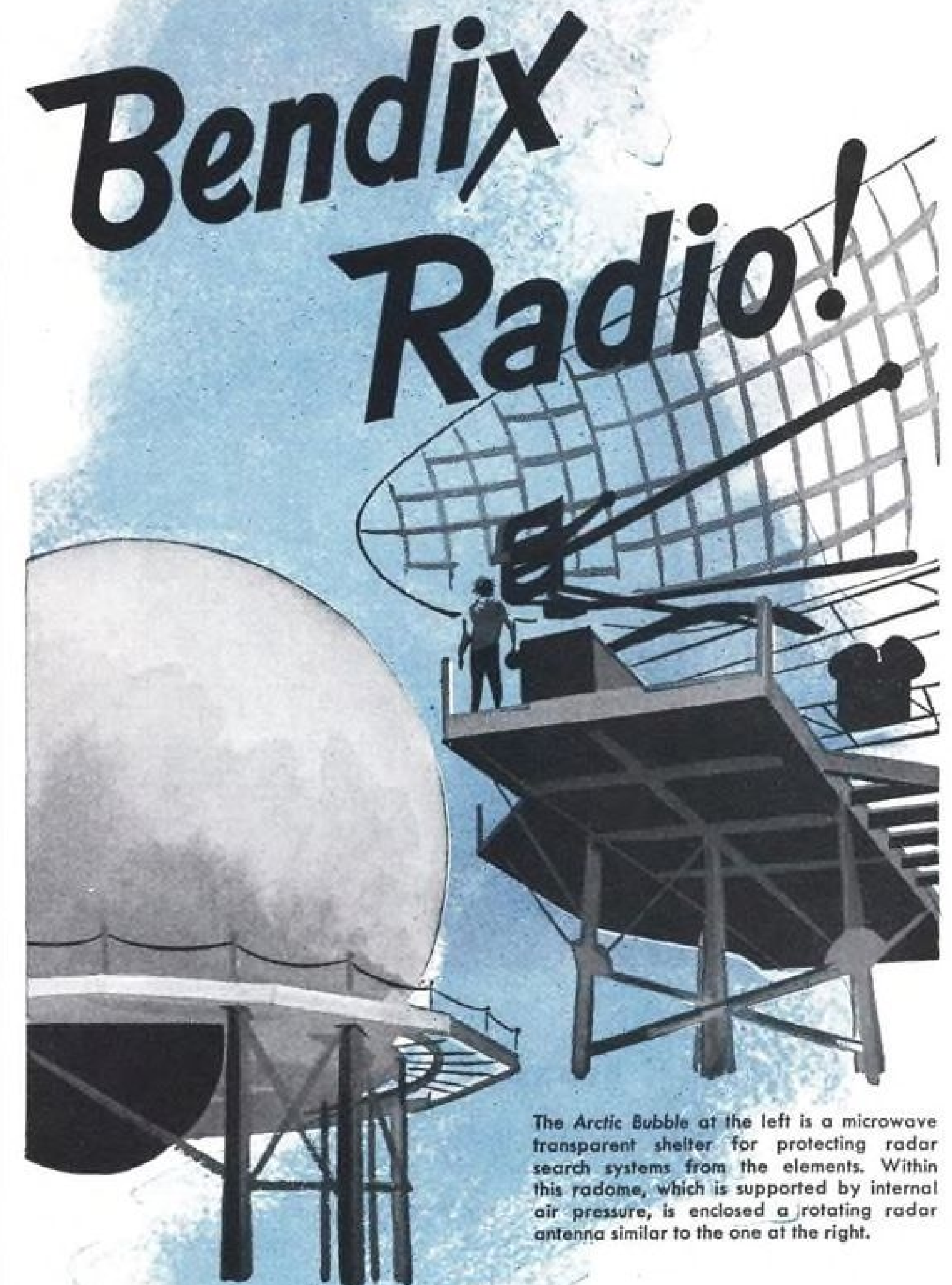
### RAF Compass

The latest Royal Air Force and Navy jet fighters are being equipped with a new type of emergency compass.

The 3-oz. transparent plastic instrument is only as large as a golf ball.

The E2A, as it is called, mounts a compass card graduated in 10-deg. in-

## Pioneer and Prime Producer of Radar—



The Arctic Bubble at the left is a microwave transparent shelter for protecting radar search systems from the elements. Within this radome, which is supported by internal air pressure, is enclosed a rotating radar antenna similar to the one at the right.

Pioneer and leader in radio communications and radar, Bendix\* Radio manufactures radar systems for civilian and military applications. Bendix is the designer, builder and supplier of GCA radar for the U. S. Navy. The Civil Aeronautics Administration has chosen Bendix to supply airport radar landing systems for 34 of the nation's major airports. Write for your copy of "Eyes for Blind Flight," the story of GCA radar.

\*REG. U. S. PAT. OFF.

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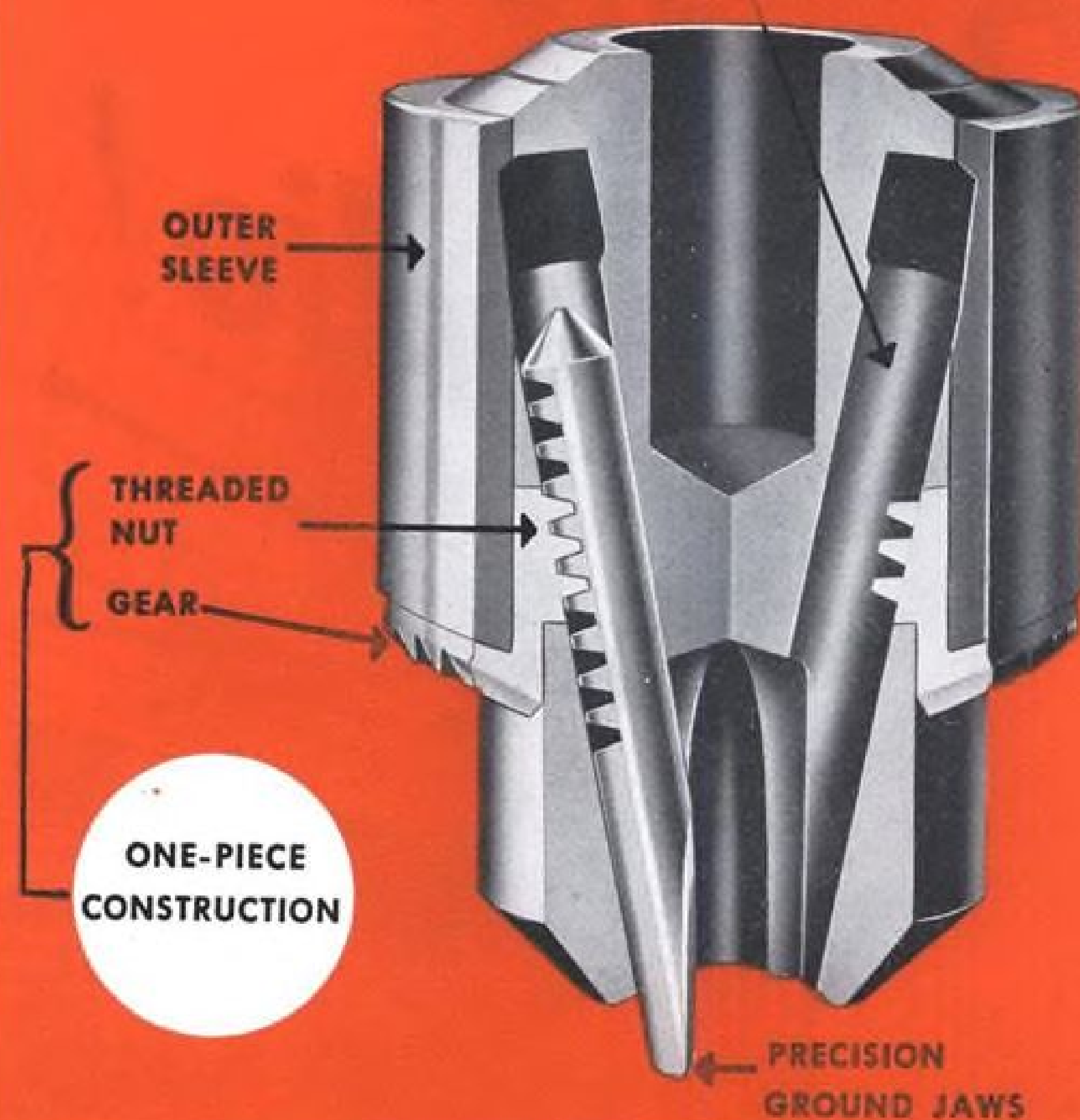


Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, New York  
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crements which turns in front of a luminous pointer. Silicone fluid is used inside the instrument for damping purposes. The compass works equally well in an inverted position.

The E2A was developed by the Admiralty Compass Observatory for the Ministry of Supply and is built by Kelvin and Hughes.

### Electronic 'Brain' Controls Fuel Flow

Pratt & Whitney's latest jet engine, the powerful J-57 (estimated thrust: 10,000 lb.) is being equipped with a new fuel control.

The new device, developed and being produced in limited quantities by Hamilton Standard division of United Aircraft Corp., combines an electronic "brain" with a hydro-mechanical system to feed the engine precise amounts of fuel for optimum operation.

Ham Standard's general manager, Erle Martin, said that the fuel control "has passed endurance tests on J-57 engines in test cells, and flight testing now is in progress."

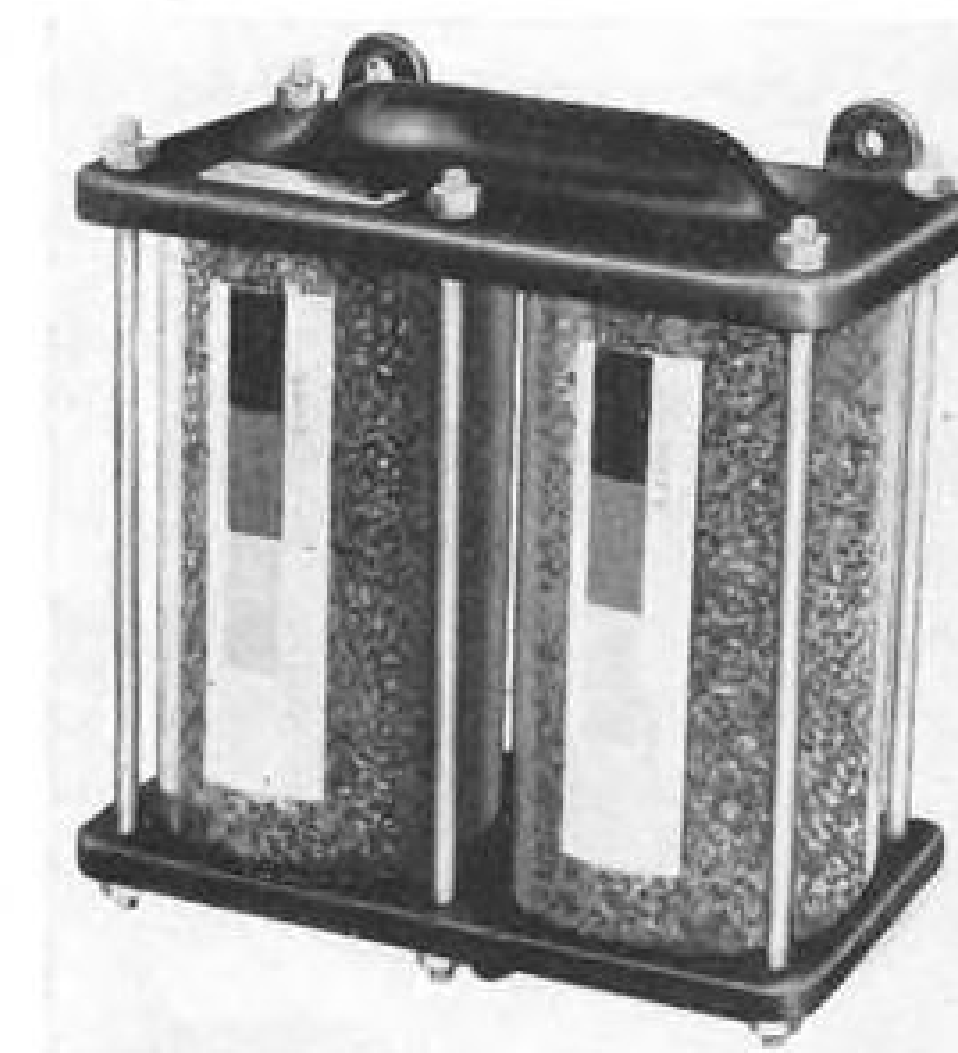
The fuel control, Martin said, relieves the pilot of a number of duties involving operation of the jet engine and accurately controls the speed of the rotor assembly. Sensing units detect air inlet and tail pipe temperatures and engine rpm., then relay this information to the electronic unit. If the engine tends to exceed its design limits, the latter signals the hydraulic actuator to reduce fuel flow.

Interesting and important safety feature of the electronic unit, resulting from intensive research on the part of Offner Products Corp., Chicago, combined with study by Ham Standard engineers, is the duplication of vacuum tubes so that a stand-by tube is always available to take over in case of failure of the first tube. Also, miniature sub-assemblies in the electronic unit are "potted" in compact housings of quick-hardening resin. Result is immunity to vibration, dust, insects, fungus humidity and other destructive elements. Added protection is furnished by encasing the entire electronic unit in an airtight magnesium casting.

Advantage of the sub-assembly housings, which are plugged into special sockets in the electronic unit, is that they can be quickly removed and replaced, eliminating the problems of servicing individual circuits or maladjustment, tampering or mishandling by inexperienced personnel.

The unit is the second in Ham Standard's expanding line of aircraft equipment to reach the production stage. The first was an air-cycle refrigeration unit for jet fighter cockpits, currently used in F-86D jets.

## NEW AVIATION PRODUCTS



### Radar Air Dryer

A new series of air filter-dehydrators for drying and cleaning air supplied to pressurized radar domes have been placed on the aircraft equipment counter by the Romec division of Lear, Inc.

Coming in cartridge sizes from 8 to 60 cu. in. of dessicant, the new units provide water adsorption capacity to match operating cycle demands of the pressurizing equipment. The dehydrators are located on the inlet side of the compressor. Water vapors, acids and other impurities are adsorbed with maximum efficiency and with low resistance to air passage, Romec says.

Wire mesh screens and filter pads are utilized to remove all air dust. Moisture-indicating crystals, visible through transparent tube, are silica gel Grade A, Type IV, meeting specification AN-D-6. Characteristic colors coincide with attached color cards at 0, 20, 40 and 60% relative humidity.

Lear, Inc., Romec division, Elyria, Ohio.

### Plane Stains Erased

A non-abrasive polish that gives a glistening, uniform sheen to aluminum surfaces on aircraft without reducing the thickness of the metal has been developed by Ryan Aeronautical Co., San Diego.

The product, Raco 220, removes varicolored stains and other blemishes marring aluminum skins during aircraft fabrication. It provides a sheen that approaches mill finish appearance, says Ryan. Strictly a surface treatment, it does not remove mars caused by corrosion. This requires an abrasive agent. However, the polish does help prevent galvanic corrosion.

Ryan developed the new polish when Boeing Airplane Co. requested that

none of the conventional types be used on C-97 fuselage sections being built under subcontract by Ryan. Boeing feared these polishes might thin out the 2S pure aluminum coating on the 24ST base alloy.

Besides its use as a safe polish for the C-97 skin, Raco 220 also is being applied to skin surfaces—particularly along the seam welds—of external fuel tanks built by the firm. Ryan engineers have found it effectively removes copper from the seams picked up during welding, thus preventing galvanic corrosion that would result if the copper were left in contact with the aluminum skin. Raco 220 is easily applied, Ryan points out. It was developed by B. W. Floersch, chemical research engineer at the firm.

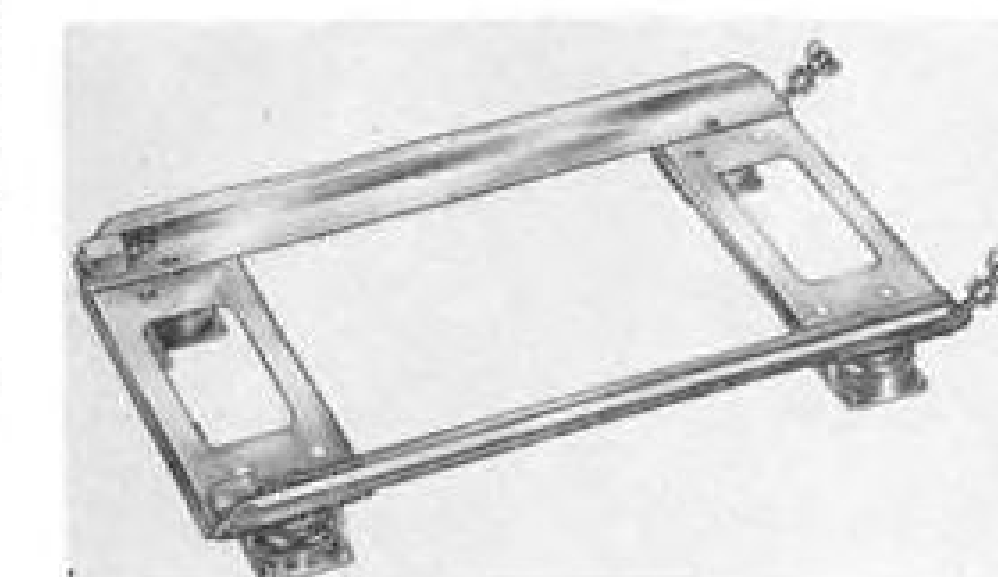
Ryan Aeronautical Co., Lindbergh Field, San Diego 12, Calif.

### Better Plane Tubing

A polyvinyl insulating tubing (Insulite XLT-175) for aircraft wiring, which does not grow fungus or support fungus growth, reportedly has been developed by Extruders, Inc.

The product is the first to meet USAF Specification 12047-A in rigid tests at Wright-Patterson AF13, the maker claims. The tubing also is said to have excellent low temperature performance and high dielectric strength.

Extruders, Inc., 3232 W. El Segundo Blvd., Hawthorne, Calif.



### Shipboard Mounts

Ruggedized vibration isolators and mounting bases, constructed to withstand severe shocks encountered in arrested landings on aircraft carriers and in crash landings, now are being produced by the Barry Corp.

These units are designed to meet shock test requirements of Spec. AN-E-19 and to support equipment sizes listed in JAN-C-172A. Mounting bases in special sizes can be supplied to meet customer's requirements.

Considerable strengthening of the framework of the mounting bases, exceeding military requirements, has been achieved with only small increase in

weight for types supporting loads up to 50 lb. For heavier loads, the bases are of stainless steel, instead of aluminum.

Unit vibration isolators cover load ranges from 1/4 to 40 lb., are interchangeable with other isolators now being used. They come both in the air-damped and "All-Metl" type.

The Barry Corp., Watertown, Mass.

### Air Flow Switch

A new air flow switch, presently used to protect ground radar equipment, may have airborne applications.

The switch is a safety interlock for forced air cooling to electronic equipment. It is designed to guard against tube failure. In event of blower failure or air passage obstruction, it operates a control relay which cuts off power to the tubes. It could serve, perhaps, in a similar capacity with airborne avionic equipment that requires forced air cooling. And it also may fit many other aircraft applications requiring a sensitive static pressure switch.

The unit is the first vane-type (no-diaphragm) switch of its pressure rating and size, the maker believes. But further reduction in size and weight still can be accomplished easily to meet specific aircraft requirements, the company adds.

Henry G. Dietz, 12-16 Astoria Blvd., Long Island City 2, N. Y.

## ALSO ON THE MARKET

**Special nails for aircraft** (precision built and closely inspected before delivery) range from 22 to 10 gauge, length from 1/4 to 2 1/2 in. They come with round, oval, conical, flat or countersunk heads. The Roberts Co., 1536 N. Indiana St., Los Angeles.

**Quieter fan operation** in aircraft can be achieved through use of a new rubber-bonded-to-metal hub which isolates vibration and forms an effective "sound dam" between shaft and fan blades. Lord Mfg. Co., Erie, Pa.

**Hand tachometer** (German "Dr. Horn" type) is a sturdy little instrument boasting six speed ranges from 25 to 30,000 rpm.; protected from overspeeding. James G. Biddle Co., 1316 Arch St., Philadelphia.

**Synergistic solvent** is supposed to have speedy, highly effective grease-cleaning and carbon-removing properties. It does not have to be heated, is said to be non-flammable and safe on hands; can be used for cleaning carburetors, oil strainers, etc. Curran Ordnance Chemical Laboratory, Lawrence, Mass.



Production  
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## FINANCIAL

### Half-Year Comparison: 1951 vs. 1950

Selected U. S. Trunk Airlines—First Six Months

TRUNKLINE	1951		1950		% INCREASE—	
	TOTAL REVENUES	NET INCOME	TOTAL REVENUES	NET INCOME	TOTAL REVENUES	NET INCOME
American.....	\$74,945,770	\$6,532,867	\$51,765,346	\$2,426,544	44.8%	169.2%
Eastern.....	51,874,000	3,736,000	40,822,000	2,459,500	27.1	51.5
TWA.....	66,416,000	2,603,000	50,897,000	1,029,000	30.6	152.5
United.....	58,220,836	2,957,558	44,392,652	(59,370)**	31.2	—
NWA.....	22,092,685	47,693	21,291,506	(3,458,396)**	4.1	—
Capital.....	18,556,837	730,923	13,414,248	300,260	38.2	140.0
Braniff.....	12,091,671	944,008	9,842,047	402,044	22.9	134.0
C & S.....	7,295,428	278,282*	6,169,709	148,207	18.4	87.5
Mid-Continent.....	4,620,484	133,600	3,878,287	154,284	22.3	-13.3

\* Excludes \$150,000 profit on sale of equipment.  
\*\* Net loss.

### Airline Net Climbing With Traffic

Record-breaking passenger volume and mail, freight, express rise, bring leverage factor into play.

Sharp gains in airline gross revenues together with even greater improvements in net profits are evident from the reports released by the major air carriers for the first six months of this year.

Record-breaking passenger traffic has developed a far greater volume of business than the most optimistic industry officials dared to anticipate earlier this year.

Preliminary estimates place total revenue passenger miles for the domestic trunk lines for the first six months of 1951 at around 5.15 billion, up some 45% over mileage for the same period a year ago.

This upsurge in passenger traffic is mainly responsible for the major gains in gross revenues of the air carriers. While mail, express and freight volumes are also up, these categories account for a much smaller percentage of the total business of most of the nation's major airlines.

► **Leverage Factor**—Inherently, there is tremendous leverage in airline operations. Once operating costs are covered, virtually all additional revenues received flow through to net. Operating costs are about the same whether 25 or 50 passengers are carried on a flight. This leverage factor had an important effect on airlines earnings during the first half of this year. In the past, for most air carriers, the earlier months of the year were seasonally unprofitable and brought heavy losses as operations fell far short of break-even points. Each year sees an increasing number of airlines reporting profits in the first half

in place of the losses so common in the past.

Seasonal characteristics are becoming less pronounced in the operations of most air carriers. This is due primarily to the greater safety experience, increased dependability in all types of weather, and aggressive promotional efforts such as coach and other devices to broaden air travel markets.

► **Seasonal Effect**—The smoothing out of the seasonal fluctuations in air travel is of tremendous import to earnings and serves to compound airline profits. A large percentage of annual airline expenditures, such as the bulk of ground and indirect expenses and depreciation, is controlled by the level of peak traffic volume within the year rather than by the average of total traffic volume. In other words, carriers could carry greatly increased traffic loads during off-peak months without proportionate increases in their over-all expenditures, if such traffic were available. The impact of such a condition made its influence felt on earnings during the war years when seasonal variations were at their lowest. This same phenomenon was quite pronounced during the first half of 1951.

The accompanying table reveals the comparative gross revenues and net income for the first six months of 1950 and 1951 for the Big Four and other trunklines. In all cases, gross revenues are up, ranging for a gain of 4.1% for Northwest to 44.2% for American. The leverage effect on earnings is highly pronounced in all cases, excepting Mid-Continent which shows a slight decline in net income.

While the industry trend in both revenues and net income is definitely on the upgrade, major qualifications are present in all cases and temper the quality of the earnings which have been reported.

► **Mail Rate Effect**—For example, during the first half of this year, the Big Four mail rate settlement was reached for past and present periods. Instead of making a retroactive application to the previous years affected, an adjustment was made in the current first half, affecting net results. Under the Civil Aeronautics Board decision, a uniform 63-cents-a-ton-mile rate was made to apply for all of the Big Four for past periods up to Dec. 31, 1950, extending back into early 1947. Further, a flat 45-cents-a-ton-mile rate was declared effective from Jan. 1, 1951.

On this basis, total overpayments aggregating \$4,959,000 are estimated for the group (\$610,000 for American; \$579,000, Eastern; \$2,113,000, TWA; and \$1,657,000 for United). But these overpayments will be reduced by tax credits to the carrier resulting from this transaction.

For example, while American was overpaid \$196,000 for 1950 and prior years, its earnings for past periods were reduced by only \$169,543. This adjustment for prior years, together with the current rate, are taken into 1951 results.

Similarly, United was held by the CAB to have been overpaid \$1,289,000 for 1950 and prior years. The net amount of its refund for this period, after tax adjustments was \$667,410. This is reflected in its 1951 earnings statement.

In other words, the net income of the Big Four would have been even greater for the current six months were it not for these adjustments resulting from the mail rate settlement.

On the other hand, a tenuous quality may be present in the earnings as reported by TWA. Its results include its domestic and international operations. On the latter, the carrier continues to operate on a temporary mail rate which affects results starting with 1949. Remaining to be adjudicated is a CAB show cause order which, if made effective, would materially reduce reported earnings for the past two and one-half years.

In a broad sense, the industry's earning power is now limited only by its capacity. Additional equipment is being fed into the airline system as rapidly as it becomes available. The need for commercial aircraft is so great that air carriers have turned down offers of more than \$85,000 each for their obsolete and high-operating-cost DC-3s. This is the environment created by boom traffic conditions.

—Selig Altschul



# AIR TRANSPORT

## CAA Testing Terminal Baby Omni

Experimental device, cheaper than ILS or VOR-DME, may give all-weather service to local airports.

By F. Lee Moore

A new experimental terminal "baby" omnirange may be the practical answer to the problem of getting reasonably dependable all-weather service to local airports.

Air Transport Assn. and Civil Aeronautics Administration technicians say that so far this so-called TVOR is the only device they know that is reliable for both navigation and landing approach—at about one-third the cost of ILS or VOR-DME, and at a tiny fraction of radar's cost.

► **The Comparison**—The terminal omnirange (TVOR) is much like the standard en-route omnirange. But the TVOR is low-power (50 watts output instead of 200) and has no standby transmitter. CAA is now evaluating two TVORs, one at Washington and one at Oklahoma City. They have been going about three months; CAA reports the "baby omni" so far meets every expectation they had.

CAA has tentative plans to put 75 TVORs into local airports the next few years if money is available, and evaluation proves the TVOR meets requirements. Current CAA plans are to install 14 TVORs this fiscal year, at about \$34,000 each.

But a minimum of 300 TVORs is

needed at local airports to keep a reasonably reliable airline schedule through the weather months, experts say. So the airlines are casting about for some way to get more TVORs into local airports. A cheaper design, plus a partial airline-municipality financing may be the answer.

Although CAA-estimated cost is \$34,000 for the TVOR, against only \$14,000 for the "H" facility homing beacon, both are probably available for less money if requirements are simplified. Military surplus "H" facilities have been procured by airlines for around \$2,000 and it is hoped the cost of an omni can be brought down considerably in time.

► **Cost Comparisons**—CAA-estimated cost for initial procurement and installation, and for annual maintenance cost, are as follows:

- **Terminal omnirange.** Initial cost is \$34,000; maintenance \$6,000.

- **"H" facility homing beacon.** Initial cost is \$14,000; maintenance cost \$5,000.

- **En route omni and DME.** Together, but without standby equipment for the omnirange. Initial cost is \$89,000 for the LVOR and \$22,000 for the DME; maintenance cost is \$6,500 for LVOR and \$22,000 for DME.

- **Standard en route omni and DME.**

Initial cost is \$102,000 for VOR and \$22,000 for DME; maintenance cost is \$7,500 for VOR and amounts to \$1,500 for DME.

- **Instrument Landing System.** Initial cost complete with standby and two markers is \$123,000; maintenance cost is \$10,500.

- **L/MF 4-course range.** No initial cost estimate is available or practical because this obsolete equipment is to be decommissioned as omnirange and DME go in; maintenance cost ranges from \$5,000 to \$7,500.

► **TVOR Advantages**—Here are relative advantages of the TVOR over other low-cost devices.

- The TVOR broadcasts on the standard omni channels for which all airlines will have receivers by the end of this year. So there is no new airborne equipment needed to use it.

- It will allow weather minimums of 400-ft. ceiling and one-mile visibility, experts say, and experience may reduce these.

- The omni gives reasonably precise and static-free information for both navigation and landing approach.

- The TVOR can make all runways equally usable in instrument weather, as it is not a uni-directional beam. Its installations locally would fill holes in the standard nation-wide VOR-DME navigation system and do so on the same receiver.

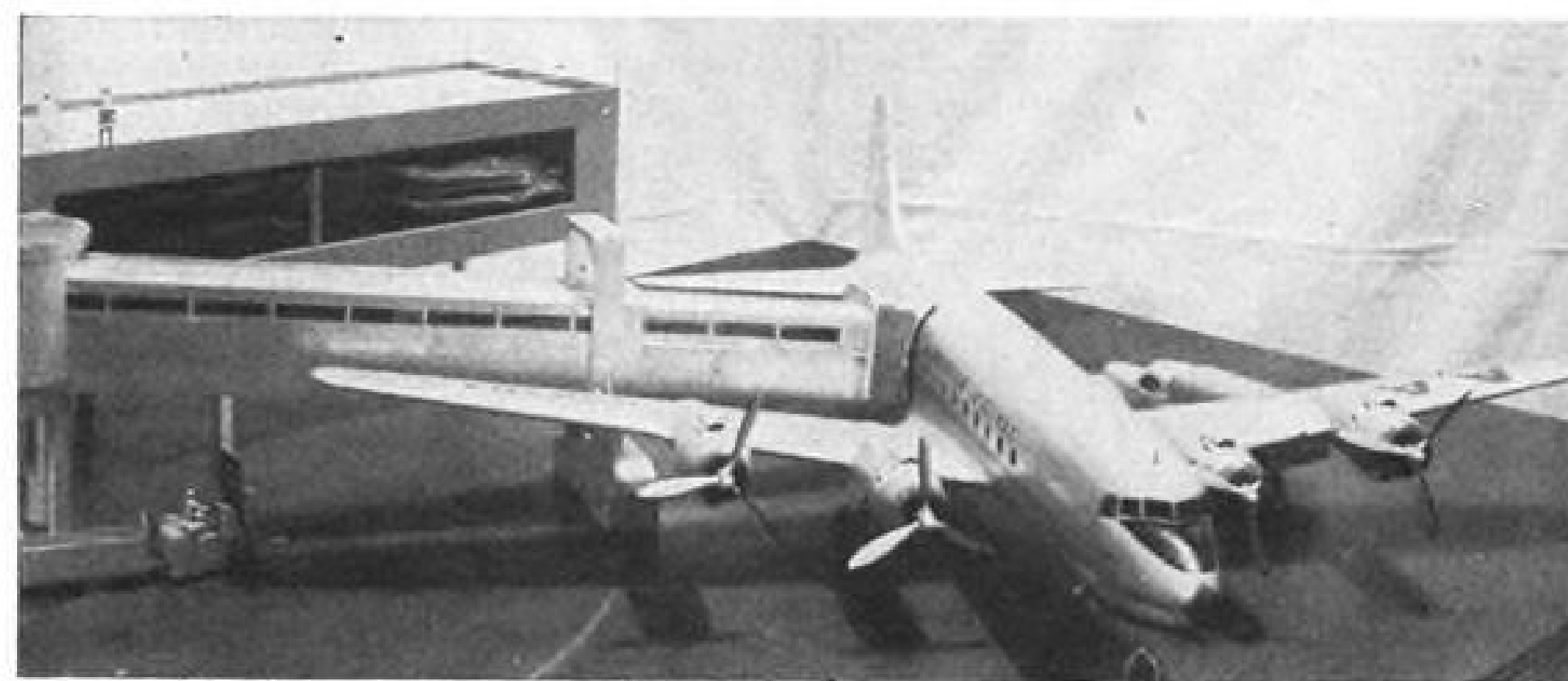
► **Other Candidates**—Contrasted with these qualifications, the other candidates for low-cost landing aid stack up as follows: The "H" facility provides no course-line navigation information; and, being low-frequency, it is not an all-weather instrument as it is not static free.

Another idea being considered is for an ILS installation without markers or a standby. That also would provide no course-line information and at the same time would restrict the pilot to one runway only.

Finally, the existing obsolescent L/MF—standard navigation facility for over 20 years—will be decommissioned at almost all locations; it is subject to static, and navigation information is devious by modern standards.

► **Immediate Outlook**—But until CAA can install more than a handful of TVOR baby omnis, and until the airlines find a way to add more than even the CAA presently plans, most local airport schedule reliability and all-weather safety levels may remain about where they are now.

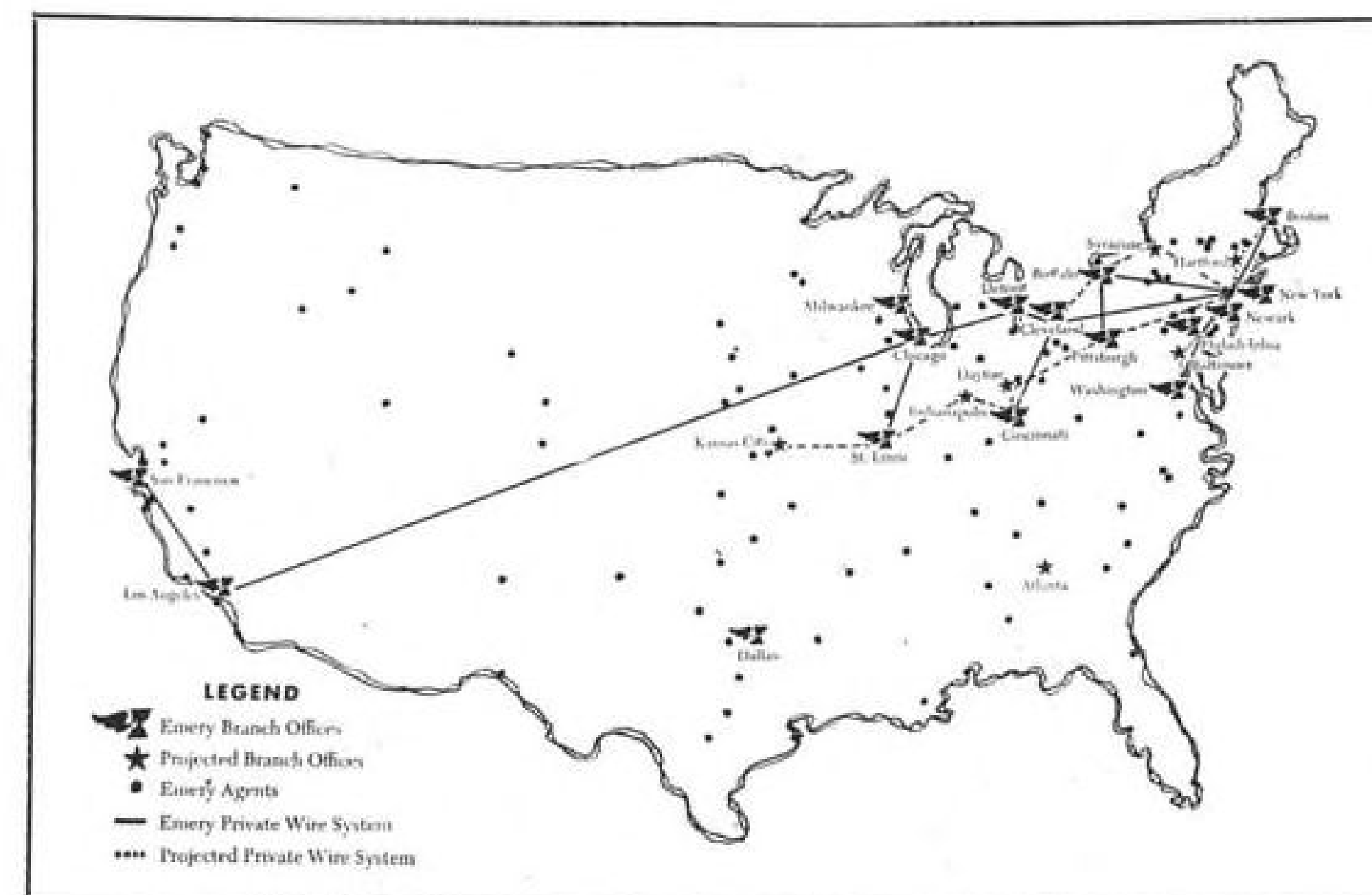
Meanwhile, CAA plans several more months evaluation of operation and maintenance on its experimental TVOR installations at Washington and Oklahoma City.



ALL-WEATHER GANGPLANK

This model gangplank is one of the latest approaches to protecting the airline passenger from rain, snow, prop wash and fast-moving ground equipment while boarding his plane. Designed by Airways Engineering Corp., Washington, D. C., the gangplank can be added to any existing airport. It fea-

tures a fully enclosed, telescoping walk-way which can be swung through 180 deg. and raised from ground level to loading door height of any existing passenger plane. The manufacturer says that increased loading efficiency will reduce time plane spends at a loading position 50 percent.



WIDE, INTENT representation linked by teletype permits courier-like forwarding service.



EMERY PICKUP TRUCK brings load directly to freight plane for fast delivery.

## Emery Sets Fast Forwarding Pace

Because of on-the-spot followups of shipments in transit, Emery's customers can revise production deadlines.

By Erwin J. Bulban

U. S. domestic airlines will collect nearly \$2 million this year from their biggest single air freight customer—rapidly expanding Emery Air Freight Corp. The New York air freight forwarder in turn will pocket over \$2 million from its novel operation and realize a profit in the neighborhood of ten percent in the process.

The reason Emery's freight forwarding service has turned out so profitably—the company has grown some 65-fold since it began operating in 1946 and its revenue has just about doubled each year—is that it has set up what practically amounts to a personal courier service, door-to-door, and squeezes the maximum speed potential from the entire U. S. transportation set-up for every shipment it handles.

► **How Fast?**—How fast can a forwarder be? Emery says it has beaten air mail special delivery coast-to-coast.

This kind of speed precludes Emery from having much to do with consolidating air freight to take advantage of tariff minimums, a practice by which most other forwarders survive. Instead it charges a premium for its speedy, watchdog service and has found that an increasing number of active customers are eager to pay it and come back for more. In fact, the more expensive of Emery's services, "blue ribbon," is the one showing the greatest steady increase, now makes up about 65% of the forwarder's business.

Actually the customer can pick either of two basic services:

- **"Blue Ribbon"** is more costly but figures delivery deadlines in terms of hours, operates around-the-clock, 365 days a year. The great majority of blue ribbon freight cannot be consolidated, goes directly to the airport, and at the terminal goes directly to the consignee.

- **"Expedited"** freight pickups and deliveries are limited to between 8 am.-6 pm. Most of the expedited loads go to Emery freight terminals, where as much as possible is consolidated without missing a schedule. In New York, for example, about 90% of the expedited shipments go to the company's East 39 St. terminal. Emery's general offices are at 801 Second Ave., N. Y. C.

"Shipping in reverse" is a comparatively new service falling under blue ribbon standards for the most part, and, as the name implies is a request for a shipment from a consignee through Emery to a consignor. Rapidly increasing, this service now averages about 30-40% of the forwarder's total shipments.

Emery owns a bare minimum of ground equipment, mostly lightweight, but relies on regular trucking services for handling this portion of the transportation.

► **Shipping Operation**—The actual shipping comprises an intricate operation. The shipments arrive at the airport with air-bills already prepared, so that the airline has only to rate and sign them. As soon as the flight leaves the ground, the originating Emery office teletypes its office at the next stop, advising its agent there of the shipment, giving the airline, flight number, and any necessary instructions for trans-shipment, if one is necessary. When the next leg of the flight begins, that agent teletypes ahead, continuing the relay. Following delivery, the office at the destination teletypes the originating office of the time the shipment was delivered.

► **The Schedule Factor**—Key factor is the schedule; cargo is transferred from carrier to carrier, air to surface and vice versa, as often as necessary, by each Emery office or agent, and as often



as necessary to effect the best timing speediest delivery.

This on-the-spot checking all along the line has resulted in a very low damage and loss claims ratio, the total figure up to the first quarter of this year being a minute .00045%. It also is expensive—Emery's communications bills runs \$15,000-\$20,000 monthly.

Performance like this takes a good organization. From the start the company went into operation on a scale that was big by air forwarder standards, and has since built up considerably. Emery spokesmen say it could have been done no other way.

President John C. Emery formulated the set-up in considerable detail while he was in the Navy during World War II heading the Transportation division, Bureau of Supplies and Accounts, Washington, D. C.

His job was to see to it that high priority shipments weighing anywhere from ounces to thousands of pounds were delivered at top speed to various theatres of war to keep some unit in action. He learned the hard way that the best way to do it was to keep track of the shipment all the way and keep the various stopover points informed so that they could insure that it kept moving.

After the war, instead of going back to Railway Express, where he had been assistant to the president, Emery formed the air forwarding service by raising \$250,000 through a public stock issue.

► **Early Days**—Operations began with four offices in New York, Chicago, San Francisco and Los Angeles, with a staff of 34, mostly top-notchers from his wartime assignment or people from the railroads and airlines.

These offices provided a good minimum coverage, but the big problem was to have representation spread out as far as possible to be able to get business and handle the shipment from the time it had to get on the airplane until it was delivered at the consignee's door. This Emery solved very handily. The company made a deal with Western Union to operate as its agents, thus giving it coverage in virtually every hamlet in the country. A further 40 agents plugged up other gaps.

This was a good beginning and things kept getting better, with more offices being opened at a rapid pace (there are now 28) and the staff growing, until it is now about 250. Shipments were soaring, over 25,000 in 1947, nearly double that the following year, over 70,000 in 1949, over 90,000 last year.

But communications, on which the offices depended for keeping tabs on shipments in transit, left a lot to be desired. Telephoning was expensive, telegraphy lacked speed. So last year Emery began linking up its stations

by teletype in the East and Middle West and telemeter from the Midwest to the Coast. It now has 22 offices connected with the system.

► **Conveyor Belt**—Emery is striving to establish its service as a "conveyor belt" for industry, using air freight's speed potential to extend production and delivery deadlines, also to cut the need for maintaining costly inventories.

As an example it cites the case of Continental Can, which previously warehoused sufficient spare parts at its 36 canneries to take care of plant breakdowns. Now, by using Emery Air Freight to supply needed parts, it needs only three spare locations, has cut inventories from \$12 million to \$6 million and expects to reduce these further to about \$4 million. Also to be taken into consideration are the resultant savings in personnel, upkeep of the structures, insurance and so forth without end.

With savings like these, and this is not an isolated instance from the forwarder's files, it is evident that transportation costs come down to being



CAPITAL AIRLINES' ticket machine issues three-part billet, saves 25 sec. per person.

## Machines Ease Counter Problems

Capital and Hawaiian Airlines have put to work two ingenious machines to solve a problem harrasing many an airline operator—how to speed up the handling of long lines of impatient passengers at the counter.

The device now being tested by Capital is a ticket issuing machine which has shown time savings of 25 seconds per passenger; Hawaiian's new gadget is used to check in the passengers and their baggage after tickets have been issued, and not only enables the carrier to get better plane utilization, but saves it \$90,000 a year.

► **Capital Way**—Capital's unit at Washington National Airport issues tickets for Norfolk, Pittsburgh, Cleveland, Detroit and Chicago. These cities are

a very small factor in the overall operation, and explains why industry is willing to pay for good air freight performance.

Right now the scheduled airlines, including Slick and the Flying Tiger Line, are the only ones capable of handling the problem with the dependability Emery says is necessary. The forwarder, mindful that air freight rates low in priority on the airlines, after passengers, air mail and air express, is keenly interested in the scheduled freighters. It sees the new Slick DC-6A Liftmaster service as one of the most interesting phases of the whole problem and plans to give it all the aid and encouragement it can.

A lot needs to be done, President Emery says, to step up air freight capacity throughout the country, especially in weak spots such as the Pacific Northwest and the Southeast. These areas, already low, suffered further with the withdrawal of Martin 2-0-2s from service by Northwest Airlines and return of Eastern Air Lines' cargo planes to the Navy.



HAWAIIAN AIRLINES' modified cash register quickly checks in passengers and baggage.

destinations of 80% of outbound Capital traffic from Washington.

Chief time-saving feature of the machine is its automatic accounting feature. The price and destination of the ticket issued is automatically totted up; ticket seller doesn't have to make any bookkeeping entry on the sale.

► **Operation**—Here's the ticket-selling operation with this machine. Washington customer asks a one-way ticket to Chicago. Agent turns to the one-way bank of buttons and pushes the one marked Washington-Chicago. Ticket machine records the sale and issues a three-part billet, which includes auditor's coupon, passenger's coupon, and the ticket itself, with price indicated.

Agent writes flight number and de-

parture time on ticket for customer convenience.

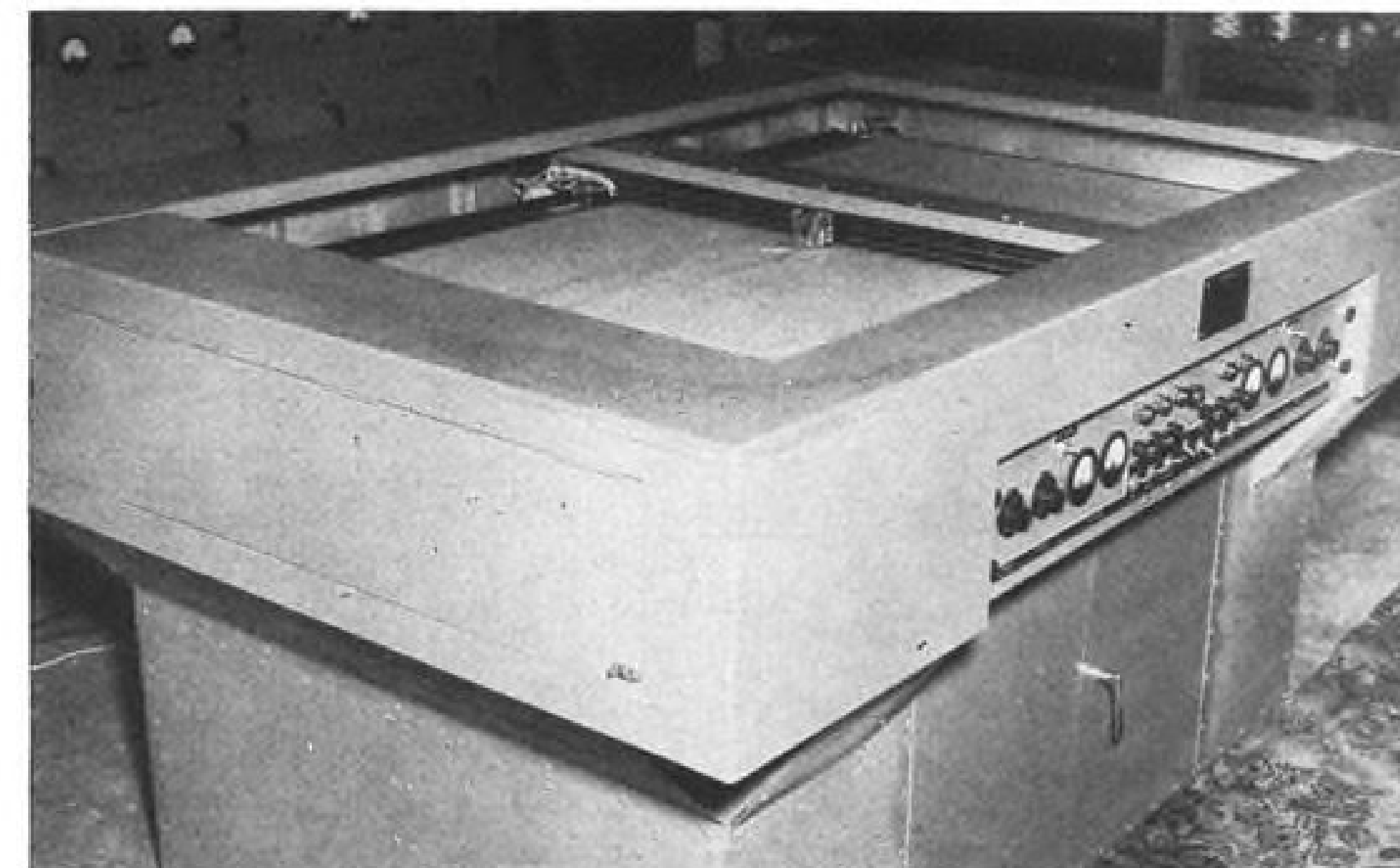
Capital figures the 25-second-per-passenger saving is doubly valuable at rush hours. Delays in ticketing 20 or 30 passengers per plane at the airport a few minutes before departure at rush hour causes sour customer reaction to the inevitable jostling and waiting at the counter and, at times, delayed plane departure causing bad connection reliability for connecting passengers.

► **Hawaiian Rings It Up**—By adapting a commonplace standard National Cash Register, Hawaiian came up with the right answer for economically and speedily recording passenger and baggage weights and other pertinent flight data. Here's how the machine (modified for the operation by the National company) operates:

The passenger hands his ticket to the girl at the check-in window at the airport. She reads his name on the ticket, then addresses him by name to ask his weight. On the modified cash register she rings up the passenger's number on the flight (whether he is the 1st, 2d, 3d passenger to check in), his weight and a roman numeral code number designating his flight.

His weight is added to that of other passengers on the same flight, also his baggage weight, with a cumulative total for the flight easily available at all times.

He is given a flight card, designating his flight and also the same serial number rung up on the register. (When serial numbers are issued up to the total number of reservations, the clerk knows the flight passenger list has been filled.)



### AUTOMATIC POSITION CHECKING UNIT

Raydist plotting board, delivered to USAF, automatically plots position of planes in traffic areas. Made by Hastings Instrument Co., Hampton, Va., to go with Raydist electronic plotting system, the board shows to within a few feet plane's actual position in

space. Accuracy of the system is claimed to be within about one foot per mile of range. Air Force is using Raydist and its plotting board to evaluate competing position and plotting systems, such as radar and ILS of various frequencies and types.

His baggage weight is tallied against the same serial number and roman code numeral for the flight.

His flight ticket is torn from his ticket book. This gives his name and flight. On the back of it the register adds his serial number, and the ticket is filed with others to be used for the flight.

► **Quick Check**—Later, when passengers are called, the attendant collects the flight cards and can tell quickly if any serial numbers are missing; if so, it's only a matter of seconds to identify the passengers for the flight who are missing.

## Need Seen for Shoulder Harness

Two controversial subjects up for consideration by the National Association of State Aviation Officials at Tucson, Oct. 24-26, will be a proposed regulation to require shoulder harness in private aircraft, and a study project to find a way of "Eliminating spiral in existing and future aircraft."

A recent NASAO board of directors meeting in advance of the Tucson convention recommended that CAA require that all crop flying be done with shoulder harness and all manufacturers should provide for shoulder harness installation in design and construction of non-airline planes.

While NASAO notes progress in eliminating bad spin tendencies in plane designs, it finds the "spiral dive" tendency needs similar attention, so a non-expert pilot "can fly safely in all kinds of weather."



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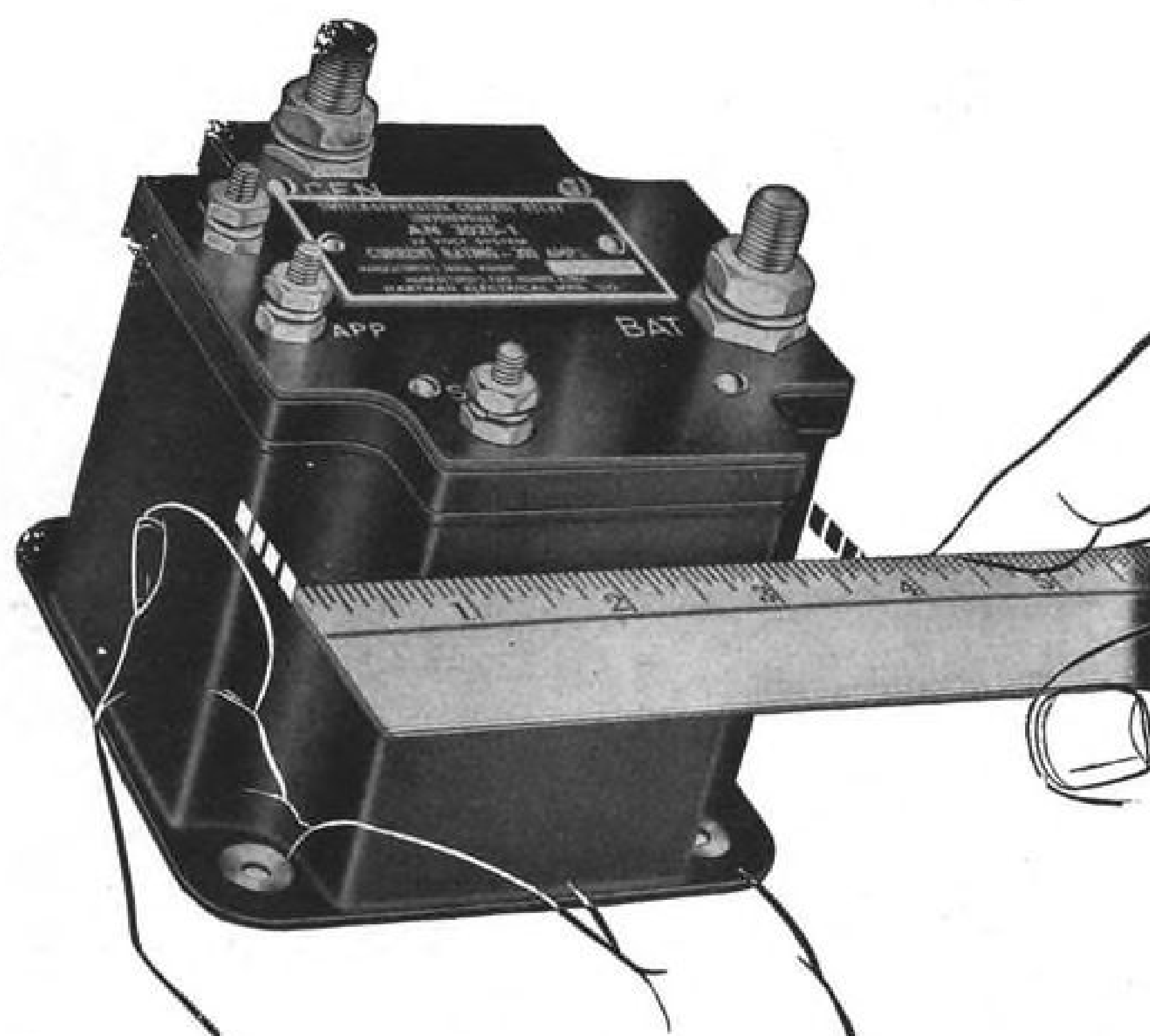
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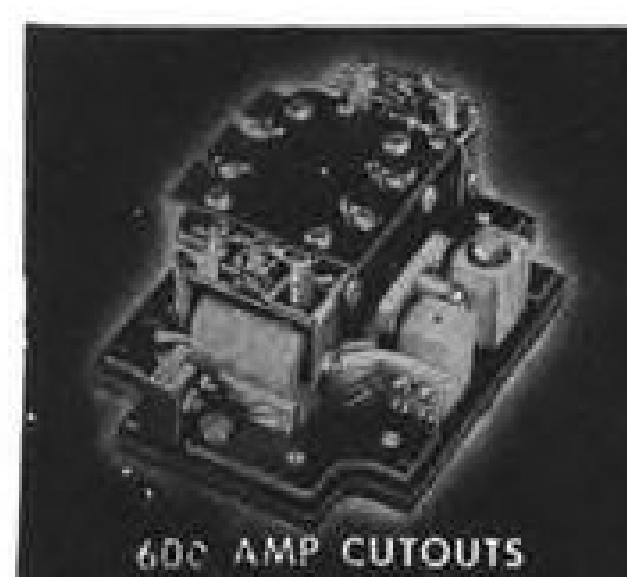
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## TWA Plans More Air Coach Service

Trans World Airlines plans to start two more air coach services soon—both to San Francisco.

One will be TWA's third transcontinental air coach roundtrip daily from New York; the other is an extension of the Kansas City-Los Angeles daily coach on up the coast to San Francisco.

TWA already operates two 81-passenger Constellation coaches a day, both to Los Angeles. The new San Francisco coach will be a 60-passenger DC-4. Carrier's daily roundtrip coach services now operating are: two New York-Los Angeles Connies; a New York-Chicago DC-4 via Pittsburgh; and a Kansas City-Los Angeles DC-4.

TWA is reported planning modification of five more Constellations to coaches this fall. Company has also put in high bid of \$320,000 for a CAA Constellation in almost new condition. Trans World's coach services have sold well since its first transcontinental coach flight last year, which actually carried 114 persons—77 adults, 32 babies and five crew.

## New Services for Alaska-Northwest

Both Pacific Northern Airlines and Alaska Airlines, certificated by the CAB to provide scheduled service from Portland, Ore., and Seattle to Alaska, hope to start operations about Aug. 15.

Each has a DC-4 undergoing conversion to provide initial daily service, with more equipment expected later. Pacific Northern bought its plane for a of Mexico, now is having it converted reported \$500,000 from Aerovias Guest by Grand Central in Los Angeles.

Alaska Airlines has secured the release of one of its DC-4s from MATS, now is doing the necessary conversion in its own Paine Field shops north of Seattle. MATS has two other DC-4s which Alaska Airlines hopes to get back soon.

Pacific Northern will be flying primarily to Anchorage while Alaska Airlines will serve Fairbanks. Alaska Airlines has been flying scheduled routes on 6,000 miles in Alaska for the last 19 years, expects these routes to feed business into the new Fairbanks-Seattle-Portland run.

Both lines will use the Seattle-Tacoma International Airport—Pacific Northern continuing to do its maintenance at nearby Boeing Field and Alaska Airlines at Paine Field. Pacific Northern would like to get hangar space at Seattle-Tacoma but none is available, and construction, even in conjunction with another line, would be expensive.

## Mail Pay Accounts

Domestic airlines are about square with the government on back mail pay accounts; international airlines are owed some back pay, but substantially less than they ask, Civil Aeronautics Board Chairman Donald Nyrop states in a letter to Sen. Edwin C. Johnson.

"There will be little or no liability for additional mail compensation to the domestic carriers, including both trunklines and local service operators," according to Nyrop's letter to Interstate and Foreign Commerce Committee chairman, Sen. Johnson.

Refunds on overpayments to some airlines will about nullify the government's Dec. 31, 1950, contingent liability of about \$89.5 million for back mail pay claims by the domestic carriers.

As to international carriers, Nyrop says: "The Board's analyses in the international field are not as far advanced as the analyses completed in the domestic area, but it is the Board's present judgment that the final mail pay awards to the American-flag carriers in the international field will be substantially less than the indicated contingent liability."

CAB figures contingent liability based on carriers' claims for back mail pay: international, \$77,302,000; territorial, \$825,000.

As an example of how the contingent liability melts away, Nyrop points out that the Big Four airlines—American, Eastern, TWA and United—claimed \$68.9 million in back mail pay for 1947-50. But the airlines ended up owing the government about \$3.5 million instead, estimated by the recent settlement on a permanent mail rate which is figured at 63 cents a ton mile.

## SHORTLINES

► All-American Airways—AAA advises the press that AAA "still has a perfect safety record," and that the recent C-46 accident in Newark was by an unscheduled Miami carrier with the same name. Laments scheduled local service airline All-American: "Because he adopted his name before we did, there is little we can do about it legally."

► Australian National Airways—ANA reports a 61% increase in passengers carried and 26% in air freight the year ending June 30, 1951, compared with a year ago. Passengers numbered over 650,000 and freight weighed 72.9 million lb.

► Central Airlines—Central's July pas-

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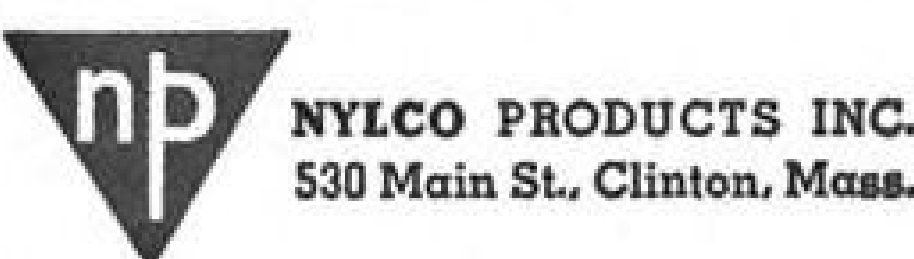
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senger traffic increased 21% over June to 3,762 passengers carried.

► **International Air Transport Assn.**—International airline traffic transactions through the IATA Clearing House increased about 15% over a year ago the first half of this year—to \$75,303,000.

► **Los Angeles Airways**—LAA's copter operation in June had operating expenses of \$1.10 a mile, compared with \$1.08 a year ago. A direct maintenance increase from 8 cents a mile a year ago to 19 cents in June this year, due to a copter accident, was offset by reduced depreciation charges.

► **Phoenix, Ariz.**—Sky Harbor Municipal Airport's increased landing fees may cost American and TWA about \$35,000 more this year than last. Estimated airport revenue will go from \$15,000 to \$42,000.

► **"O" Mexicana**—New airline plans to start Mexico City-Guatemala service via Merida, Yucatan, soon. Mexicans own 51% of the stock. Service awaits a concession from the Mexican Secretariat of Communications. Serving this route at the present time are TACA, and Pan American.

► **Sabena**—Sabena Belgian Airlines reports passenger nationalities in the following proportions going through Brussels the first half: Belgian 34%, British 18%, U. S. 12%, French 4%, Netherlands 2%, all other nationalities 30%.

► **TACA International Airlines, S. A.**—TACA has started a new air service linking five Central American capitals with New Orleans. Daily service is San Jose, Managua, Tegucigalpa, San Salvador, Guatemala, New Orleans. Trip is by DC-3 to San Salvador and DC-4 from there on to New Orleans at total price of \$126.

► **Swissair**—Carrier has inaugurated the first scheduled trans-Atlantic crossing by the new Douglas DC-6B, with full 50-passenger load.

► **United Air Lines**—New schedules owing to DC-6B operation, plus high load factors due to "record national defense, civilian business and vacation travel" have helped United set a new one-day traffic record of 6,903,000 revenue passenger miles.

► **Wisconsin Central Airlines**—WCA in July made its first net operating profit—\$103,197—since starting DC-3 operations three months before. Mail pay of \$107,235 was only \$4,000 over a year ago.

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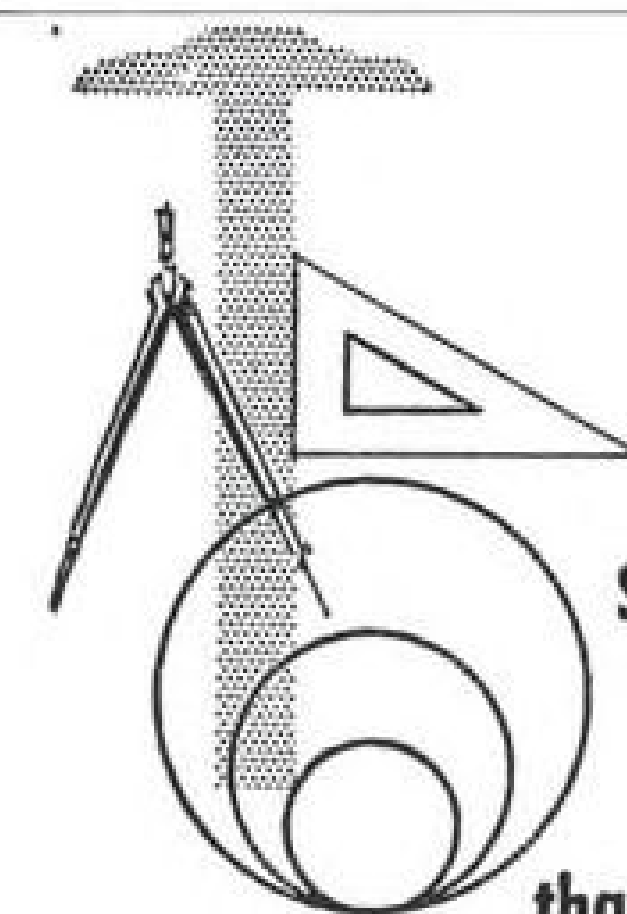
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1157	35787-5	Bushing
2174	35787-10	Bushing
814	35814	Blower Amy.
3947	35817	Spring
280	35855	Cap
2446	35924	Washers
4200	35932	Gasket
22	36759	Rod Assy.
182	46400E	Liner
30	48346	Cylinder
1475	48360	Bearing
53	48362	Shaft
175	48363	Shaft
100	48389	Fitting
209	48390	Retainer
56	48392	Sump
533	48447	Bushing
107	48457	Adapter
390	48461	Gear
149	48468	Bearing
90	48468B	Bearing
389	48469	Bearing
470	48470	Bearing
75000	51506	Plug
395	54847	Clamp
71	57006	Cover
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1000	987	Bulb
300	AN3135-1	Bulb
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29	FT293	Mount
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400	AN 5780-2	Weston Model 882-PN111602 Description as above U. S. Gauge Air Pressure Gauge (0-2000 lb.)
1500	AW 2-65B	Pesco fuel pumps Thompson fuel booster pump
160	2E-492E	Adel anti-icer pumps
700	TFD 8600	Pesco fuel pump
125	D-7818	Adel anti-icer pumps
170	2-P-771-A	Pesco fuel pump
250	AN4014	AN4102-1 Erie Meter Systems D-2 hand wobble pump
300	1H260k and KA	Pesco Hydraulic hand pump
478	D9530	Adel selector valve
233	D9530-2	Adel selector valve
428	D9560-2	Adel selector valve
744	D10044	Adel selector valve
2200	AN 4078-1	37D6210 Solenoid United Aircraft etc.
2000	AN 3096-4	Grimes Light assembly
800	AN 3096-5	Grimes Light assembly
380	AN 3096-6	Grimes Light assembly
175	EE 709-M2	Alr Associates Motor
115	P4CABA	Parker Primers
80	AN 3212-1	Scintilla Ignition switch
568	A-9 (94-32226)	Ignition switch
687	RS-2	Malory Selector boxes
380	AN 6203-1	Vickers Hydraulic Accumulator
88	572-3A	Eclipse Distributor Valve
90	JH-950R	Jack & Helix Starter Motor for JH5 starters
492	S841 (94-32253)	Electric box
12	FA122	Flasher Exterior lights Wallace & Tiernan
1000	13018A	Interphone Box
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## COCKPIT VIEWPOINT

By Capt. R. C. Robson



### Transition From Instrument to Visual Flight

(This is the third in a series of All-Weather Flying—Parts I and II appeared in AVIATION WEEK July 23 and Aug. 13.)

The psychological effect of a Weather Bureau ceiling report is a major item, though seldom discussed. Experienced pilots, knowing the usual inaccuracy of these reports, plan each instrument approach for "rock bottom" conditions, at which point they will re-appraise the situation. The ticklish part of any approach is the transition from instrument to visual flight.

If a ceiling has been reported as "measured 400 feet" the pilot is led to believe that transition should occur at about that altitude. Certain cockpit procedures may be altered by this assumption. If the measurement proves in error an unhealthy condition may exist.

► **Critical Altitude**—It is also possible that by using weather observations as the sole criterion some minimums may be set too low for safe pull-outs. If a critical altitude concept were used, basing minimum altitudes on terrain, aircraft and pilot performance, equipment, etc., the pilot would be assured that his plane was capable of a safe go-around.

Some interesting statements concerning automatic and manual flying appear in reports of test approaches made by the Sperry Gyroscope Co. on ILS. "Analysis of the manual ILS test approaches indicates that 100% would have terminated in successful landings on a runway 150 feet in width provided the pilot was able to maneuver the airplane with visual reference to the runway 3,000 feet from the approach end." (Airplane was a DC-3.)

"Analysis of the automatic localizer test approaches indicates that 100% would have terminated in successful landings on a 150-foot runway if the pilot had been able to maneuver the airplane with visual reference to the runway 250 feet from the approach end."

"... the manual localizer bracketing performance is approximately  $\frac{1}{2}$  as effective as the automatic."

These conclusions indicate that both automatic approaches and visual aids are essentials in an all-weather program. (All work in the field of visual aids shows that the centerline approach lights with condenser units, high intensity runway lights and bold runway surface markings provide the only satisfactory answer.)

► **Instrument Improvement**—Lower approaches mean closer tolerances in all parts of the system. This is especially true of cockpit instruments where such factors as lag, accuracy of reading and arrangement need much improvement.

The measurements made by Sperry on the ILS test approaches show that there is approximately one second from the time a plane moves in space until the pilot can observe this movement on his ILS cross-pointers. Other instruments have their own lag intervals. These intervals must be shortened.

The success of an instrument approach is closely allied with maintaining an accurate heading when close to the runway threshold. Heading indicators in use today cannot be read accurately to closer than 2 deg.; they should present  $\frac{1}{2}$ -deg. readings.

► **Program for Progress**—Progress in all-weather flying can be materially hastened by a program as outlined in this series.

• There must be a thinking and regulatory change from the weather minimum to the critical altitude concept.

• Necessary equipment must be installed as a system, not piecemeal.

• Refinement and re-arrangement of instruments will facilitate lower approaches.

## WHAT'S NEW

### New Literature

Air Applicator Information Series, 6 volumes. Edited and published by the Air-Applicator Institute, 412 Scott Building, Portland, Ore. Price for the complete set, \$12.50; special rates in quantity.

For the agricultural plane operator, or pilot, or even the farmer who is using or intends to use their services, this six-volume set contains the basic knowledge needed for intelligent work in an expanding field which is beset by numerous technical and legal hazards for the unwary.

Each of the six volumes specializes in a particular phase of the operations:

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• **Vol. 2, Crop Pests**, 95 pages, covers insect, weed and fungus identification.

• **Vol. 3, Spray and Dust**, 112 pages, is, as its title suggests, a working handbook on the actual aerial application process, covers timing, distribution, good practices, accident prevention, preparation of materials and contractual agreements.

• **Vol. 4, Efficient Equipment**, 92 pages, gives profuse technical data on essential equipment, sprayer and duster components, types of aircraft, forest and ground spraying equipment and experimental development. It covers both conventional planes and helicopters.

• **Vol. 5, Legal Problems**, 56 pages, provides a working knowledge of federal, state and local laws controlling agricultural aviation, including CAA regulations.

• **Vol. 6, Where to Find It**, 68 pages, is a classified directory serving as a quick reference guide for information on agricultural organizations, chemical and equipment companies, state colleges, state and federal agencies and the other numerous sources which can provide valuable information to the professional.

These volumes are profusely illustrated with photographs and detailed drawings.

The Flying Club, a booklet on the organization and operation of flying clubs, has been prepared by CAA, and is now available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Included are: articles of incorporation, suggested by-laws, suggested rules and manual, methods and forms for figuring hourly costs of flying and membership dues. Price is 15 cents.

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AVIATION WEEK—SEPTEMBER 3, 1951

AIRCRAFT-MARINE PRODUCTS, INC. Agency—Renner Advertisers	32	SPERRY GYROSCOPE COMPANY.....Third Cover Agency—Charles Dallas Beach Co., Inc.	
ALUMINUM CO. OF AMERICA..... Agency—Fuller & Smith & Ross, Inc.	36	STANDARD OIL CO. OF INDIANA.....Second Cover Agency—McCann-Erickson Corp.	
ARROWHEAD RUBBER COMPANY.....	29	SUPREME PRODUCTS, INCORPORATED..... Agency—Hamilton Adv. Agency, Inc.	40
BENDIX RADIO DIV. OF BENDIX AVIATION CORP. Agency—MacManus, John & Adams, Inc.	39	TINNERMAN PRODUCTS, INC..... Agency—Meldrum & Fawcett, Inc.	35
B. G. CORPORATION, THE.....Front Cover Agency—Buchanan & Co., Inc.		TITFLEX, INCORPORATED ..... Agency—Robert L. Marloff, Inc.	4
BOWSER, INCORPORATED ..... Agency—Charles Palm & Co.	47	U. S. MOLDED SHAPES, INC..... Agency—Hall Advertising Agency	24
BREEZE CORPORATIONS, INC..... Agency—Burke Dowling Adams, Inc.	19	VOI-SHAN MANUFACTURING CO., INC..... Agency—Sutler Company Adv.	23
CHICAGO PNEUMATIC TOOL CO..... Agency—G. M. Basford Co.	7	SEARCHLIGHT SECTION (Classified Advertising)	
CONSOLIDATED INDUSTRIES ..... Agency—Lindsay Advertising	50	EMPLOYMENT Positions Vacant .....51, 52, 53 Positions Wanted .....53 Selling Opportunities Wanted.....52	
CONTROL PRODUCTS, INC..... Agency—George Homer Martin Associates	57	SPECIAL SERVICES Contract Work .....51	
EICOR, INCORPORATED ..... Agency—Sander Rodkin Adv. Agency	10	EDUCATIONAL Schools .....51	
ELASTIC STOP NUT CORP. OF AMERICA .....Fourth Cover Agency—G. M. Basford Co.		PLANES-EQUIPMENT (Used or Surplus New) For Sale .....54, 55	
ESSO STANDARD OIL CO..... Agency—McCann-Erickson Corp.	22	WANTED Equipment .....54 Miscellaneous .....54	
GENERAL ELECTRIC COMPANY..... Agency—G. M. Basford Co.	6		
HARTMAN ELECTRICAL MFG. CO..... Agency—Palm & Patterson, Inc.	48		
INDIANA GEAR WORKS..... Agency—A. L. Perkins & Co.	28		
KIDDE & CO., INC., WALTER..... Agency—Cunningham & Walsh, Inc.	3		
KOLLSMAN INSTRUMENT CORP..... Agency—Erwin, Wasey & Co., Inc.	49		
MECHANEEERS, INCORPORATED ..... Agency—Gardner Advertising Co.	20		
MONSANTO CHEMICAL CO..... Agency—Gardner Advertising Co.	20		
NORTH AMERICAN AVIATION, INC..... Agency—Hatten, Barton, Durstine & Osborn, Inc.	37		
NYLCO PRODUCTS, INC..... Agency—Howard Wesson Co.	50		
PHILLIPS PETROLEUM CO..... Agency—Lambert & Peasley, Inc.	5		
PIASECKI HELICOPTER CORP..... Agency—B. K. Davis & Bro.	57		
REMINGTON RAND, INCORPORATED..... Agency—Leeford Adv. Agency, Inc.	30		
REYNOLDS METALS COMPANY..... Agency—Price, Robinson & Frank, Inc.	26		
SCIACKY BROS., INCORPORATED..... Agency—Russell T. Gray, Inc.	8		
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## LETTERS

### ALPA's Troubles

I have been as close as anyone to the internal workings of the Air Line Pilots Assn. for a good many years and from that vantage point some of the recent news releases and statements about plots and counterplots have caused me both amusement and amazement.

Thus, for the sake of the record, I would like to impose upon you with a few observations of my own.

Caesar was destroyed by his friends. Not so Dave Behncke. Nor by his enemies either. He worked it out all by himself. To my knowledge he has no enemies among the pilots in the generally accepted meaning of the term. None bears him any personal ill will. None would take malicious action to hurt him. Those who pushed most forcefully for his recall were also the ones most vehement in support of a full salary lifetime pension in recognition of his long and honorable service.

The only "plot" in ALPA concerning Dave Behncke was a plan advanced by several of the lead pilot representatives on the major airlines to:

1. Elevate him to President Emeritus of ALPA for life at a salary above that currently being received.

2. To keep his vast knowledge, experience and prestige available for the benefit of the airline pilots until the end of his days.

3. Relieve him, by mandate if necessary, from the detail and interminable comma moving upon which he insisted and which caused him to do himself inestimable harm.

4. In general, place him on a pedestal and let him become the legend to the pilots which he had so richly earned by dedicating his life in their behalf.

Most "victims" would have welcomed this "plot" with open arms. That Dave chose the alternative of going down in a welter of blood and guts at the imminent risk of pulling everything he had created down after him is regrettable but is nevertheless a decision which he made against the sincere pleadings of his oldest and staunchest supporters.

His continued attempts to remain in office, by legal action, in spite of his recall by the board of directors is indicative of the attitude which brought about the recall in the first place.

The theory, which has received some circulation, to the effect that many individuals were hoping to grab his job as a result of his downfall, is ridiculous. I presided over the directors' meeting and can truthfully say for a while it looked like we might have to run a raffle to decide who we could get to take this so-called "plum."

However, once again it was action taken by Dave himself which solved the problem. The man best qualified for the job, Clarence N. Sayen, was available and also happened to be the only man in the room out of a job—as a result of Behncke's discharging him several days before.

It is always disturbing to see a strong man go down, particularly when he is a close friend and associate and in addition

when the action itself could easily have been made unnecessary and thereby avoided. However, that is now "water over the dam" and ALPA will continue representing the pilots with strength not only undiminished but in fact greatly enhanced as a result of the important steps taken and contemplated by the directors.

Your impartial and objective reporting in our hour of travail is greatly appreciated. It is all we ask but not all segments of the press have been so considerate, which to a degree explains why your publication has forged so rapidly to the top as the pilots' favorite.

JEROME E. WOOD  
First Vice President  
Air Line Pilots Assn.

### From Hy Sheridan

Congratulations on having R. C. Robson writing for you. His stories are clear, honest, and thorough; they make sense.

The whole thing is some kind of a hoax, though, and you must have had some help from a secret admiral: How can a man with intelligence be 1) an airline pilot, and 2) a writer?

HIRAM WILSON SHERIDAN  
595 Riford Road  
Glen Ellyn, Ill.

(Like Capt. Robson, who writes *Cockpit Viewpoint* in AVIATION WEEK, Mr. Sheridan is an American Airlines pilot.—Ed.)

### The Canberra Story

Concerning Irv Stone's Canberra story (AVIATION WEEK July 23) . . . I can assure you that everyone at Martin not only appreciated the way the story was handled but consider it an exceptionally comprehensive and carefully prepared analysis of the situation. There were some differences with a few of the opinions expressed but none at all with the very able factual reporting which characterized the piece.

RICHARD W. DARROW  
Director of Public Relations  
The Glenn L. Martin Co.  
Baltimore 3.

### Pilot Insurance

I have read with interest your editorial, "Pilots, Painters, & Safety" in AVIATION WEEK June 18. I would be interested in learning the insurance company offering airline pilots life insurance at the extra premium rate of \$2.50 per thousand. At the current time I am paying \$4 per thousand on one policy and have just been refused coverage on another policy I have had for about 10 years without aviation clause. The reasons given for the latter refusal were age (31), and the Korean situation. The company says it has not been granting full coverage when there is an aviation hazard.

R. W. M.

(We are told by the Board that Connecticut General Life Insurance Co., Hartford, Conn., has long offered this rate: "Commercial airline pilots, including co-pilots and members of the crew flying anywhere in the world for United States or Canadian incorporated airlines certificated by the aviation authority of either country as scheduled air carriers, provided such airlines have maintained scheduled flying for a minimum period of two years. Annual extra, \$2.50 per \$1,000, any kind of life insurance. AVIATION WEEK will be glad to publish names of other companies offering this rate, if they will notify us.—Ed.)

### Pilot Salesman

While flying American Airlines Flight 12 on April 8, from Memphis to Philadelphia, I experienced a bit of salesmanship on the part of Capt. L. P. Hulett which I believe should be repeated on all airline flights in order to promote a better understanding of airline operation on the part of the public and to develop their confidence, which in turn will bring about increased passenger revenue.

Over the inter-com system Capt. Hulett gave a fine dissertation on cloud formations, described why there would be a little rough air ahead and, most important, demonstrated to all passengers how the de-icing system worked.

He let some ice build up on the wings and then advised the passengers he was turning on the de-icing system. During the warm-up period, he described how it worked and the passengers then saw for themselves the ice being dissipated from the wings.

Following this, when we again established visual contact with the ground, Capt. Hulett gave an extremely interesting dissertation on points of interest, as well as how he was following the beam, how it operated and how the positions of all aircraft are controlled by Air Traffic Control.

As the flight progressed, it was evident that Capt. Hulett had captured the imagination of all passengers and had promoted within them a better understanding of aircraft problems, not to mention a good public relations job for American Airlines.

At destination, there was hardly a passenger who didn't ask the hostess to thank the captain for his dissertation. It is my sincere belief that effort on your part to have the airlines instruct all their captains to follow this procedure would do much to increase air travel. Once the passenger is in the plane it behooves the airlines to make as certain as possible that he will come back again. To my mind, Capt. Hulett's method is a most effective way to accomplish this.

T. R. PIERPOINT, Service Manager  
Piasecki Helicopter Corp.  
Morton, Pa.

(Editor Robert H. Wood, whose editorials usually appear on this page, is on vacation.)

## CLASSROOM *in the clouds*

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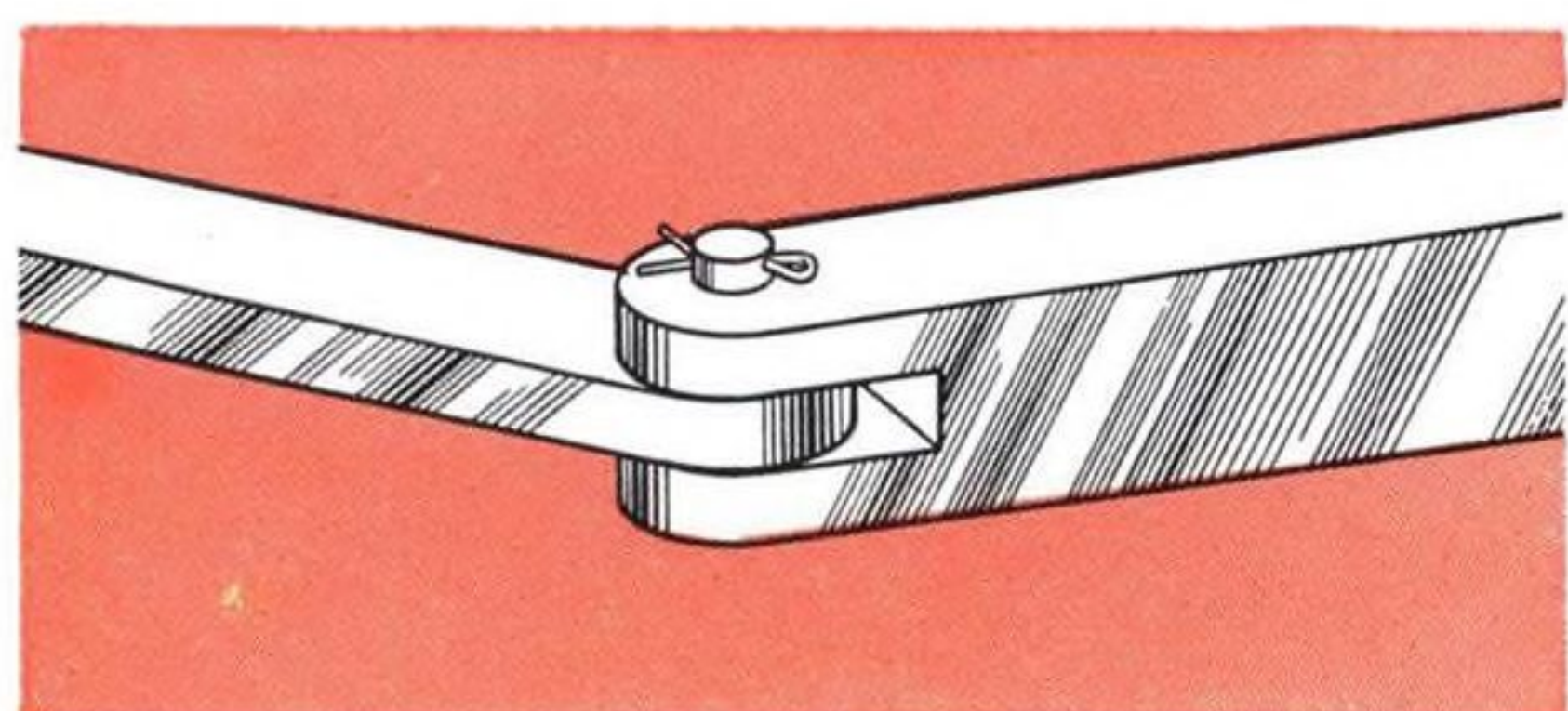
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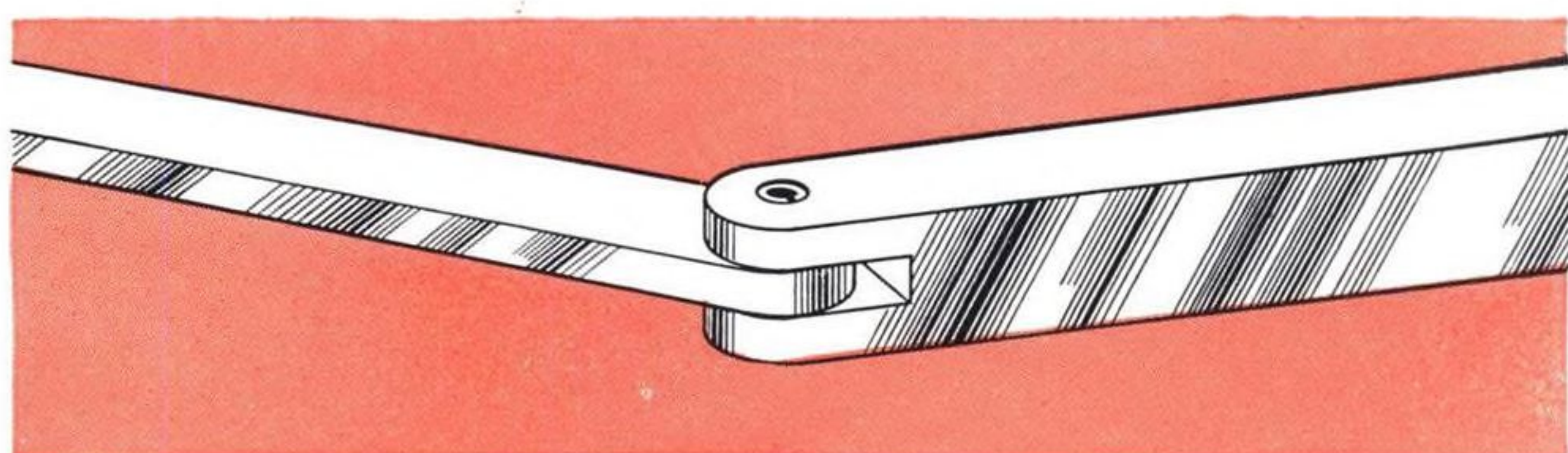
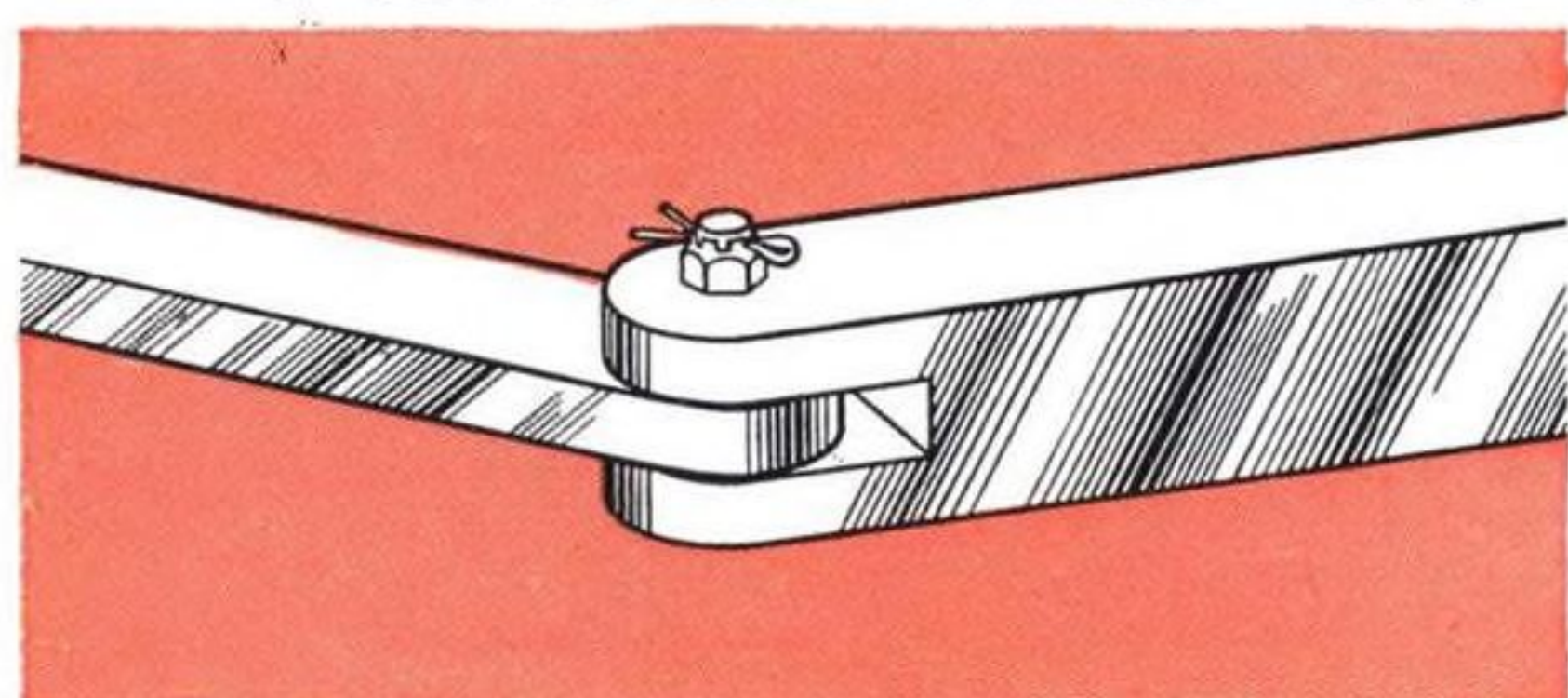
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Rollpin replaces hinge pin for faster assembly of hinges. Inexpensively and simply driven in place, it cuts assembly costs. Constant spring tension holds Rollpin firm against vibration on heavy-duty automobile door hinges—on lightweight sheet metal hinges for meter or instrument panel covers.



IF YOU DO THIS ▲ OR THIS ▼ . . .



**TRY THE ROLLPIN WAY INSTEAD . . .** Rollpins offer many advantages as pivot and clevis pins for linkages or yoke assemblies. Heat-treated to provide excellent fatigue resistance and wear characteristics, Rollpins fit flush, grip firmly in the outer or inner members, depending on your design requirements, and are simply, inexpensively pressed in place. They are faster to install than cotter pins or safety wire . . . straight edges protect workers' fingers and clothing. Rollpins are readily removed with a punch . . . can be used again and again . . . assure simplified maintenance.

**USE ROLLPINS (1) To replace set screws and rivets. (2) To pin or key gears . . . pulleys . . . levers . . . knobs. (3) As locating dowels, stop pins or shafts for small gear trains.**

Once you test their effectiveness you'll want the secure, vibration-proof fastening of Rollpins in your products. Write now for a sample package and full details. Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, N. J.



**ELASTIC STOP NUT CORPORATION OF AMERICA**

GET YOUR FREE TRIAL ASSORTMENT OF ROLLPINS.

Mail this coupon now.



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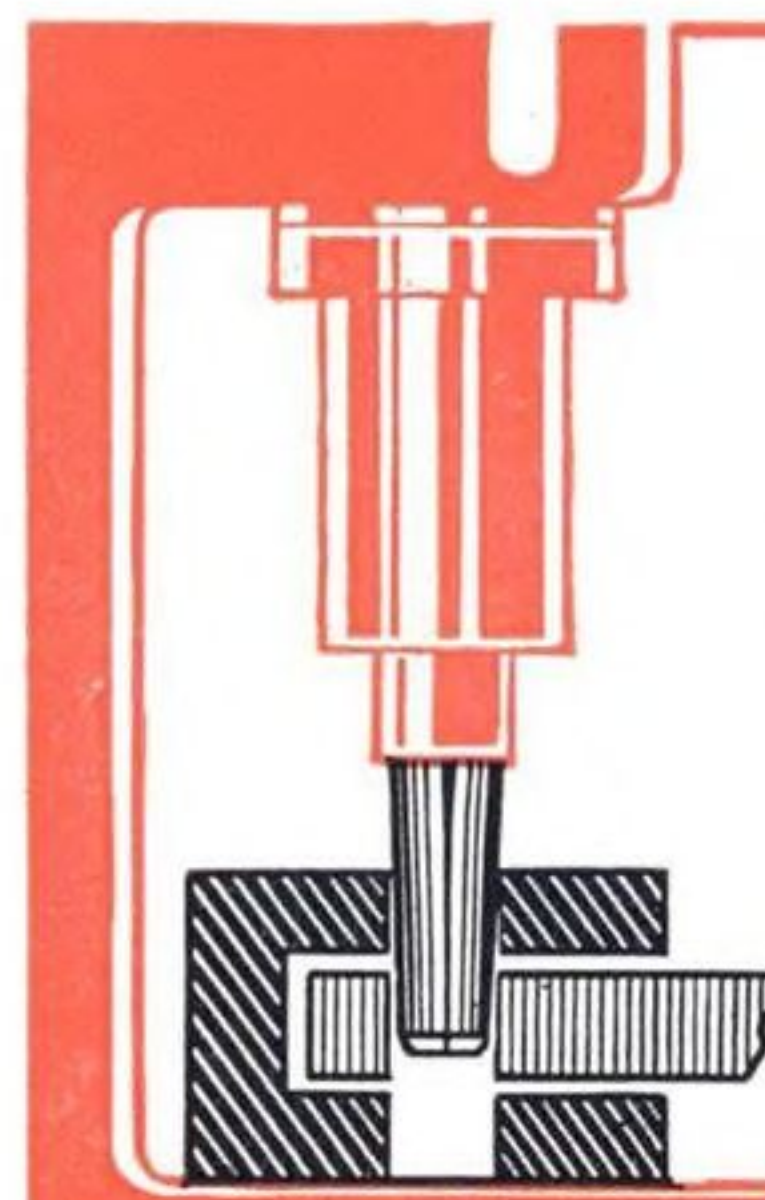
Please send me full application data and test samples of the Rollpin.

Name \_\_\_\_\_ Title \_\_\_\_\_

Firm \_\_\_\_\_

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City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



### HERE'S HOW ROLLPINS PROVIDE A VIBRATION-PROOF FIT

Rollpins are easily pressed into production drilled holes—chamfered ends facilitate automatic or manual insertion.

Rollpins compress as they are driven—are self-retaining in production drilled holes—fit flush. Secondary hole-reaming or riveting operations are eliminated.

Constant spring tension against walls of hole lock Rollpins permanently in place until deliberately removed with a pin punch. Rollpins don't damage the hole and can be used again and again.