

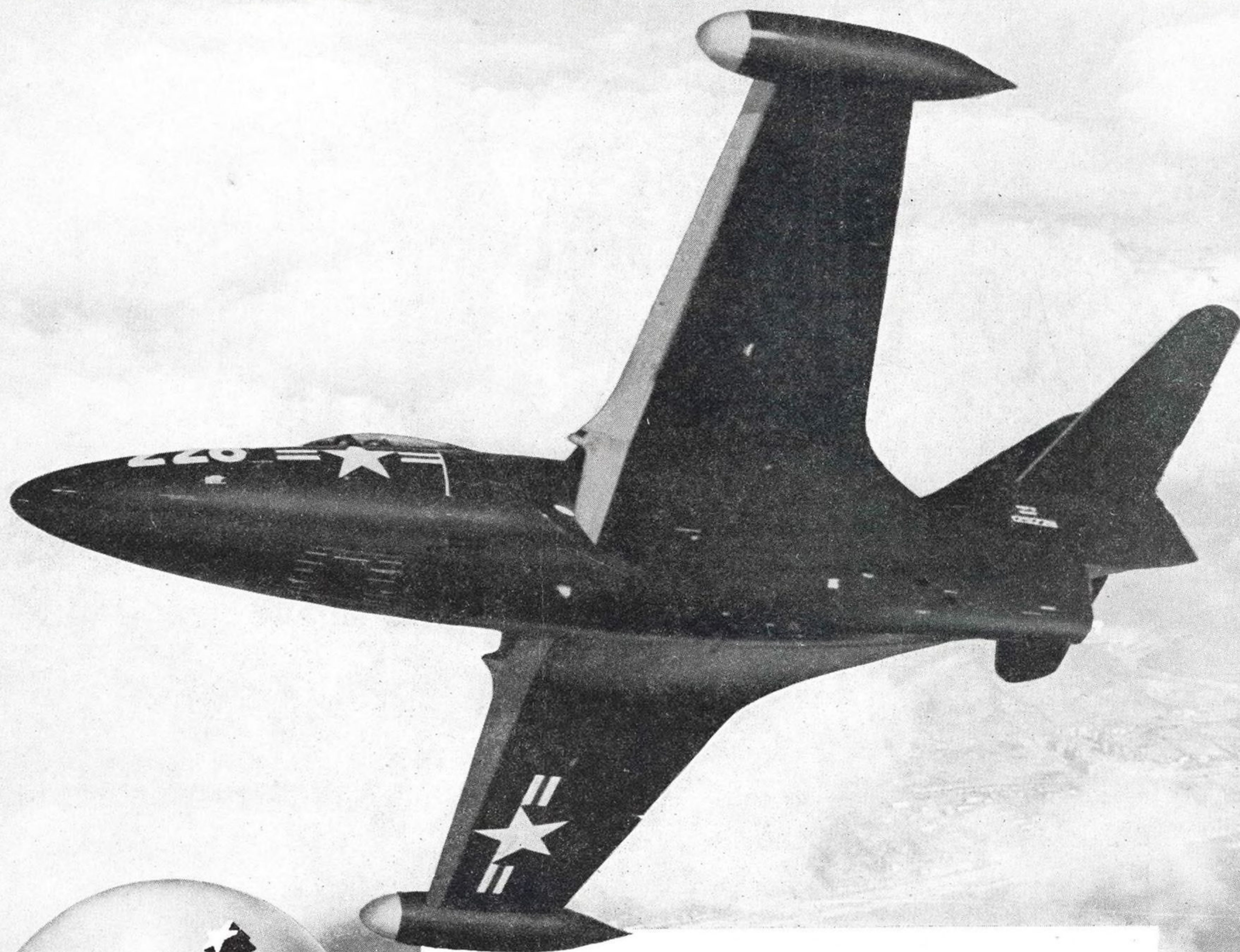
AVIATION WEEK

APR. 23, 1951

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A YEAR

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Exclusive Report
AIRLINE EQUIPMENT OVERHAUL TIME



This PANTHER has sharper claws!

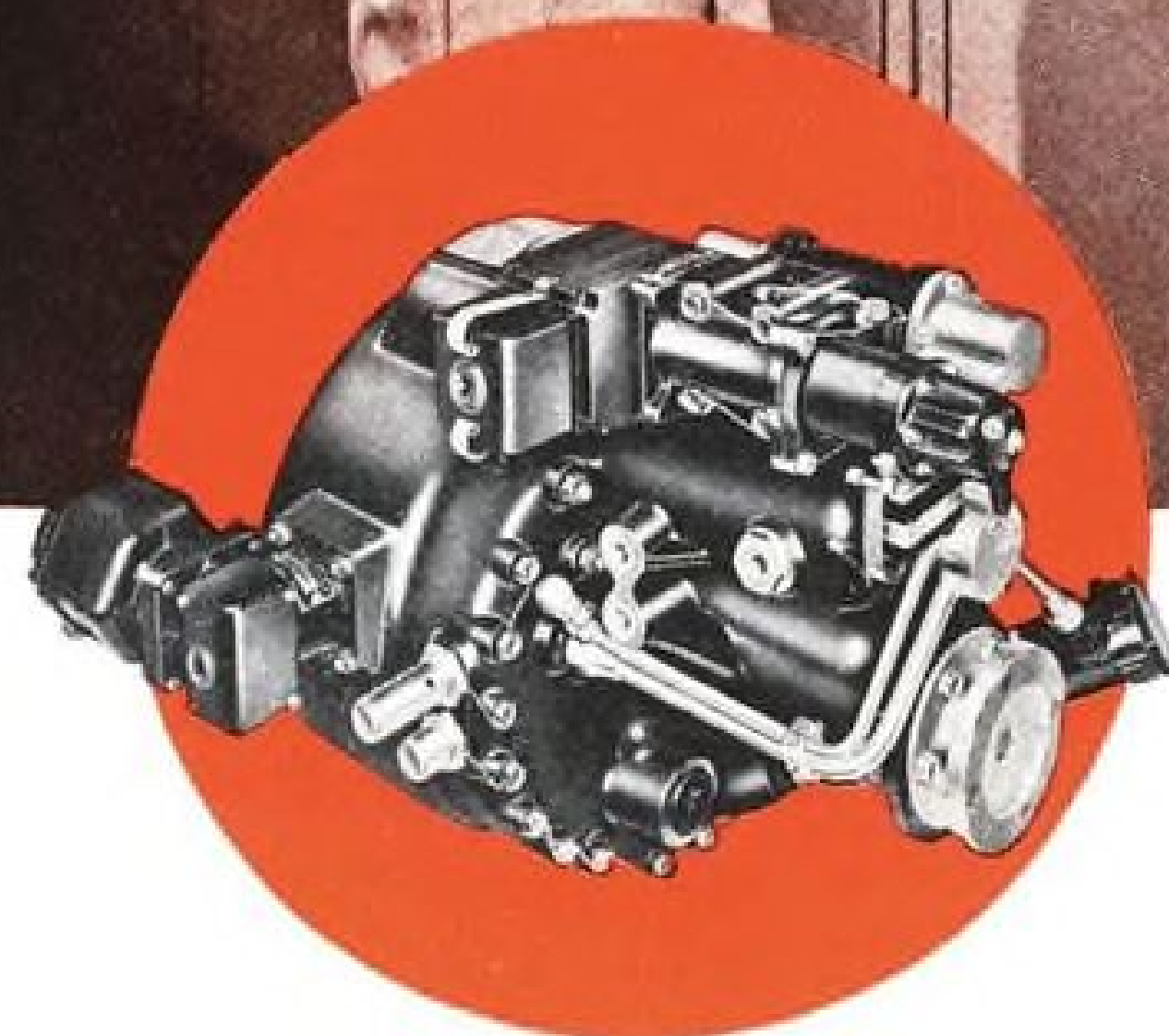
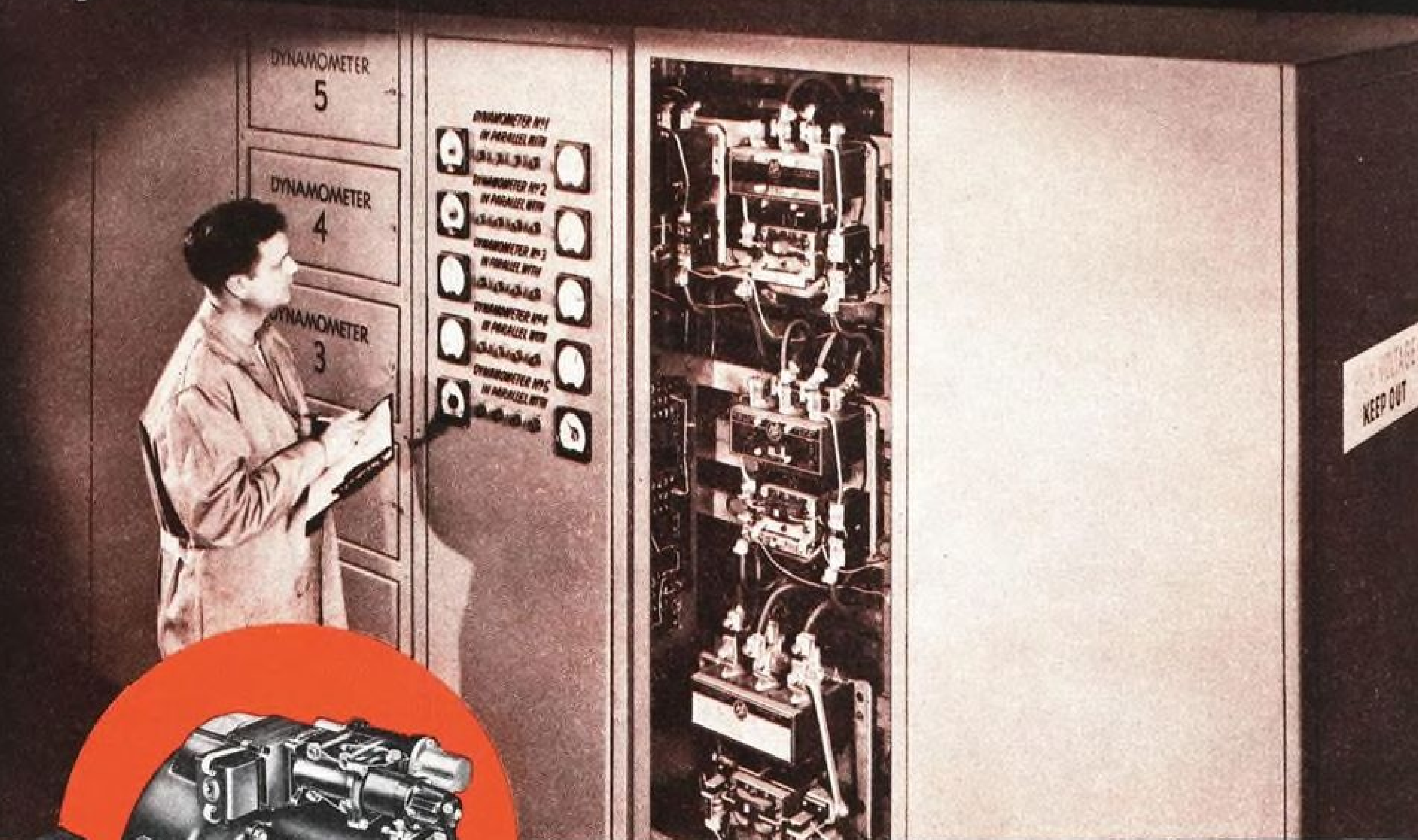
Latest modification of the GRUMMAN PANTHER, the F9F-5, is more powerful, aerodynamically cleaner, faster, and reaches higher altitudes than its predecessors. First jet aircraft used by the Navy in combat, the PANTHER is currently flown from carrier bases by Navy pilots and from Korean fields by pilots of the U.S. Marine Corps.



GRUMMAN AIRCRAFT ENGINEERING CORPORATION, BETHPAGES, MARYLAND

Contractors to the Armed Forces

Power-absorbing "load bank" verifies performance of Sundstrand alternator drive



Load bank duplicates characteristics of all control functions on the B-36

Compactly housed in this steel cabinet is one of the world's largest "load banks" . . . developed by Sundstrand specifically for testing constant speed alternator drives used on the B-36. Drives can be tested simultaneously, and in parallel, at speeds duplicating those of the engines on a B-36 from take-off to landing. Characteristics of all the control functions on the plane are present. This same type of load bank will be used for testing and run-in purposes on Sundstrand constant speed accessory drives for transports, bombers and fighters. It is typical of Sundstrand's facilities for *reliable* research, *expert* engineering and *precision* production of specialized aircraft hydraulic products.

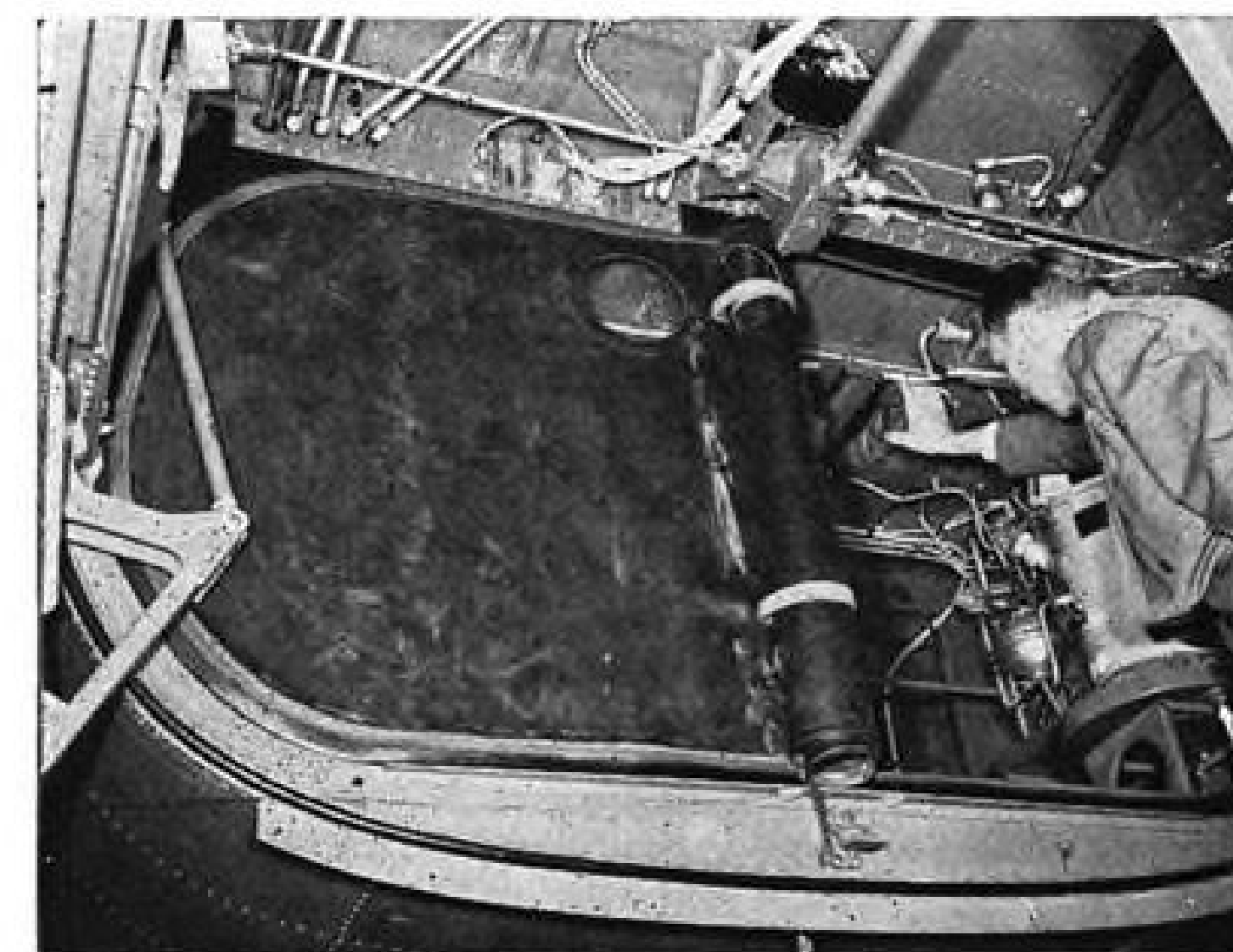


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B.F. Goodrich



Open and shut case for B. F. Goodrich zippers

Shuts up torrent of hot air. Designers wanted to make the hot air duct in the Douglas C-124 (*top left above*) in 6-foot sections. They needed a strong, flexible coupling that would permit easy removal of the sections. B. F. Goodrich Pressure Sealing Zippers proved ideal. They provide a 100% seal, resist the heat, resist damage, speed maintenance.

Sealed lips hold secret of faster maintenance. Flap seals that join aileron and wing posed a maintenance problem on the B-36 (*top right above*). Taking off the aileron meant removal of hundreds of screws fastening the 60-foot seal. Convair engineers tried putting a B. F. Goodrich Pressure Seal-

ing Zipper down the middle of the seal. Result: the zipper's overlapping lips keep a tight seal. And mechanics can simply zip the seal off.

Keeps fumes from bothering plane's nose. The Lockheed Neptune's problem was to keep fuel fumes from the bomb bay out of the forward compartment—yet keep a ready entrance between the two. BFG engineers built a mammoth curtain. A Pressure Sealing Zipper runs all the way around the edge, making the curtain airtight and also easily removable. (*Bottom left above*).

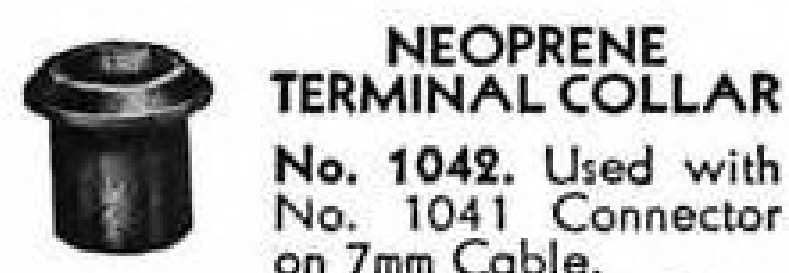
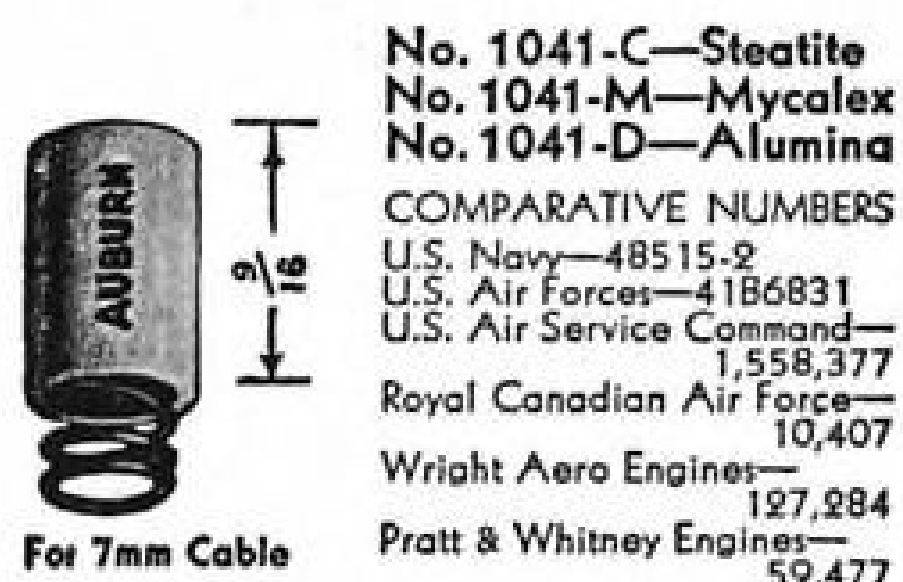
60" bag holds 12-man boat, unzips itself in seconds. The Coast Guard needed a storage case for inflatable life

rafts. A case that would seal out the water and oil, be easily portable and open quickly. BFG engineers designed a case with a Pressure Sealing Zipper running all the way around and an instantly-opened lock (*bottom right above*). The case is water-tight. It unzips automatically as the boat inflates. The launching operation can be handled by one man. If you have a problem that a zipper might solve, check into B. F. Goodrich Pressure Sealing Zippers. *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

B.F. Goodrich
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rocket spark plugs and ig-
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Aviation Week



Member



Volume 54

April 23, 1951

Number 17

Airliner Equipment Overhaul Guide 37

Headline News

Speed Material Relief for Plants 13
Salaries of Aviation Executives 15
National Air Races Planned 15
Experimental CF-100 Crashes 16
Boeing Delivers TB-50D Trainer 17
Two New Copters Offered Military 18

Production

Tests Show Value of Press-Forging 50

Air Transport

Break in ANDB Overcast Seen 71
CAA Announces Avionics Program 72
Now on Order: 466 U. S. Transports 73
Senate to Study Foreign Air Subsidy 75

Aeronautical Engineering

Convair's Turbo Flight Experience 21
New Way to See Boundary Layer 32

Avionics

High-Purity Polarization for VOR 34

Editorials

Due Notice or Smear? 86
Eventually—Why Not Now? 86
Embarrassing, Eh What? 86
The Newest CAB Member 86

Departments

News Digest 7
Sidelights 8
Who's Where 11
Industry Observer 11
Washington Roundup 12
New Aviation Products 42
What's New 84

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Erwin J. Bulban Special Assignments
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Editorial Offices: 330 West 42nd St., New York 18, N. Y., Phone Longacre 4-3085
National Press Bldg., Washington 4, D. C., Phone National 3414.

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

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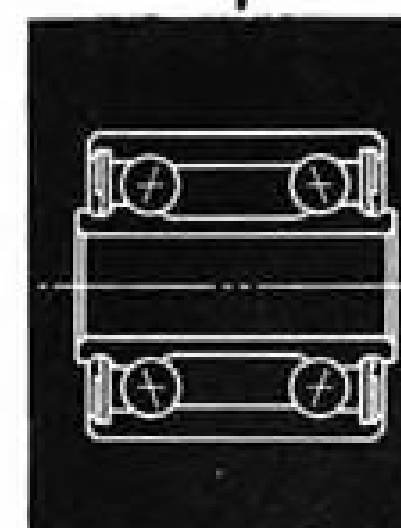
BELL Aircraft CORPORATION

16 YEARS

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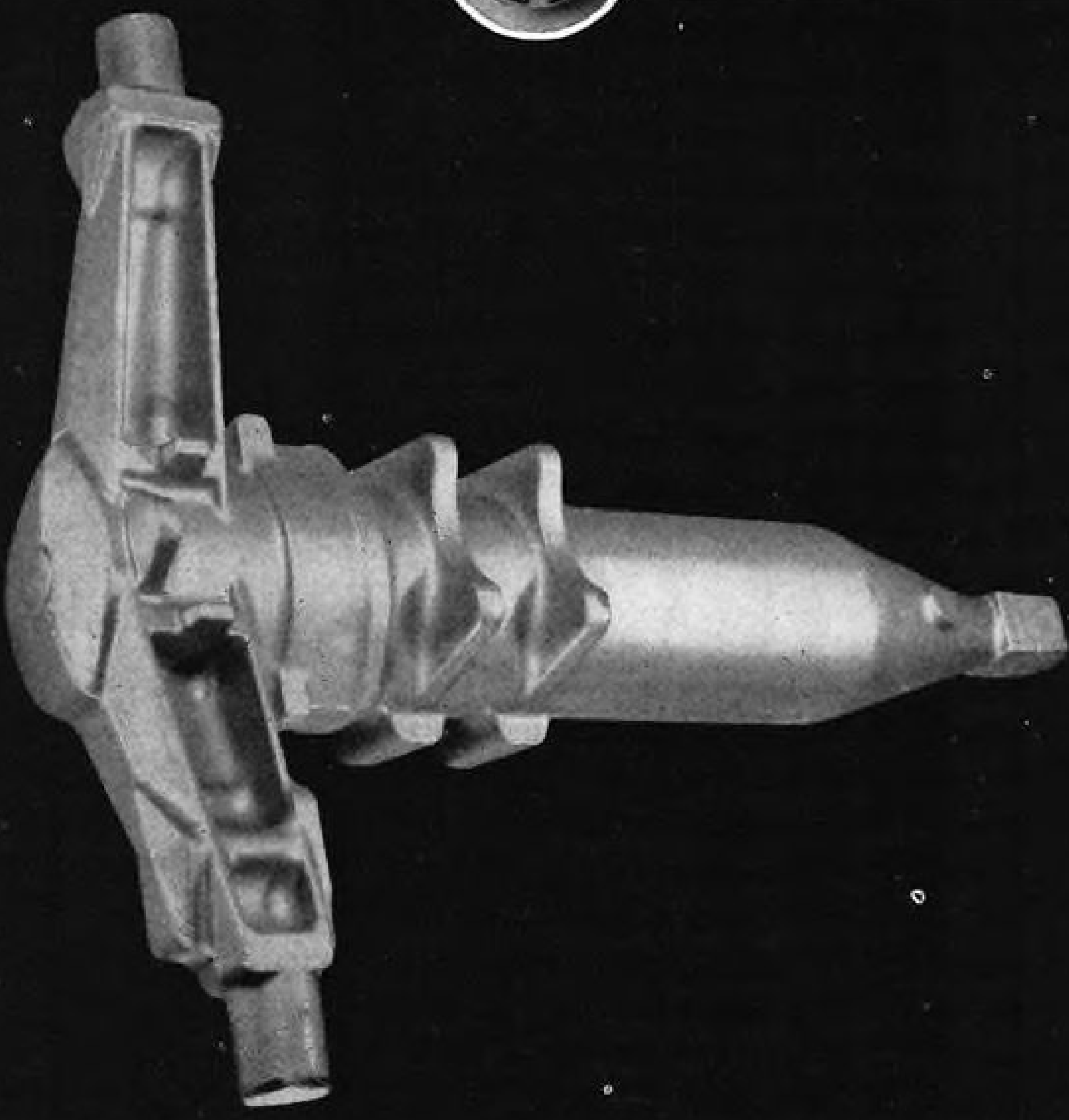
The Bell X-1 supersonic jet fighter reflects the type of advanced research and development done by the Bell Aircraft Corporation. Only extraordinary skills blended between science and shop are capable of producing such results. It's been Fafnir's privilege to work closely with Bell Aircraft since the founding of Bell in 1935 . . . 16 years. There's a good reason for this long association . . . more than just good ball bearings. It's the Fafnir attitude and aptitude . . . a way of looking at ball bearings from the designer's side, an aptitude gained from more than twenty years' specialization in aircraft ball bearings. The Fafnir Bearing Company, New Britain, Conn.

Fafnir DW Series . . . is one of the Fafnir Aircraft Ball Bearings regularly specified by Bell. Its double row design eliminates need for two individual ball bearings as well as complicated machining and assembly in certain applications.



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Forgings for the aircraft industry today demand the utmost in engineering and production techniques and in scientific laboratory control. This massive complicated landing gear component, weighing over 400 pounds, is typical of Wyman-Gordon's forging contribution to the ever-growing progress in aircraft design. In crankshafts for the automotive industry and in all types of aircraft forgings, steel and light alloy, Wyman-Gordon has pioneered in the development of forging "know-how"—there is no substitute for Wyman-Gordon experience.

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HARVEY, ILLINOIS DETROIT, MICHIGAN

NEWS DIGEST

DOMESTIC

A. P. Fontaine has been elected a vice president and general manager of Convair. A veteran of 21 years experience in aviation, Fontaine returns to the company where he held several executive engineering positions between 1939-1945. President LaMotte T. Cohu had held the title of general manager.

Piasecki H-25 is the Army designation of the HUP-2 helicopters which are being purchased for service in the Transportation Corps out of fiscal 1951 funds.

Two XR60-1 Constitution transports will continue in operation under a new grant of funds for spares, engine overhaul and 1500-hr. heavy maintenance, thus permitting their continued use on fleet logistics airlift between California and Hawaii and the West Coast and Washington, D. C. Official Navy comment was made on the trouble-free 3000-hr. operation of the two 180-passenger Lockheed planes, and Navy says the transports will be kept in service for their normal life.

Materials allocations for non-airline civil plane manufacturers seemed assured to permit each company to produce at five-sevenths of its 1950 rate. This would mean output of approximately 2500 planes a year. CAA and Air Coordinating Committee have already approved this rate and Defense Production Administration was expected to give it the go-ahead last week.

Senate has confirmed the nominations of Delos Rentzel as Undersecretary of Commerce for Transportation; Donald Nyrop as a member of Civil Aeronautics Board and Charles Horne as Civil Aeronautics Administrator. The President is expected to designate Nyrop as CAB chairman, succeeding Rentzel.

Consolidated Vultee Aircraft is negotiating with Navy for construction of a guided missiles plant at Pomona, Calif., for production of the surface-to-air 2600-lb. rocket-propelled anti-aircraft Terrier missile.

National-Panagra interchange between New York and South American points (AVIATION WEEK Apr. 16)) was tentatively approved by CAB and set off a chain of objections. Pan American filed objections; the four PAA directors on Panagra did likewise. PAA's big point: it controls Panagra planes between Balboa and Miami because of the carrier's joint "through-service" agreement and Panagra cannot charter those planes to National, and CAB has no

right to authorize such a charter. W. R. Grace & Co., half owner of Panagra, claims it has the legal right to charter planes to National.

FINANCIAL

Consolidated Vultee Aircraft Corp. has reported a profit of \$2,495,886 for the first quarter ended Feb. 28, before provision for federal taxes. Sales for the period were \$61,012,990. A dividend of 35 cents per share was declared, payable May 25 to stockholders of May 15.

Beech Aircraft Corp. has voted a regular quarterly dividend of 20 cents per share to stockholders of record Apr. 23, payable May 4.

Douglas Aircraft backlog Apr. 1 is \$788,552,064, highest since World War II's end. First quarter sales of \$39,348,399 are 50 percent over a year ago. Net earnings of \$1,681,581 or \$2.80 a share are up 81 percent. Some 15 percent of the Apr. 1 backlog is commercial orders for 91 DC-6Bs. Of the military backlog, 53½ percent is Navy, 46½ percent Air Force.

Pacific Airmotive Corp. reports first-quarter sales of \$4,270,000—65.6 percent ahead of the same period in 1950. Current backlog continues over \$9 million, with the Manufacturing division's backlog being over \$2 million.

INTERNATIONAL

Siamese Air Lines DC-3 crashed at sea in the vicinity of Cape d'Aguilar (near Hong Kong) with sixteen aboard. At presstime, no wreckage or any survivors had been sighted.

William G. A. Perring, director of the Royal Aircraft Establishment, Farnborough, England, since 1946, died at the age of 52. He joined the Farnborough staff in 1925.

Canada will spend about \$300 million in the U. S. on defense items in fiscal 1951-52, according to Canadian Defense Minister Brooke Claxton. Most of the money will be for engines and components for the Canadair-built F-86E and for Army and Air Force equipment to replace stocks sent to Western Europe.

Canadian government has placed orders for \$267 million worth of Avro Canada CF-100 and Canadair F-86E jet fighters, and for reconditioning a "considerable quantity" of World War II aircraft engines.

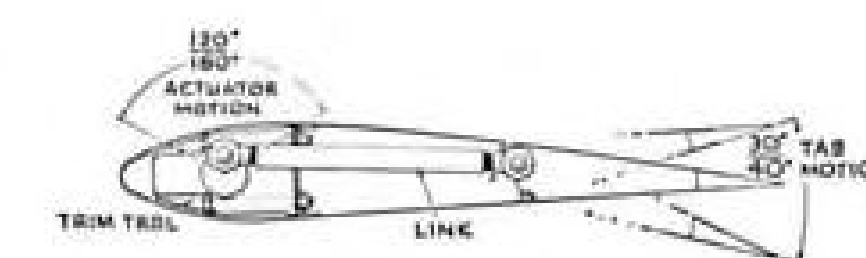
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SIDELIGHTS

Budget Delayed to May

Budget Bureau doesn't expect to be ready to submit 1952 fiscal year budget for the military services to Congress before May. Program now is for a \$6-billion supplemental for this year (now pending in Congress) and a 1952 fiscal appropriation of about \$70 billion—or a \$76-billion emergency defense build-up. The original program was a \$10 billion supplemental in January and a \$62-billion '52 budget, a total of \$72 billion. When the services firmed up estimates on this program, though, the total came out \$106 billion.

Congress

W. Stuart Symington, chairman of NSRB, was selected by the President as the new RFC administrator. There were not enough votes in House & Senate to defeat the President's plan to have the agency headed by a single administrator rather than the present five-man board. . . . Senate Small Business Committee may subpoena former CAB Chairmen Landis and O'Connell for hearings on the role of non-skeds in air transport.

European Recovery Program

Aero Club of Italy wants to buy 50 two-place Beech Mentor trainers through ERP, but Italian manufacturers are trying to balk the sale, claiming it infringes on their right to re-establish Italian production.

Marines Not Wanted

All three members of Joint Chiefs of Staff (Navy, Army, Air Force) oppose putting the Marine Corps Commandant on JCS, according to a letter to Senate Armed Services Committee from Defense Secretary Marshall. This committee opened hearings last week on legislation, backed by 43 senators and 65 representatives, directing this, and a doubling of Marine strength to four divisions and four air wings.

Dayton

Air Materiel Command has canceled a second annual industrial exposition at Wright-Patterson AFB on Armed Forces Day, despite large crowds drawn by Air Force contractors last year. Reason: the emergency, and fact that Production Division already has on the road exhibits to recruit new subcontractors for prime AF contractors. . . . "Markups" sought by some subcontractors by applying for DO's for larger quantities of critical materials than are called for in their subcontracts are being watched closely by the AF. . . . Air Research & Development Command, while waiting for top authority to decide on permanent quarters, is cooped up in a penthouse atop old Bldg. 11 at Wright-Patterson AFB, under conditions far from conducive to expediting research and development. . . . Col. Clarence H. Welch, retired public informa
(Continued on page 18)

AVIATION WEEK, April 23, 1951



NEWEST NEPTUNE—Latest version of the Lockheed long-range Navy patrol bomber, the P2V-5, incorporates changes in nose armament—two flexible 20mm. cannon in place of earlier models' six fixed 20s—and increased and improved radar gear for tracking enemy naval craft. First P2V-5s will be delivered this month. The eight-place plane has two 3250-hp. Wright R-3350-30W compound engines.



XC-99 FIELD MODIFICATION—This development of the giant Convair XC-99 as a twin-fuselage cargo craft would be an impressive achievement to beggar all description, but as yet it exists only "in camera." A clever photo lab technician at Kelly AFB, Tex., made this remarkable picture montage to mark April Fool's Day and appropriately designated the result the XC-198. Coming events . . . ?

Aviation Picture Highlights of the Week

NEW YORK'S FIRST HELIPORT—This 45x40-ft. platform mounted atop the Port Authority building in lower Manhattan will be used as a base for the Authority's Hiller 360 copter which will expedite travel between regional airports. Meanwhile, it is being proved out by the Police Dept.'s Bell helicopters.



AVIATOR ESCALATOR—A help to tired Navy carrier pilots is this neat escalator, probably the first such installation, aboard the USS Oriskany, one of the Navy's new Essex-class aircraft carriers.



For more than 20 years leading U.S. planes have used MACWHYTE AIRCRAFT CABLE

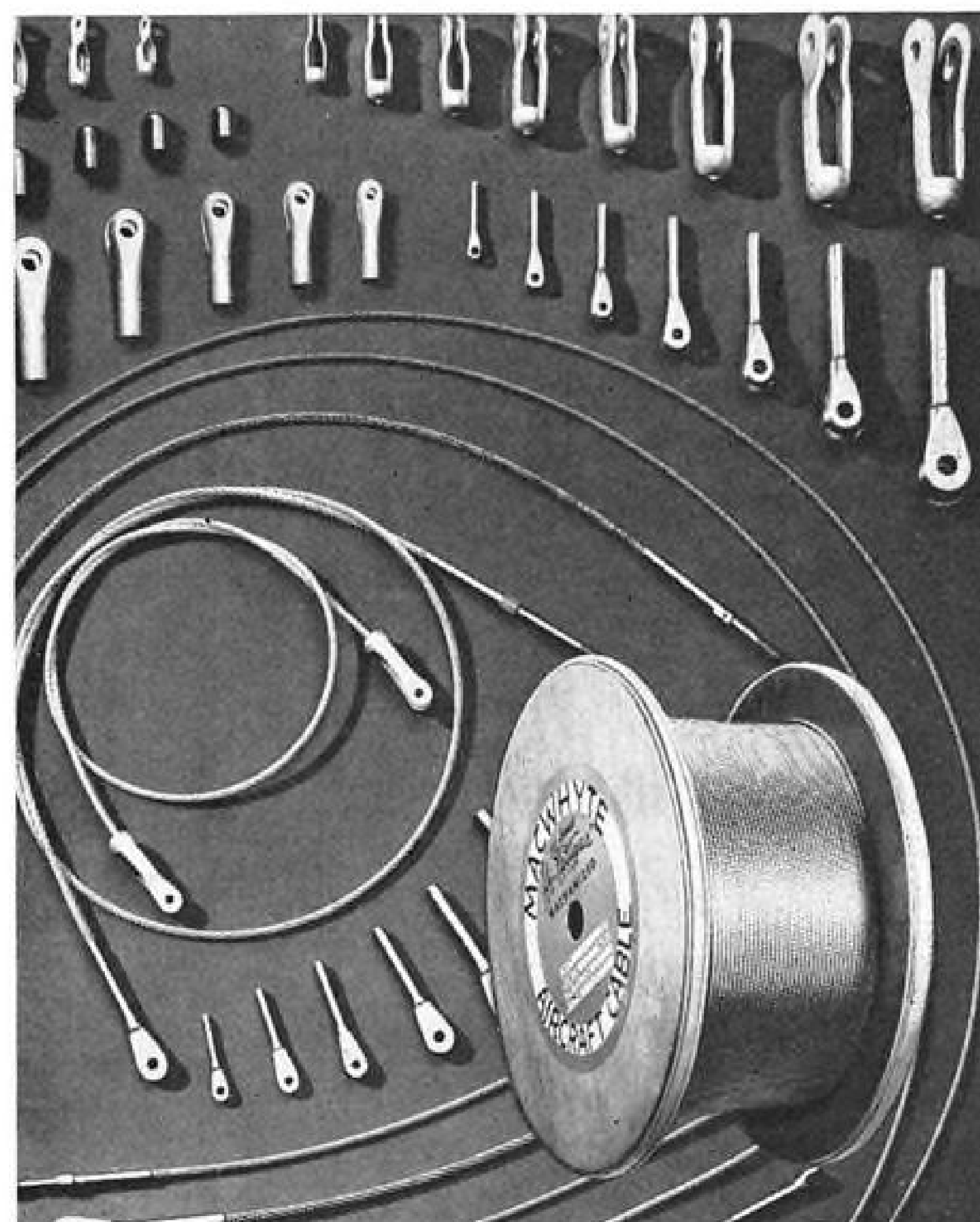
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Controls made with Macwhyte reliable "Hi-Fatigue" Aircraft Cable and "Safe-Lock" swaged terminals are noted for their superior quality to resist wear, and bending fatigue. Maximum efficiency, long life, and greatly reduced maintenance save time and money.

Catalog and literature is available on request.



Macwhyte "Hi-Fatigue" Aircraft Cable is supplied in reel lots, specified lengths, and cable assemblies.

Macwhyte "Safe-Lock" and "Socket-type" terminals are supplied loose or attached to cable.

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2905 Fourteenth Avenue, Kenosha, Wisconsin. Manufacturers of "Hi-Fatigue" Aircraft Cable • "Safe-Lock" Cable Terminals • Cable Assemblies • Tie Rods • Braided Wire Rope Slings • Bright, Galvanized, Stainless Steel and Monel Metal Wire Rope.



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1008-A

WHO'S WHERE

In the Front Office

Alan G. Binnie has been appointed vice president of Kollsman Instrument Corp., subsidiary of Standard Coil Products Co. An engineer, Binnie has been assistant general manager at Kollsman for the past five years; prior to that was manager of the sales and service engineering department.

Edward K. Foster has been made a vice president of Bendix Aviation Corp., also a member of the firm's administration committee. He will continue to be general manager of the company's radio communications division, Baltimore. Foster joined the company in 1936.

Robert E. Johnson has been named vice president and assistant to the president of United Air Lines. Johnson, who has been with UAL for 22 years, has been and will continue to be responsible for public relations, advertising and publicity.

Charles T. Roggi has been appointed assistant to Vice Adm. Emory S. Land, president of the Air Transport Assn. Roggi continues his duties as director of ATA's public affairs department.

What They're Doing

Ludwig A. Majneri, former vice president and chief engineer of Warner Aircraft Corp., has formed Aeroguild, Inc., to work in the field of hydraulics and precision products and parts. Majneri is president and chief engineer of the new concern, which is located at 11639 Klinger Ave., Detroit 12.

Eugene Sibley, who has been described as "one of the men who laid the foundations" for the airways system in the U. S., has retired from CAA at the age of 60. Sibley has been in government service for more than 30 years, his first position being with the Post Office Department. He transferred to the newly organized Aeronautics Branch of the Department of Commerce in 1928.

Changes

Harry R. Reynolds has joined Kellett Aircraft Corp. as industrial engineer and Herbert A. Clarke has joined the firm as electronics engineer to head up a new department. . . . Robert A. Wolf has resigned as assistant chief of preliminary design of Bell Aircraft to become principal engineer in Cornell Aeronautical Lab's special projects department to handle operational analysis and weapons evaluation.

Paul Reeves has been made director of sales for the Timken Roller Bearing Co. . . . Richard M. Morgan has been appointed service manager of Boeing Aircraft's newly formed service organization for its Gas Turbine division. . . . John R. Schwarzkopf is new public relations director for Central Airlines.

INDUSTRY OBSERVER

► Several top operating people at AMC think mobilization planners overlooked a point when they omitted magnesium as a basic metal from the Controlled Materials Plan for scheduling critical materials. These AMC people say magnesium should be listed along with aluminum, copper and steel, and they may push for revision of CMP, to include it as a primary metal.

► After long delay Curtiss-Wright hopes to deliver a two-cylinder rocket engine to Bell Aircraft for X-2 powerplant. Unit is undergoing static tests at the Wright plant and at Lake Denmark, N. J., Rocket Engine Facility. The engine is said to deliver approximately 15,000-lb. thrust.

► USAF Senior Officers Board is in session to determine winner of airframe phase of the 1954 automatic interceptor competition (Aviation Week Jan. 15). Hughes Aircraft won the first phase for design of the electronic guidance system. Military sources have indicated that most of the airframe entries are completely unconventional in comparison to present airframe configurations. Industry observers and some military quarters predict that award for two experimental models will go to North American Aviation. Plane will carry a pilot monitor, is to be completely automatic, capable of sonic speed, and able to knock down an enemy bomber at 60,000 ft. It will carry one air-to-air guided missile.

► Goodyear has completed 90 percent of an AMC project for development of a durable forged magnesium landing wheel center for heavy transports. The new wheels are expected to have a life ten times that of existing wheels.

► Beech Aircraft is about to complete the first of an experimental USAF order of jettisonable magnesium wingtip tanks. They will be evaluated against aluminum tanks. Project is an indication of a trend to replace more critical aluminum with magnesium in aircraft components.

► Reynolds Metals' experimental program to extrude aluminum cylinders—with ready-made reinforcing ribs—which can be cut and straightened into ribbed aluminum sheet has encountered a problem, in the form of a hump which appears on the smooth side of the sheet at each rib when the cylinder is straightened. Further tests are being made to eliminate the humps. Meanwhile Reynolds has produced satisfactory samples of rolled tapered aluminum sheet of aircraft size and quality, including stepped tapered sheet, and is continuing development on this project, started by the USAF in 1948.

► Virtually every major jet engine in the USAF procurement program is in the process of a components redesign study for elimination of critical materials and for improved producibility in large quantities.

► Strategic Air Command headquarters requirements at Omaha are expected to keep the big Martin Nebraska plant busy. It doesn't figure in the present phase of plant assignments to manufacturers. At the present rate of removal of machine tools from storage, the Omaha plant may be cleared in about six months and then SAC is likely to take it over completely, as Air Materiel Command did with the Oklahoma City Douglas plant of World War II.

► One little-known experimental approach to the critical problem of making electronic tubes more reliable (Aviation Week Apr. 9) is being investigated for the USAF by two competitor manufacturers. The development is ceramic power tubes that will operate at a higher temperature and be more resistant to breakage than glass tubes now in use.

► Shutter complications of pulsejet engines have just about written them off as far as future Air Force planning is concerned, with the possible exception of helicopter engines. And even here consensus seems to be that anything the pulsejet can do, a ramjet can do faster and better, once it gets started.

Washington Roundup

MacArthur on Air Power

"Even before General Douglas MacArthur was to speak before Congress last week, Washington observers felt he would take up the cause of air power, the cause of martyred "Billy" Mitchell where Mitchell left off, with his death a decade and a half ago. In his closing days, Mitchell predicted that MacArthur would.

Mitchell's fight was for an air service co-equal with the ground and naval services.

MacArthur's fight will be for a dominant air force—a "first line of defense" supported by ground and sea forces in auxiliary roles.

Members of Congress and top military officers, who have conferred privately with the five-star general, say it is "certain" that he will march into the role of crusading successor to Mitchell.

MacArthur supporters claim they have documentary evidence showing that he vigorously opposed the verdict of the 1925 court martial which suspended Mitchell from the Army for five years.

If he did, Mitchell apparently never knew it. But he was aware that MacArthur sympathized with his position when he wrote in 1935, shortly before his death:

"A number of the men who convicted me will be called upon again to guide this nation in a second world war in all probability. I hope they will then understand what I had to say.

"Douglas MacArthur, I believe, will be the first to admit that I was right when the next war comes. He regrets that part he played in my court martial. May he be brave enough to say so openly."

Democrats have long suspected that the belated Hoover-Taft-Wherry advocates of air power are echoes, jumbled with politics by military novices, of a MacArthur master plan for U. S. defense.

Career politicians Taft and Wherry, the record indicates, have fitted defense to suit politics. The result: inconsistency on defense. Both supported the Truman-Johnson slash-back of the 70-group Air Force program, to promote economy. Their recent advocacy of air power has been largely written off in Washington as more politicking.

But career military man MacArthur can be counted on to mold his defense policy first. On this score, Democrats, as well as Republicans, are ready to listen attentively to what he has to say.

Those who have talked with him say MacArthur's defense concept entailing all-out build-up of strategic air power is this:

- The U. S. must tailor its defense to meet the challenge of a direct war with Russia—draw a decisive line; discard appeasement; if and when Russia crosses the line, squarely meet the challenge.

- The Administration's policy of Russian "containment" through an endless series of land-war "police actions" throughout the world will dissipate the U. S. strength to meet the prime challenge.

- Under the first course, the U. S. would dictate air warfare, the field where it is superior, thus giving promise of victory.

- Under the second course, Russia is dictating endless land warfare, probably will dictate a hopeless ground war to hold Europe against its aggression. Against the mass armies the Kremlin controls in its homeland, satellites, and the Far East, the ground forces of the U. S., plus all

the Allied support it might muster, can never hope to win.

The Joint Chiefs of Staff have drawn up their strategic concept, emphasizing build-up of the Army for "containments," to fit the Administration course. USAF's Chief of Staff has unenthusiastically endorsed it—to date.

Plane Contracting Delay

Outlook is that several months will pass before Air Force and Navy can confirm "letters of intent" with contractors for aircraft and engines.

The services started dispatching the letters shortly after the declaration of a "national emergency" last December. They didn't have funds to back them up, but anticipated them soon. They wanted to let manufacturers know what their requirements would be, so they could plan. The Administration and Congress were keyed to approve promptly funds for a quick defense build-up.

Then the economizing mood set in. The prospect now: • Air Force and Navy will get a "small amount" for plane and engine purchases when Congress approves a pending supplemental appropriation bill for this year, probably in a few weeks.

- Funds for aircraft purchases in the 1952 fiscal year won't be available before July. Probably they will be tied up in Congress long after that date.

House Appropriations Committee members are demanding a "complete shopping list" of the military program, which will probably total around \$70 billion, for "thorough" review.

Added to this indication of delay, Republican senators are preparing for a word battle to divert Army funds into the Air Force for a build-up of the strategic air arm.

Here and There

- Industrial Mobilization. Defense Mobilizer Charles E. Wilson's plan for a one-shift military industrial capacity that could triple production by going to three shifts at the push of a button has been modified. The plan now is for expansion to two-shift capacity that could rapidly increase production by going to three shifts in an emergency.

- CAB Investigation. Sen. Charles Tobey has itched for it for five years. His appetite was whetted back in 1946 during testimony on the nomination of oilman Edwin Pauley for Undersecretary of Navy. On the basis of evidence disclosed then, Tobey charged that former Democratic National Committee Treasurer George Killian used the threat of refusal of a CAB certificate to United Air Lines for a Denver-Los Angeles route in an effort to obtain a political campaign contribution from UAL President William Patterson. Patterson said he made no contribution. UAL did not get the route. Tobey will have his opportunity now as a member of the Senate Small Business Committee, weighing the charge of nonskeds that the Board is controlled by the scheduled industry.

- Nonsked Regulation. Nonskeds are ready to recommend that they be confined to "second class" service, supplementing the first-class service of scheduled airlines. But they will fight to the end against any limitation on route-type service. As long as they are offering a different type service, they say, it won't draw away traffic from the scheduled airlines, no matter how regularly they operate between points. More likely, they add, they will attract the low-income traffic of rail and bus. —Katherine Johnsen

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Relief Speeded for Material-Short Plants

- Aircraft Production Resources Agency already set up and functioning for military contractors.
- Shortly, you will have to file your requirements, and then allocations will start about July 1.
- But a steady flow of materials into aircraft plants probably cannot begin much before September.

By Alexander McSurely

Dayton—How much aluminum, copper and steel will U. S. air power need? And how much will it get?

Answers to these two questions aren't easy.

But the job of piecing the answers together has been started here at Wright-Patterson AFB, by a month-old three-man board representing Air Force, Navy and Army, and a staff of military civilian industry planners.

► Precedent—They may find encouragement in the knowledge that essentially the same job was done successfully once before. That was in World War II when a tough organization called Aircraft Scheduling Unit made a lot of fast, hard-headed priority decisions to straighten out the materials problem for the aircraft industry. ASU incidentally stepped on a lot of toes, but it did its job well enough so that the U. S. industry built the greatest military and naval air fleet that the world has ever known.

Now the successor to ASU, a similar setup with a few changes dictated by World War II experience, is getting set for a similar job.

This time, Department of Defense and its top planning agency, the Munitions Board, are calling the new scheduling unit APRA. The four letters stand for Aircraft Production Resources Agency.

Until Apr. 15, when Manly Fleischmann, NPA Administrator, announced the kickoff on Controlled Materials Plan at Washington, the new APRA organization was only potentially a heavyweight outfit. A big part of the staff's time was taken up with day-to-day trouble-shooting and expediting on materials and other industrial resources. And some of it was quite effective, too. But it was on a voluntary basis without any real ground rules to go by.

Now CMP provides the ground

rules—very similar, overall, to the Controlled Materials Plan of World War II.

► APRA's Task—APRA acts as the U. S. Government claimant agency for the Air Force and the Navy Bureau of Aeronautics in applying for controlled materials. Job of reconciling conflicting requirements, if and when they occur, between the services will be the assignment of the three APRA members: Col. George Schaetzel, Air Force, who was elected first director; Capt. Roy Jackson, Navy; and Col. Richard R. Danek, Army. The agency director will be elected annually from the three service representatives.

To take care of materials allocations and plane production scheduling for airline and other civil planes, Civil Aeronautics Administration is sending Carl Dowell to APRA. He will receive detailed lists of requirements from the CAA Office of Aviation Defense requirements in Washington.

Dowell's job will be to integrate civil production needs with military schedules, and to remind the military of the importance of civil aviation as a ready airlift reserve.

► Lead Time—As far as the aircraft industry is concerned, APRA planners expect that it will be from three to five months after the starting date (Apr. 15) before materials flow will come from the mill.

Schedules show that it takes about 75-120 days for the mill run of alloy steel, 30-60 days for carbon steel, 35-60 days for copper and 45-60 days for aluminum on an average. And the run will not be started until preliminary procedure of determining materials requirements and allocations has been handled.

NPA has announced that allotment of specific amounts of materials to producers will start July 1. This coincides with the APRA planning time table. But the distribution of allotments

to Air Force and BuAer prime contractors which starts then will take an estimated 30 days. And at least an additional 15 days will elapse while the prime contractors get their allotments of material divided with their subcontractors and supplies. Add the mill run time and it is apparent it will be well into September or possibly October before quantity materials will be flowing from the mills under the new schedules.

The NPA announcement said that manufacturers of military products, products for the Atomic Energy Commission, and certain defense-related construction projects would be required to file their detailed requirements on forms which will be available about May 1 through the Department of Commerce and its field offices, national trade associations, and similar groups.

► NPA Products List—An NPA list of products for which application forms will be required includes such items as aircraft and aircraft parts; machine tools; metal-working machinery and accessories, including welding and cutting apparatus; metal shipping containers; electrical wiring devices and supplies; electrical indicating and measuring instruments; electrical accessory equipment for internal combustion engines; radio, radar and television equipment; radio tubes; tires and inner tubes; aircraft instruments; optical goods; photographic equipment; repair and replacement parts.

► Categories—Products whose manufacturers will come under the plan are in two categories:

- "A" Products (including most defense production) classified as those for which the most convenient method of production authorization and materials allotment is vertical. In other words, the prime contractor would get his authorization and allotment from the government agency that was his "customer," the subcontractor would rely in turn upon the prime contractor, the sub-subcontractor on the subcontractor, etc.

- "B" Products defined as those for which authorizations are furnished horizontally directly to the producer, including certain civilian type items, industrial machinery and equipment and some components needed for defense. Producers of B items will receive authorizations and allotments from NPA's industry division.

Once Controlled Materials Plan gets

rolling, it is planned to decentralize the operation, after the first three months, handling most authorizations and allotments through commerce field offices working with local producers. However, as far as the military aircraft program is concerned, APRA will check closely on authorizations and allotments to guard against unnecessary roadblocks and delays in distribution.

► **Industry's Responsibility**—NPA has stated that a major share of responsibility for success of CMP is left to industry, particularly to the prime contractors. They will be expected to schedule production and allotments of materials to subcontractors so that the components are ready on time and in the right quantities. Some special program will be instituted to assure availability of certain common components which are in great demand.

Under the status of controls now contemplated, a substantial supply of the three basic metals—steel, copper and aluminum—will be left for non-defense production. Other NPA powers such as the M or limitation orders on materials will be used to keep the civilian distribution in balance.

The APRA organization as now constituted includes many veteran employees from the Aircraft Scheduling Unit of World War II. It drew heavily on the Industrial Planning Division of Air Materiel Command for civilian personnel. Strong flavoring of unification is seen in its organization, with Navy, Army and Marine officers intermingled in the group. It is expected that APRA will grow eventually to about 600 personnel, as compared with the peak of 1500 personnel in the old ASU.

► **APRA Makeup**—There are four APRA sections: requirements, materials, components and equipment, and industrial resources coordination.

While CMP has placed emphasis on only aluminum, steel and copper, APRA plays close attention to other materials as well. Its non-ferrous metals branch, for example, includes specialists assigned to magnesium sheet and castings, and miscellaneous materials.

Importance of electronics in the military aviation picture is indicated by the fact that there is a special electronics branch in the requirements section of APRA. Other requirements groups include the key requirements research branch and branches for recording materials and components.

A control and procedures branch in the materials section is charged with liaison with the Munitions Board, NPA and other agencies and with preparing directives, manuals, etc., for CMP operation.

While most of APRA's attention is concentrated on materials, it has branches in its resource coordination section which are assigned to other in-

Our Expanding Industry...



PIASECKI HELICOPTER CORP.'S main plant at Morton, Pa., will look like this by the end of this year, with an additional 197,000 sq. ft. added to the large plant area. When complete,

Rheem Mfg. Co.'s Aircraft division has received a letter of intent from Northrop Aircraft to build and assemble F-89 Scorpion components. Rheem will do preliminary work at its South Gate (Calif.) plant, with actual fabrication and assembly to be handled at its new Downey plant nearby. . . .

Ryan Aeronautical Co. began construction of a 14,000-sq. ft. warehouse-hangar to provide additional facilities for military and civil Navion service and spare parts departments. The building is expected to be completed by the end of next month. . . .

Boeing-Wichita will build a \$4.5-million hangar large enough to contain 12 B-47s, adjacent to the northeast section of the airplane parking area on Wichita Municipal

the company will have over 517,000 sq. ft. of area, including all plants and leased facilities concentrated exclusively on military helicopter output by the end of 1951.

Airport. Plans are to have the building completed by the end of 1951. . . .

Plymouth division of Chrysler Corp. has contracted to build hulls for the Grumman Albatross air-rescue plane at its Evansville, Ind. plant. About 1400 employees will be needed when top monthly output is attained. . . .

Air Associates, Inc. has leased a modern four-story building of 65,000 sq. ft. of floor area to expand its electronic production in Orange, N. J. This is the second major expansion for the firm this year; three months ago the company leased a three-story 21,000-sq. ft. building in Hackensack, N. J., to house its eastern supplies branch, thus freeing floor space at the home plant for further military output.

dustry mobilization problems, such as equipment, services and utilities, facilities and manpower.

► **Assignment**—APRA operates under a charter issued Mar. 5 establishing it as an agency of the military departments under policy direction and guidance of the Munitions Board. It is assigned to perform for the Munitions Board and the military departments detailed work under policies and programs established by the Munitions Board on resource requirements and allocations production scheduling and expedition, and conservation measures in support of the combined aircraft production schedules and associated programs.

More specifically its assignment calls for it to:

- Consolidate requirements for produc-

tion resources to facilitate operations.

- Reallocate production resources to individual contractors, within allocations made for the aircraft program; control inventories of production resources and direct redistribution as required.

- Screen and process contractor requests for plant maintenance, repair and operating supplies.

- Recommend measures for improving and accelerating production of aircraft and related procurement.

- Prepare production schedules for selected critical components, ground, deck and airborne equipment in support of approved schedules for aircraft and related procurement.

- Perform expediting functions necessary to solve critical shortages.

- Undertake conservation programs.

- Perform other actions as directed.

Salaries Listed of Aviation Executives

Top salaries paid by aviation manufacturing firms during 1950 are listed in a partial survey by AVIATION WEEK.

Details (with 1949 income in parenthesis) are:

► **Lockheed Aircraft Corp.** Robert E. Gross, president, \$94,815, plus pension payment of \$17,321 (\$75,200, plus pension payment of \$11,819); C. A. Barker, Jr., vice president, \$70,762, plus pension payment of \$15,635 (\$60,350, plus pension payment of \$12,292); Cyril Chappellet, vice president, \$52,706, plus pension payment of \$5085 (\$45,300, plus pension payment of \$4050); Courtlandt S. Gross, vice president, \$70,376, plus pension payment of \$7252 (\$60,350, plus pension payment of \$5773); Hall S. Hibbard, vice president, \$52,356, plus pension payment of \$5695 (\$45,000, plus pension payment of \$4508); Carl B. Squier, vice president, \$52,356 plus pension payment of \$12,243 (\$45,000, plus pension payment of \$9683).

Total for all officers and directors, \$529,649, plus pension fund payments of \$74,517 (\$476,944, plus pension funds payments of \$62,702).

► **Boeing Airplane Co.** William M. Allen, president, \$60,000 plus incentive payment of \$4186 cash and \$3114 stock (\$60,050, plus incentive payment of \$1429 cash and \$1071 stock); Wellwood Beall, vice president, \$38,335, plus incentive payment of \$2114 cash and \$1586 stock (\$35,025, plus incentive payment of \$1284 cash and \$966 stock); Fred P. Laudan, vice president, \$29,335, plus incentive payment of \$2114 cash and \$1586 stock (\$28,035, plus incentive payment of \$1284 cash and \$966 stock); J. E. Schaffer, vice president, \$29,335, plus incentive payment of \$1778 cash and \$1322 stock (\$28,005, plus incentive payment of \$937 cash and \$693 stock); Edward Wells, vice president, \$31,000, plus incentive payment of \$2114 cash and \$937 stock (\$28,020, plus incentive payment of \$1586 cash and \$693 stock).

All officers and directors, \$325,085, plus incentive payments of \$18,721 cash and \$13,894 stock (\$274,135, plus incentive payments of \$8204 cash and \$6111 stock).

► **Sperry Corp.** Thomas Morgan, president, \$126,965, plus \$15,375 under salary adjustment plan (\$126,890); Thomas B. Doe, director, \$51,685, plus \$6150 salary adjustment and \$3934 pension payment (\$54,225, plus \$4550 pension payment); John Sanderson, vice president, \$76,800, plus \$9225 salary adjustment, and \$20,054 pension payment (\$77,040, plus \$19,256 pension payment); Harry Vickers, vice president, \$86,380, plus \$10,450 salary adjustment and \$15,760 pension payment (\$85,353, plus \$15,094 pension payment).

All officers and directors, \$544,973, plus \$57,434 in salary adjustments and \$69,938 in pension fund payments (\$547,219, plus \$7037 salary adjustments and \$68,982 in pension funds payments).

► **General Electric Co.** Charles E. Wilson, president to Dec. 15, \$125,000, plus \$76,016 bonus and 1621 shares of stock valued at \$48 a share (\$125,000, plus \$76,000 bonus, plus 2000 shares of stock valued at \$38 a share); Philip D. Reed, chairman of the board, \$80,000, plus \$49,984 bonus and 1067 shares of stock (\$80,000, plus \$49,992 bonus and 1316 shares of stock); Ralph J. Cordiner, executive vice president, \$80,496, plus \$42,484 bonus and 907 shares of stock (\$71,250, plus \$36,014 bonus and 947 shares of stock).

All officers and directors, \$1,354,789, plus bonus payments of \$568,603 and 12,127 shares of stock (\$1,284,725, plus bonus payments of \$538,802 and 14,175 shares of stock).

► **Reynolds Metals Co.** R. S. Reynolds, chairman of the board, \$102,544, plus \$85,000 bonus (\$100,000); R. S. Reynolds, Jr., president, \$58,563, plus \$35,000 bonus and \$6154 pension payment (\$57,799, plus \$25,000 bonus and \$4089 pension payment); M. M. Caskie, executive vice president,

\$50,579, plus \$35,000 bonus and \$18,243 pension payment (\$50,259, plus \$35,000 bonus and \$12,316 pension payment); J. Louis Reynolds, vice president, \$46,167, plus \$38,208 bonus and \$5741 pension payment (\$40,380, plus \$20,000 bonus and \$3128 pension payment); I. P. Macauley, vice president, \$28,930, plus \$18,750 bonus and \$8435 pension payment (\$25,260, plus \$12,500 bonus and \$5654 pension payment); Basil Horsfield, vice president, \$25,280, plus \$25,000 bonus and \$6148 pension payment (\$25,280, plus \$10,000 bonus and \$3970 pension payment); W. G. Reynolds, vice president, \$40,380, plus \$30,000 bonus and \$3875 pension payment (\$40,400, plus \$20,000 bonus and \$2571 pension payment); Walter L. Rice, vice president, \$36,453, plus \$25,000 bonus and \$4541 pension payment (\$30,640, plus \$15,000 bonus and \$1458 pension payment); D. P. Reynolds, vice president, \$40,340, plus \$30,000 bonus and \$3650 pension payment (\$40,220, plus \$20,000 bonus and \$2424 pension payment); C. F. Manning, vice president, \$31,493, plus \$16,500 bonus and \$6404 pension payment (\$22,200, plus \$10,000 bonus and \$3490 pension payment); Keen Johnson, vice president, \$19,473, plus \$12,500 bonus and \$4362 pension payment.

All officers and directors, \$653,261, plus \$425,708 bonus and \$92,002 pension fund payments (\$647,898, plus \$205,000 bonus and \$51,411 pension fund payments).

► **Square D Co.** F. W. Magin, president, \$55,000, plus \$72,147 bonus and \$21,956 pension payment (\$55,000, plus \$72,147 bonus and \$20,336 pension payment); Lauron Mercer, vice president, \$20,000, plus \$20,645 bonus and \$7065 pension payment (\$20,000, plus \$20,645 bonus and \$6624 pension payment); Henry Morgan, vice president, \$20,000, plus \$21,590 bonus and \$8522 pension payment (\$20,000, plus \$21,590 bonus and \$7690 pension); Joseph Pengilly, vice president, \$20,000, plus \$11,000 bonus and \$9137 pension payment (\$20,000, plus \$11,000 bonus and \$7868 pension payment); Victor Carbonara, vice president, \$19,999, plus \$20,000 bonus and \$5539 pension payment (\$19,999, plus \$20,000 bonus and \$5245 pension payment); Allan Emil, vice president, \$26,250 (\$11,250); F. H. Roby, general sales manager, \$14,115, plus \$9030 bonus and \$1491 pension payment.

All officers and directors, \$209,515, plus \$169,661 in bonus payments and \$60,408 in pension fund payments (\$208,951, plus \$165,850 in bonus and \$53,182 in pension fund payments).

6 Pacific Planes Sent Back by MATS

Higher utilization of both Military Air Transport Service and other aircraft on the Pacific airlift has enabled MATS to phase out six of the sixty-six U. S. airline planes contracted.

Northwest Airlines has all three of its planes back in commercial service, and Pan American, United and American have taken back one each. California Eastern has replaced a TWA DC-4 on the lift.

In nine months' operation, the Pacific airlift has flown more than 22,000 tons of high-priority payload—73,000 passengers, 11,000 tons cargo and 2000 tons mail across the Pacific.

Peak month to date was September, when more than 13,000 passengers and 1784 tons of cargo and mail made the crossing.

Over 2100 battle casualties and patients have come home from Japan via MATS air evacuation planes. Biggest "air-evac" month to date was December, when 6300 patients came from Japan to

the U. S. Some evacuees travel from Japan to Texas in 28 hours, with one stop at Hickam Field, Honolulu.

National Air Races Planned for 1951

The National Air Races, the nation's annual aviation classic, will be resumed this year but in a new midwestern location, AVIATION WEEK has learned.

The races were canceled last year after an economy edict by former Defense Secretary Louis Johnson forbade military participation.

Air Force and Navy, in a coordinated decision, have agreed to take part providing there is "not an unprecedented worsening of the international situation," a Defense Dept. spokesman said. Papers for Secretary Marshall's actual authorization of military participation were being prepared.

Decision where this year's races will be held has not yet been made by National Air Race headquarters, but Chicago and Detroit already have put in their bids. The races probably will be held over the Labor Day weekend as in the past.

Ben Franklin, National Air Races general manager, said that the races this year would feature six separate jet aircraft events and that three of these would be sponsored by Bendix, Thompson Products, and Allison division of General Motors.

There will be aerial demonstrations by USAF, Navy and Marine fighter squadrons and flybys of virtually every production aircraft in the U. S. air power arsenal, the Defense Dept. spokesman said, in addition to static displays of all three of the military services.

Franklin said every effort was being made to draw the Continental 190-cu. in. race event back as part of the annual air classic. The Continental feature was staged by the Aero Club of Detroit last year.

The Continental small plane race, if it is flown, will be the only pylon measured race event of the show, Franklin asserted.

Drastically revised safety standards, worked out by the National Aeronautics contest board last year, will govern this year's races.

Bargaining Handbook

A collective bargaining handbook for the aircraft industry is being compiled by the Bureau of Labor Statistics. It will highlight the prevailing practices in aircraft on various bargaining issues for use by unions and companies as guides in contract negotiations. This will be one of the first in a series covering several major industries.

Experimental CF-100 Crashes on Test Hop

A. V. Roe Canada Ltd.'s two-place CF-100 Canuck twin-jet fighter that recently crashed on an endurance flight near Komoka, Ont., killing RCAF flight-lieutenant Bruce Warren and engineer Robert Ostrander, was the second experimental model powered by Rolls-Royce Avons.

Canadian reports say that the plane suddenly nose-dived from level flight, into the ground at about a 20-deg. angle, the explosion digging a crater approximating the size of a house, scattering debris over a wide area and sending up a mushroom pattern of smoke that hung over the scene for about 15 minutes.

Cause of the crash was not announced, but since this was the fifth crash in eastern Canada recently, an investigation for possible sabotage is under way.

A third model of the CF-100—the first powered by Orenda jets, designed and built by Avro Canada—has already moved from the production line to flight line status.

► **Avon to Orenda**—Originally, it was planned to power more than the first two Canucks with Rolls-Royce Avons, but this arrangement is now altered. All of these fighters coming off the line, beginning with the third model, will carry the company's Orendas. About 25 of these jet engines are on hand now.

This switch in powerplants indicates that the Orenda will give as much—perhaps a little more—thrust than the Avon in this particular CF-100 installation, for it isn't likely that Avro would step down the power in the engine changeover. Static sea level thrust for the Orenda has been reported at 7000 lb.-plus.

Cost of Canada's three-year production program is reported at more than \$1½ billion.

In 1953, production of the CF-100s is expected to hit a rate of 50 monthly, and a stockpile of about 500 of these fighters should be on hand sometime during that year.

Certain AF Units To Leave Capital

Administration's plan for permanent decentralization of the federal government calls for removal of these Air Force units from Washington:

Office of the Deputy Chief of Staff, Comptroller, 187 employees, to Denver.

Office of Deputy Chief of Staff, Materiel: 150 employees of the Office of Director of Installations, to Baltimore.

Research and Development Command: 452 employees, to Dayton.



NEW BUAER CHIEF

Rear Adm. Thomas S. Combs, 52, has been ordered to duty as chief of Navy's Bureau of Aeronautics. He takes up his post on May 1. Combs, formerly chief of staff and aide to the commander in chief of the Atlantic Fleet since April 1950, succeeds Rear Adm. Alfred M. Pride, who has been assigned to sea duty. Combs has been a naval aviator since 1922, and during World War II was at one time in charge of all naval planes in the Southwest Pacific.

Annual Airlines 'Trouble Clinic'

The airlines' annual "trouble clinic," —Air Transport Assn.'s Engineering and Maintenance Conference—gets under way tomorrow at the Drake Hotel in Chicago.

For three days airline engineering and maintenance specialists will fire hundreds of questions at representatives of makers of the airframes, engines, propellers and equipment they fly. If past conferences are a criterion, the sessions will be lively.

All currently flying U. S.-built transports will be gone over with a fine-tooth comb. And so will their powerplants, electrical, hydraulic and pressurization systems and the accessories that make them run. Pneumatics will appear on the agenda for the first time.

Under the chairmanship of S. R. Shatto, vice-president, operations of Western Air Lines, the meeting is expected to have the largest attendance ever, according to M. B. Spaulding, Jr., of ATA. Not only will all member carriers have representatives present, but so will all important airframe, engine, propeller and equipment manufacturers, petroleum companies, the military, government agencies such as CAA and CAB, and foreign carriers.

The agenda has at least one notable improvement. Under each of the main topics of discussion, all questions relat-

ing to a particular type of plane have been grouped together so that each aircraft will be discussed completely before passing on to the next.

Subjects to be discussed and the chairmen of the respective conferences:

- **Tuesday**—Heating, Ventilating and Pressurization, chairman, David North, AAL. Hydraulic and Vacuum Systems, chairman, R. R. Stark, EAL. Ground Servicing & Shop Equipment Maintenance, chairman, R. K. Horton, TWA.
- **Wednesday**—Engines, chairman, F. G. Bennett, PAA. Electrical Systems, chairman, W. C. Mentzer, UAL. Structures and Controls, chairman, J. B. Franklin, CAP.
- **Thursday**—Ignition, chairman, J. T. Dyment, TCA. Instruments, chairman, J. D. Crane, NAL. Fuel and Oil Systems, chairman, E. Cheyno, AAA.

Helicopter Meeting To Hear Kimball

What promises to be the most complete showing of operational helicopters will feature the seventh annual forum of the American Helicopter Society, Apr. 26-29, in Washington, D. C.

Twenty military helicopters belonging to the Army, Navy and Air Force will demonstrate capabilities of rotary-winged aircraft Saturday and Sunday at a Anacostia Naval Air Station open house. These copters and other company aircraft will also be the main attraction at a static display at Hains Point Saturday and Sunday.

Society President Frank N. Piasecki, in formalizing the schedule of events during the four-day forum, declared that this year's turn-out promises to be the biggest in the history of the society.

Bertram Kelly, of Bell Aircraft, forum chairman, has arranged five discussion sessions for Apr. 26, and a symposium for Apr. 27. Lee Douglas, Piasecki Vice-President of Engineering and E. F. Katzenberger, Chief Design Engineer, Sikorsky Aircraft will share chairmanship of the first day sessions. Discussions the first day will cover theory, design, development and testing.

Herbert Toomey, chief CAA Aircraft division will act as moderator for a technical symposium Friday morning concerning commercial operations. Capt. Robert Strieby, USMC, will be moderator of the morning's symposium devoted to military operators. Helicopter economics will be featured during the afternoons discussions and will be conducted by E. E. Gustafson of Bell Aircraft.

Honors night banquet will feature Navy Undersecretary Dan Kimball as principal speaker and music will be furnished by the Air Force band. Three awards for outstanding service in the helicopter field will be presented during the banquet.



Boeing Delivers TB-50D Trainer

Modified production B-50D is flying classroom for navigator, bombardier, radar operator training.

Boeing Airplane Co. has delivered the first of several TB-50D navigator-bombardier trainers to the Air Force at Mather AFB, Calif.

The plane is not a new production model but is instead an extensively modified version of the current production B-50D four-engined Superfortress. As production of the all-jet B-47 is stepped up at Boeing-Wichita, Lockheed-Marietta, and Douglas-Tulsa, the B-50 bomber series will be phased out of production. Final production B-50 planes will come off the line as TB-50D types.

The trainer version will furnish the Air Force with a flying school room capable of training two student navigators and one instructor and two student radar operators and one instructor per plane in addition to the normal flight crew.

► **Modification**—In modifying the 400-mph. B-50 for its classroom role, the rear bomb bay is sealed and used for installation of a large portion of the electronic equipment used in training. The rear compartment, formerly the central fire control station for the Superfort's gun turrets, now contains installations for one instructor and the two student radar system operator. The forward section of the bomber is used by the B-50D flight crew and in addition provides quarters for the two student navigators and their instructor.

The trainee stations each contain a complete set of equipment including a radar scope, controls, switches and pertinent instruments. The trainee, when graduated, should be proficient in three specialties—navigator, bombardier and radar operator.

Air Force currently provides train-

ing in navigation at Ellington AFB, Tex. This school is considered the basic school in the new "triple-threat" aircrewman program. At Mather AFB, the students complete the radar bombardier training school, then go to an operational combat unit.

► **Refreshers**—At Ellington, also, World War II navigators get a refresher course, combined with the latest techniques of bombardier training, during a 14 week period. The trainees then go to Mather to be indoctrinated into the radar technique for another 14 weeks. At the end of that time the trainee graduates as an Air Force "1037" crewman—USAF parlance for the navigator-bombardier-radar operator.

The new "1037" designation will be given those who are able to develop proficiency in the three separate skills, thereby making them valuable assets to the Air Force, since they will be able to operate as specialists on any one of the positions or, in an emergency, fill in where needed most.

The World War II bombardier takes a more extensive course. In addition to a brush-up bombardier technique he follows a 30-week navigator course, then is sent to Mather for an additional 11 weeks in radar operation.

A special course is given to a few selected pilots. This group studies the techniques of navigation and bombardment for 33 weeks at Ellington, then goes to Mather for an additional 16-week course in radar operation.

Other medium speed, medium altitude aircraft such as the TC-47, TB-25, an T-29 are used in the primary training stages. The TB-50D program completes the training for the future crewman of the three-place medium Bomber B-47.

More USAF Clinics For Subcontractors

Dayton—Success of the first Air Force clinic to bring subcontractors and prime contractors together for a wider distribution of subcontracts for components of USAF equipment, held recently in New York (AVIATION WEEK Mar. 5, p. 13), has led to plans for five additional clinics to recruit more subcontractors in other parts of the nation.

Two of these, disclosed last week by Air Materiel Command's procurement division, have already been definitely planned:

• **Chicago.** Mid-Central Air Procurement District will conduct a clinic for subcontractors at Navy Pier, Chicago, from Apr. 30 through May 9, from 9 am. to 5 pm. daily.

• **Boston.** Northeastern Air Procurement District will hold a similar clinic in Boston Armory, from May 15 through May 19.

Still in the formative stage are plans for three additional clinics, one to be conducted by the Central Air Procurement District at Detroit some time in June, at a location to be announced later, and a unified three-service clinic for subcontractors to be held in Los Angeles under sponsorship of the Western Air Procurement district, dates and location still to be announced. A clinic is also scheduled to be held at Ft. Worth, Tex.

► **N. Y. Formula**—Formula for each clinic will be basically that used in New York. Principal manufacturers who hold prime Air Force contracts are being invited to show samples of components which they wish to "farm out" to subcontractors at a central show room. There potential subcontractors are invited to meet with the prime contractors' representatives, discuss the components, select the products they can make, and in many cases complete terms for going to work.

Much larger responses are expected from prime contractors at the later shows, as an advance registration of over 80 prime contractor exhibitors for the Chicago show already indicates. There were 27 exhibitors at the New York show.

Reports from prime contractors to the Eastern District indicate that 25 subcontracts with a face value of \$486,000 were let during the show. An additional 38 subcontracts resulting from the show are now in negotiation between primes and subcontractors with a total dollar value of \$4.3 million.

Air Materiel Command is interested in the clinic results especially from a small business standpoint, since it brings out small manufacturers who may not otherwise be placed in contact with the prime contractors.



"BUCK PRIVATE," American Helicopter Co.'s one-place pulsejet copter, and . . .



"HELI-JEEP" of Rotor-Craft Corp. shows the variety of West Coast helicopter designs.

Two New Copters Offered Military

Two more West Coast hopeful helicopter manufacturers have announced their plans for small rotary-wing craft, hard on the heels of Hiller's Hornet and McCulloch's MC-4 (AVIATION WEEK Feb. 19, p. 25; Mar. 26, p. 18).

They are American Helicopter Co., Manhattan Beach, Calif., and Rotor-Craft Corp., Glendale. They are both boosting their craft for military use and holding back most of the details, but there the similarity ends. American Helicopter's product is a single-place pulsejet copter that is flying; Rotor-Craft's is a design proposal for a tandem-rotor personnel transport and evacuation copter.

American Helicopter's XA-6 "Buck Private" is the second pulsejet copter built by the firm. The first, the XA-5 "Top Sergeant," is a two-place craft that first flew in January, 1949. The XA-6 has an empty weight of about 200 lb., and is about as simple as you

can get a helicopter, merely a single formed aluminum tube with a seat and small tricycle landing gear. It has an endurance of about one and one-half hours without refueling.

Rotor-Craft Corp.'s "Heli-Jeep" is planned to be about 25 ft. long, with doors about seven ft. wide to accommodate stretchers. Powerplant is to be a single 276-hp. engine horizontally mounted with transmission shafts running under the floor. The craft is designed for a speed of approximately 100 mph., maximum range of 200-300 miles, and useful load of 1200 lb.

Other manufacturers are expected to join the competition to supply the Armed Forces with rotary-winged craft. Since use of the craft is becoming more widespread on the heels of its success in Korean operations, defense officials will probably call for a larger role for the helicopter in their future mobilization plans.

SIDELIGHTS

(Continued from page 8)

tion officer at AMC, is going with Hughes Aircraft as personnel & public relations director at the new Hughes missile plant in Arizona. . . . Marty LeBoeuf, son of the late George LeBoeuf, has succeeded his father as Dayton representative for Fairchild Engine & Airplane Corp.

MATS

Military Air Transport Service at Andrews AFB, Washington, D. C., says the world-wide service needs civilian engineers—civil, construction, general, mechanical, structural, heating, air conditioning, ventilating, refrigeration and sanitary. Starting salaries are \$5400 to \$6400.

Army

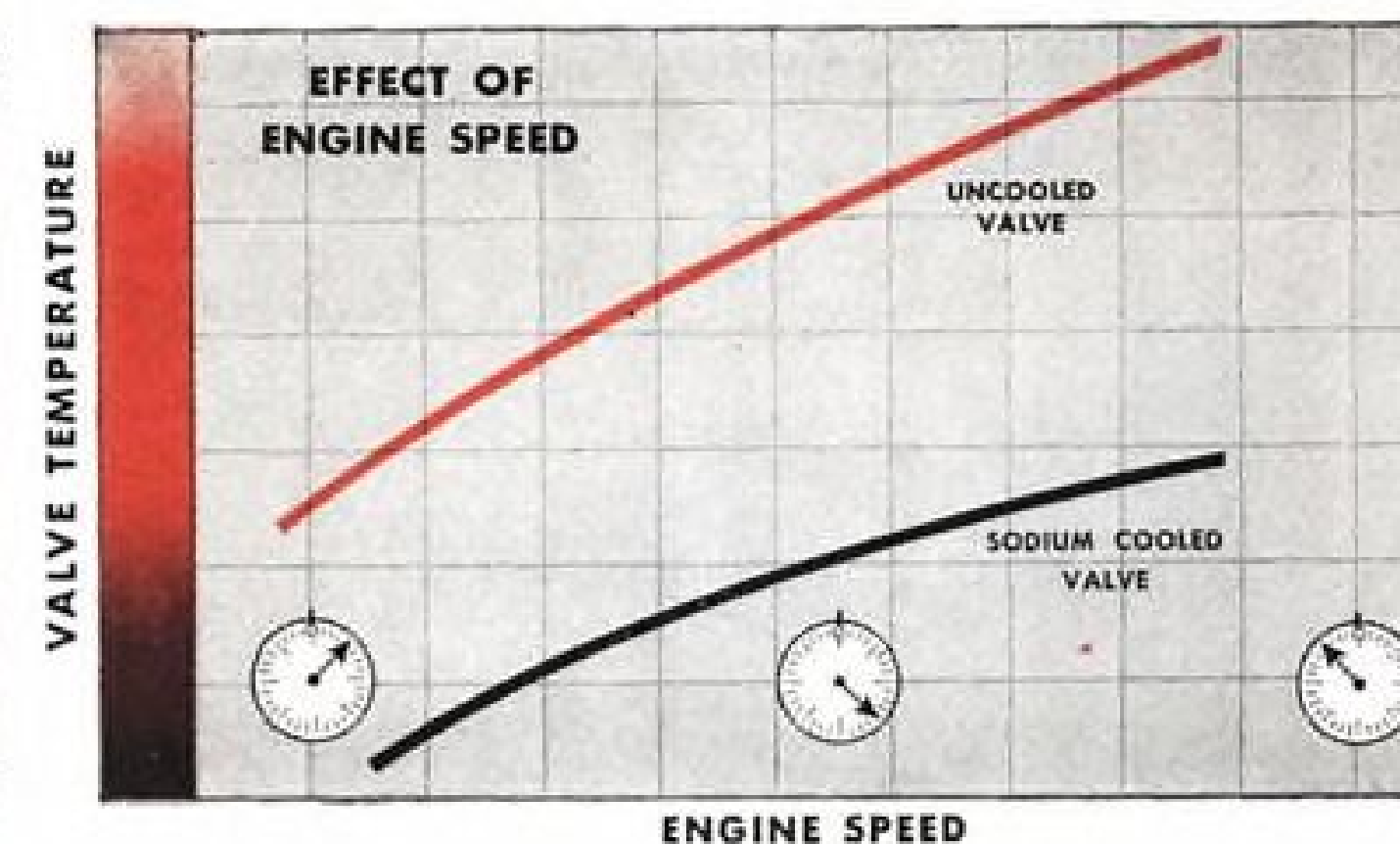
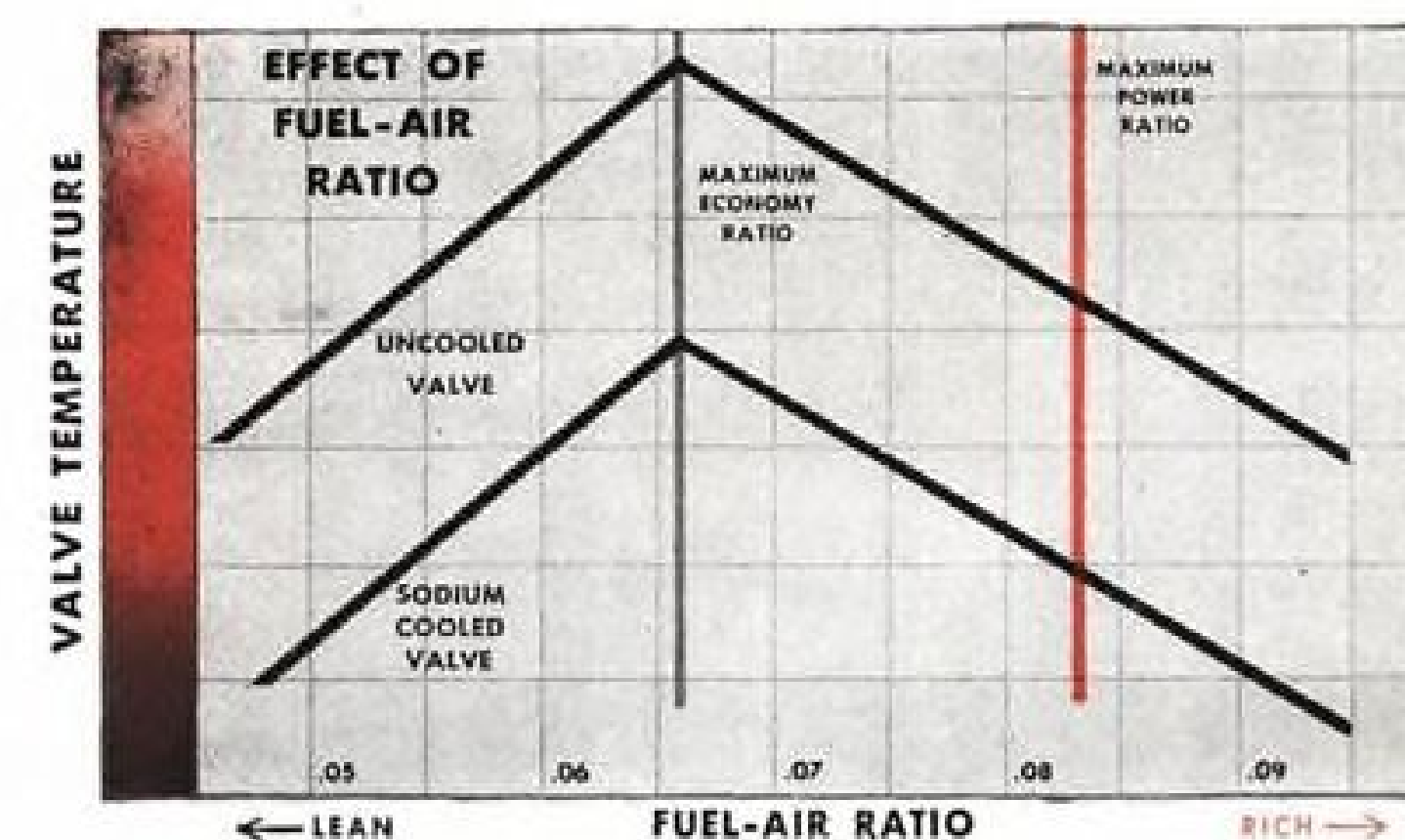
Two of four of the Canadian L-20 Beaver light transports recently purchased are in test at Ft. Bragg's Airborne Center. All four, plus additional L-20s to be bought, will be used for light cargo transport. . . . Negotiations between Army, USAF and Beech Aircraft Corp. for purchase of four Twin Bonanzas are under way. Purchase will be made out of the third supplemental funds. . . . A 2000-ft. flight strip at Ft. Monroe, Va., Army Field Forces HQ, is nearing completion.

Air Force

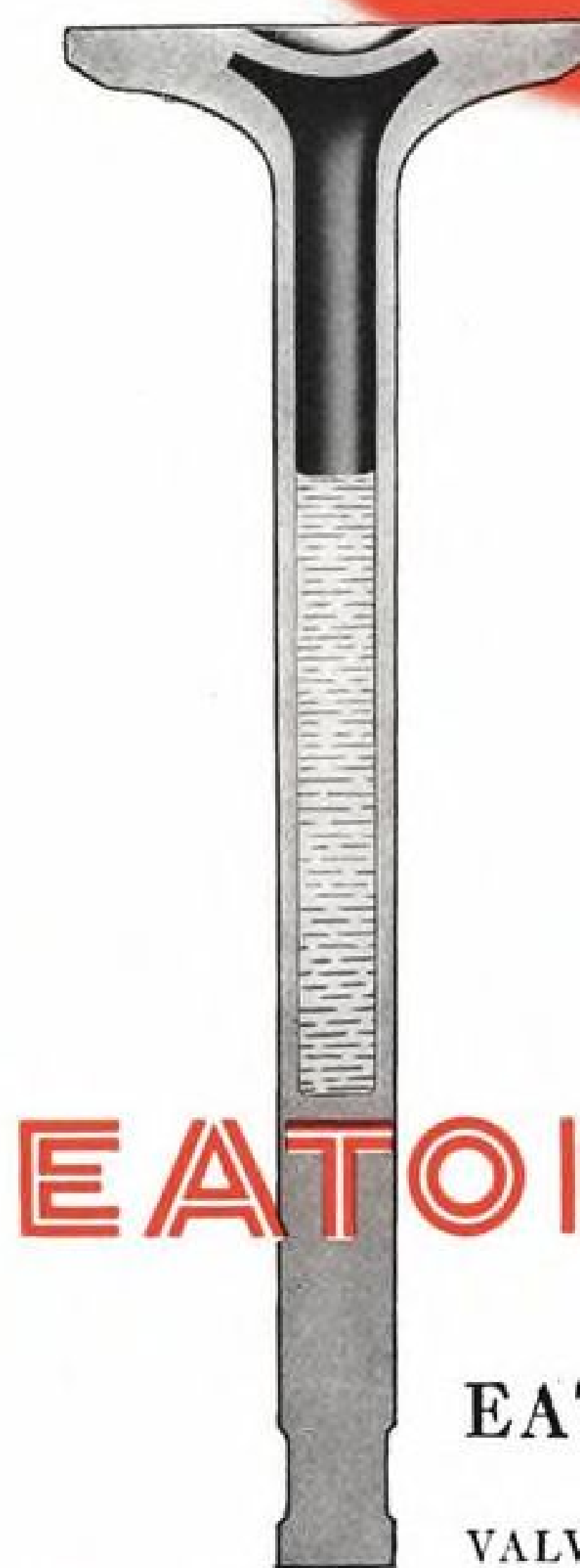
USAF is constructing a complete "command post" in the Pentagon. Already in partial operation, it will be nerve center of all USAF operations. . . . AF has canceled city of Bangor, Me., entry rights to Dow AFB because of increased military activity, but use by scheduled airlines will continue for the time being. . . . Air Force now has an official flag. It carries the AF seal on a dark blue background, with a thunderbolt and shafts of lightning, a shield and a circle of 13 stars. . . . Greenville AFB, S. C., is renamed Donaldson AFB for Capt. John O. Donaldson, of World War II.

Industry

Convair wants to call its new California plant the "Avionics Division" but Navy may not OK this new word, coined by AVIATION WEEK. . . . Aircraft Industries Assn. reports expenditures in connection with legislative activities of \$26,477 for 1950 in its report to the Clerk of the House under the Lobbying Act. . . . Pratt & Whitney is following the same policy of licensing agreements with auto manufacturers as during World War II: no royalty or payments other than reimbursement for expenses. . . . Boeing is still feeling repercussions of its 1948 strike. Latest is a hearing by NLRB, scheduled for May 1, on a complaint the company illegally refused to rehire some of the strikers, and later discharged some employees for union activity. . . . Republic Aviation, tooling up for the F-84F, still has sizable orders on the E model, so that for a time both models will be in production at once by the organization.



The Effectiveness of Sodium Cooling



In considering factors which influence exhaust valve life, temperature is the dominant one. High temperatures sharply reduce the resistance to corrosion, distortion, and fatigue life of the finest alloy steel. The effectiveness of sodium cooling in reducing valve temperatures is shown by the curves above, typical of recorded test data.

The curve "Effect of Fuel-Air Ratio" shows that as the mixture is leaned out to obtain maximum economy, valve temperatures rise. The curve showing "Effect of Engine Speed" indicates that temperature rises rapidly as speed increases.

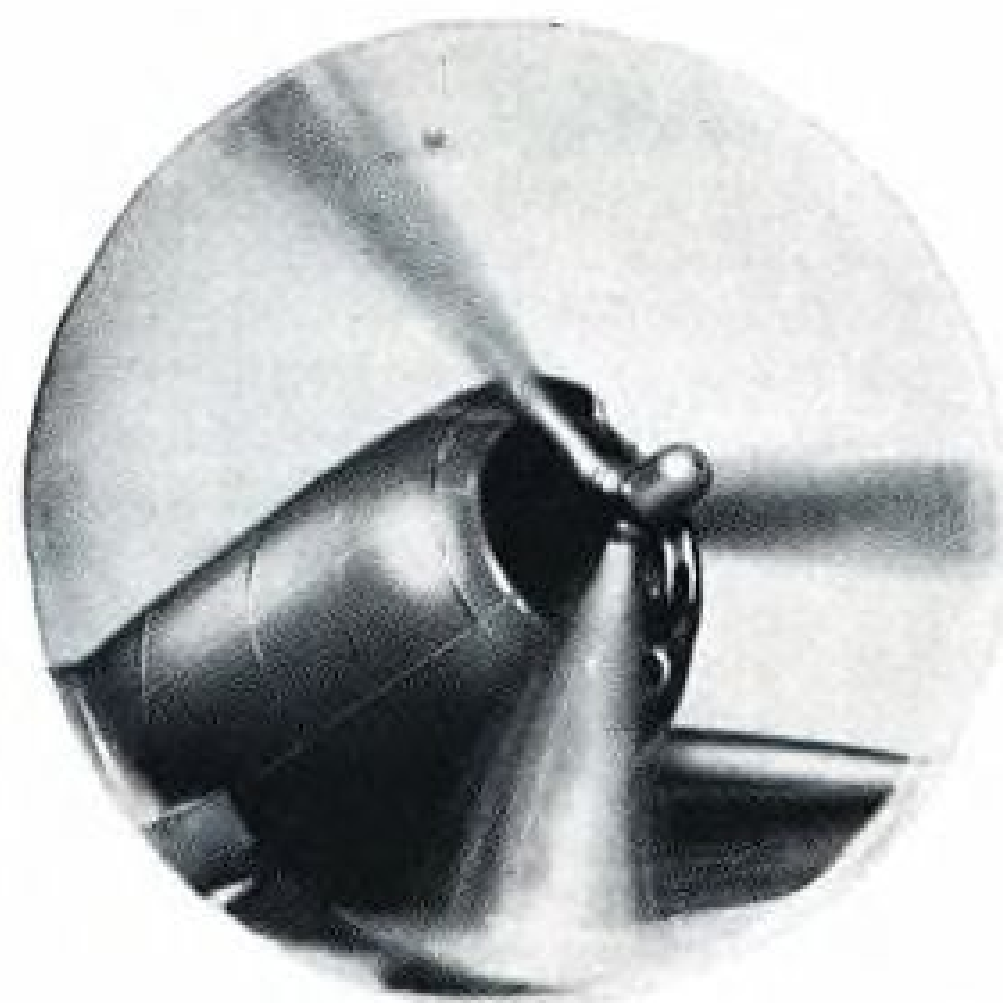
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and Air Force Engineers throughout the country consult with PAC engineers and craftsmen to study these methods. Incidentally, Pacific Airmotive is the only privately owned concern in the country authorized to overhaul these 4360 engines. The CAA has also approved the 25% saving of test-run time, as pioneered by PAC engineers.

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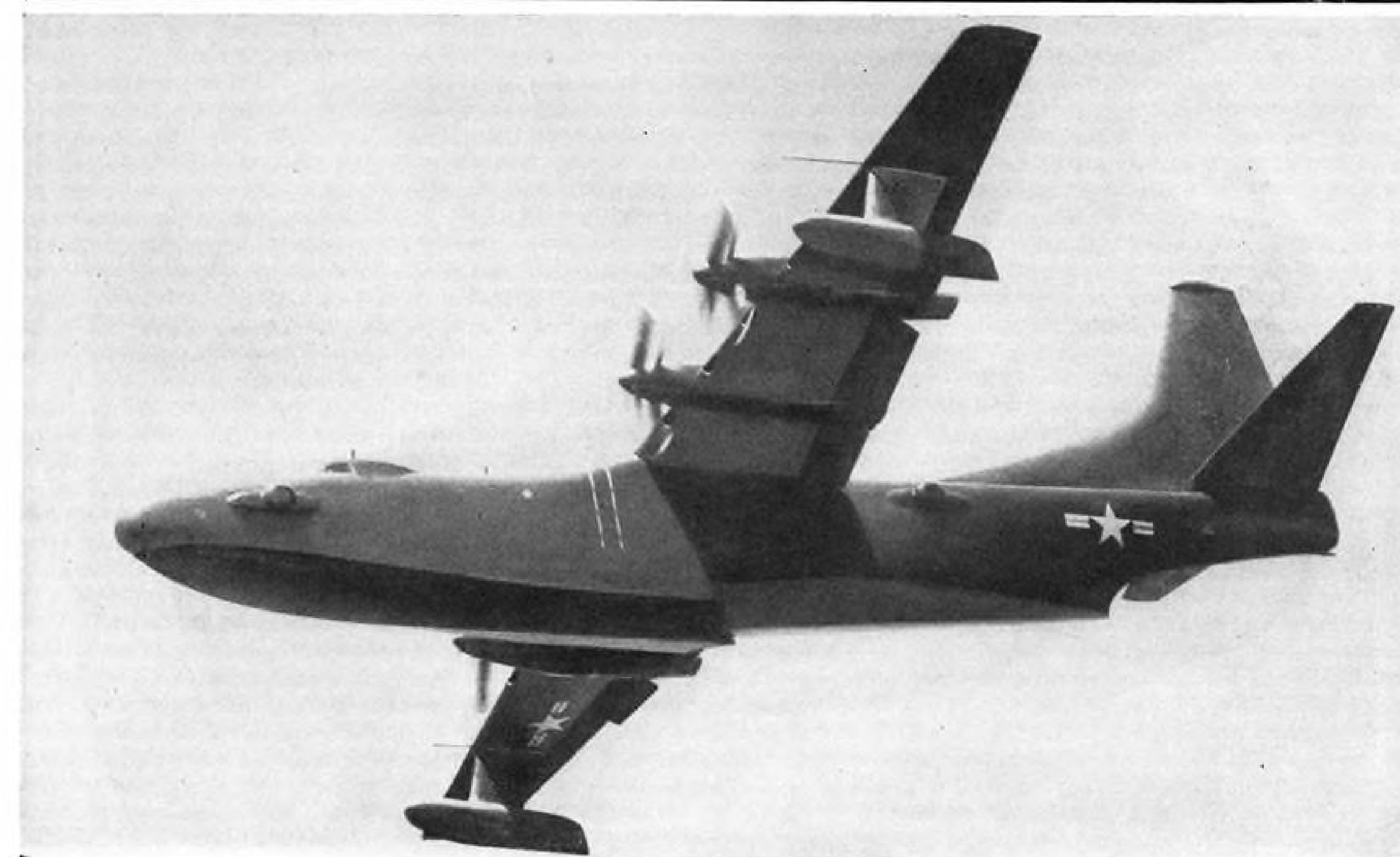
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AERONAUTICAL ENGINEERING



XP5Y-1 turboprop flying boat.

Convair's Turboprop Flight Experience

Operations with Allison 501 engines in XP5Y-1 and Turboliner summarized for benefit of other users.

Flight experience with turboprop-powered aircraft in the United States has been rather limited. And yet, in spite of the lack of operational time, there has been no lack of technical papers which purport to present operational and flight characteristics of turboprop powerplants.

It comes as refreshing as a breeze on a hot day to find a technical discussion which is based on honest accumulated flight time; which says what is wrong as well as what is right; which tells the "trade secrets" of the tricky operations with turboprops. And last week, the audience at one of the SAE's National Aeronautical Meeting sessions heard just such a paper.

Consolidated Vultee Aircraft Corp.'s manager of inspection and flight R. C. Loomis and chief pilot E. D. Shannon

have compiled the results of Convair's experience with the Turboliner and the XP5Y-1.* The excerpts which follow are taken from, or based on, their paper.

► **Common to Both**—The basic power section used on both Turboliner and XP5Y-1 is an Allison Model 501 turbine. This turbine is geared to a single-rotation four-bladed Aeroproducts propeller on the Turboliner through a 12.5:1 gear reduction. Two turbines are united through a single gear box to drive dual-rotation Aeroproducts three-bladed propellers on the XP5Y-1.

The Model 501 power section includes a 17-stage, single-entry compressor, a set of eight combustion chambers of the cylindrical through-flow type, and a four-stage turbine. The turbine drives the compressor by means of a splined coupling shaft. The power sections drive the reduction gear assembly through splined shafts at the face of the compressor rotor assembly. Each power section and reduction gear assembly incorporates an independent dry-sump oil

system. In both the XP5Y-1 and the Turboliner a common oil tank and oil cooler ties the independent oil system into a common unit.

The Aeroproducts propellers are controlled by a constant-speed electronic governing control coordinated with the fuel control through a single power lever. The electronic governing is used only in the flight range and is designed to give 4 deg. per second blade pitch changes for small off-speed signals. Overspeed protection is provided by a hydraulic topping governor which automatically takes over if the electronic governor fails. This governor can change blade pitch angle at a maximum rate of 15 degrees per second. Additional overspeed protection is provided by a droop in the fuel governor which can cut fuel back as much as 50% depending upon the amount of overspeed.

► **Single Control**—A single lever for each power section is installed in the cockpit and operates a coordinating control on the power section. This control in turn operates the fuel control by cam action and the propeller actuator by a variable potentiometer. The propeller actuator

* "Flight Experience With Turbine Propeller Powered Aircraft," R. C. Loomis and E. D. Shannon, prepared for delivery at the SAE National Aeronautical Meeting, Apr. 16-19, 1951, New York City.



Turboliner, Allison's experimental turboprop version of the Convair-Liner.

controls the blade angle in the region below flight governing. In the flight-governing region the actuator signals propeller governing speed through another variable potentiometer. The electronic governor sends signals to a valve in the propeller control which in turn changes blade pitch to maintain constant speed. The constant speed is variable from 12,800 rpm. turbine speed at operational or flight idle, to 14,300 rpm. at full power.

Below operation idle, governing ceases and the propeller blade angle is controlled by the throttle position. At this time speed is controlled by a fuel governor. Since the governing range must not be left while the airplane is in flight, an operational idle stop is provided by the airframe manufacturer. This stop is not to be pulled until the aircraft is on the ground or waterborne and then is pulled manually by the pilot on the XP5Y-1 and electrically by a solenoid on the Turboliner. At ground idle or start the blade angle for minimum torque and approximately zero static thrust is set and turbine speed is approximately 11,500 rpm. As the throttle is pulled back, reverse blade angles are set until maximum reverse thrust becomes available at 0° throttle quadrant setting.

Feathering is provided from any throttle position by driving the propeller actuator electrically. Manual feathering is available in the event of electric failure.

► **Operations**—The operation of a turboprop powerplant is considerably simpler than that of a reciprocating engine. A single power lever combines all the conventional engine controls including throttle, propeller, mixture, supercharger, and carburetor heat. The most important engine instruments required are tachometer, torquemeter, turbine inlet temperature, flowmeter, oil temperature, fuel and oil pressure, and bearing vibration meter. The latter unit has proved to be a valuable indication of incipient power section failure.

In the XP5Y-1 the pilots are provided only with a tachometer and turbine inlet temperature for each engine, but the latter will be replaced with a torquemeter since turbine temperature can be limited by fuel control. The pilot is vitally interested in power output during take-off and the torquemeter is his only means for determining this. Turbine inlet temperature is not a true guide of power.

The flight engineer has a complete set of instruments, but his major concern is to monitor this equipment since adjustments are not normally made in flight. Normal engine run-up check before take-off is non-existent. The flight engineer monitors turbine inlet temperature, turbine speed, and fuel flow during take-off and advises the pilot only if any exceeds its limit.

Engine check-out before releasing the airplane for flight is also quite simple. This routine normally consists of a full-power check of fuel and speed schedules, an overspeed governor check with electronic governing inoperative, an operational idle check of fuel and speed schedules, and a full reverse check. The whole procedure is accomplished in a matter of a few minutes after bringing the oil temperature up to minimum limits.

Experience to date shows that design precautions must be taken with turboprops to keep foreign material and water out of the turbines. Several compressors have been severely damaged by foreign material. The propellers pick up debris from the ramp and throw it into the inlet ducts. When using reverse thrust on landing the XP5Y-1, the propeller tips throw water forward which returns through the hub section and on into the inlet ducts. On occasion this water can quench the turbine flame, resulting in a dead engine. This problem is being solved by adding a plenum chamber to the inlet duct system, designed to prevent both foreign material and water from reaching the power section.

► **Starting Ease**—Starting power is supplied by an AiResearch gas turbine compressor of 35 hp. which is started by an electric motor. Compressed air from the GTC drives an air starter mounted on the reduction gear assemblies. This starter spins the power section to 2500 rpm when ignition occurs. The starter remains engaged until 5500 rpm. is reached at which point the power section is able to accelerate itself to 11,500 rpm. On the Turboliner the propeller turns with the starter, but on the XP5Y-1 the power section only turns and the propeller is engaged later.

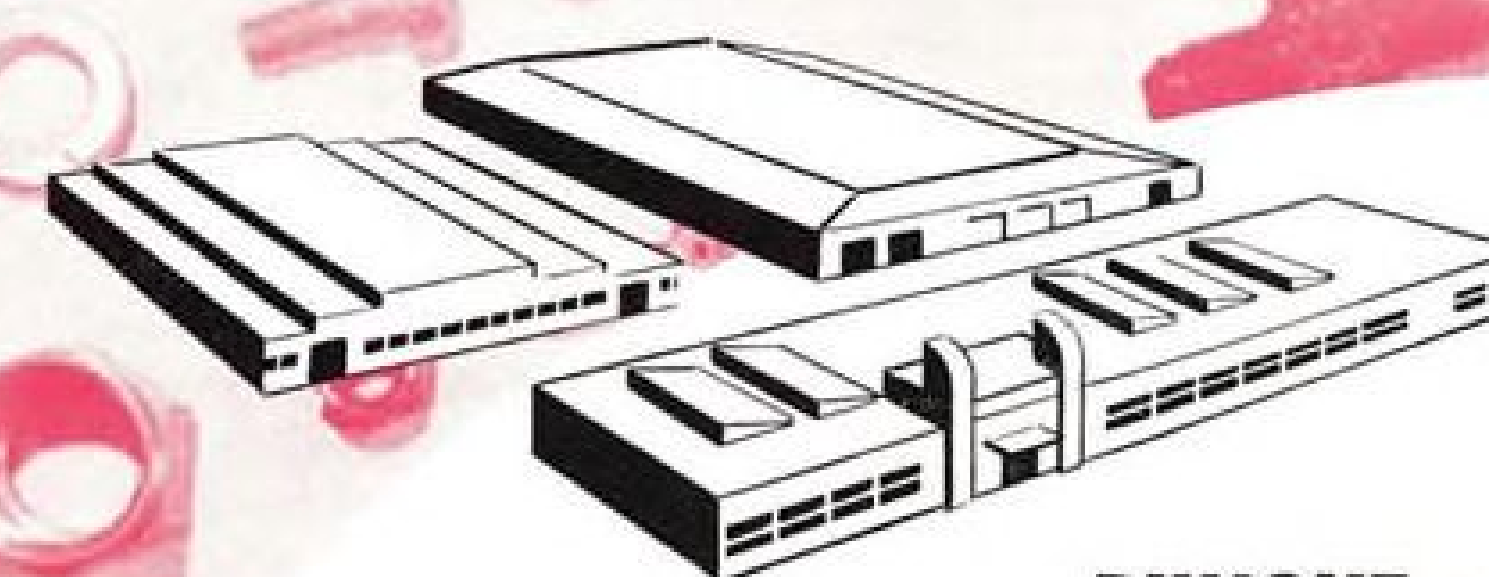
Some difficulty was experienced at first matching the GTC to the air starter, but minor adjustments solved this problem and starts have been regular and orderly. Minor ducting problems were originally encountered on the XP5Y-1 which required two GTCs to be operating to get a clean start, but these problems have now been solved. No experience with cold weather starting can be obtained in San Diego, but it is expected that reciprocating engine practice will be followed to reduce starting torque. It is not expected that cold weather ignition will be a problem. No hot starts have been experienced to date, probably due to the excellent fuel control during starting.

The initial taxi runs and early flights of the turboprop airplanes were plagued with all the usual electro-mechanical faults of a brand-new type of engine.

It was soon found that ordinary Cannon plugs were not suitable for the turboprop since any loose connections immediately resulted in wandering propeller blade angles during taxiing. These prevented the pilot from properly controlling the airplane. After all non-essential Cannon plugs were eliminated in favor of straight-through wiring (unfortunately at the expense of easy maintenance) and essential Cannon plugs were replaced with vibration-resistant equipment, operation became quite reliable.

Early flights soon revealed drifting

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governing speeds, due to temperature and pressure effects on electrical resistance of balanced circuits. This requires very careful balancing of compensating circuits before each takeoff, and readjustment of resistors by the flight engineer during flight. Special rheostats were temporarily installed for the flight engineer, and a redesign of the governing system is now underway to eliminate this condition.

► **Throttle Tracking**—It is extremely important that the propeller actuator track throttle position to an exact schedule within narrow limits. This actuator is operated by an electric motor controlled through variable resistors and a micro-positioner circuit using a polarized relay. This type of circuit introduces electrical hysteresis and step changes in the propeller actuator motion which, added to the mechanical hysteresis of the coordinating control, caused relatively large off-schedule speed signals to be sent to the propeller control. All these conditions are now being corrected by the installation of a propeller actuator mechanically connected to the coordinating control, and by the substitution of fixed resistors for the variable ones. Difficulty has been experienced in setting the hydraulic overspeed governor. The overspeed governor must start to open below 100 percent rpm. in order to restrict turbine speed to less than 105 percent rpm. The result is that the electronic governor is biased at 100 percent rpm and setting take-off governing speed is a delicate operation. No definite solution has yet been found for this problem.

Fortunately, a complete hydraulic failure in the propeller control has not been experienced. This condition will be dangerous because a mechanical low pitch stop is not presently installed in the propeller. Such a mechanical stop is mandatory on turboprop installations because of the high drag of the propeller and windmilling turbine at flat blade angles of the propeller.

In spite of these difficulties, it has been found that the turboprop is an amazingly flexible thrust-producing powerplant. Full positive thrust and full negative thrust are instantaneously available even with rapid motions of the throttle. When the control system is functioning properly, no surging of power or speed is experienced when the throttle is rapidly advanced. Response to the throttle is immediate and smooth when accelerating after a missed approach. This is a pleasant improvement over the reciprocating engine which must be handled rather gingerly when accelerating from a power-off glide.

► **Flight Experience**—Once the electro-mechanical equipment was operating properly, it was apparent that turboprop controls afforded superlative water handling characteristics on the XP5Y-1 dur-



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ing slow speed maneuvering. During all normal taxiing, up to approximately 40-mph. speed, the power plants are operated below operational idle.

The pilot may readily vary the thrust from each of the four nacelles in small increments. This permits the airplane to be stopped dead in the water, backed or turned at will regardless of wind or tide conditions. It is even possible to maintain complete control of the airplane on the water with two nacelles on the same side operating.

Propellers operating at high speed near zero thrust create a startling amount of noise. Maximum noise when doing minimum work is something new and annoyingly different.

A most baffling condition traceable directly to the installation of turbo-props on a multi-engine airplane came to light on initial landings and stall checks of the XP5Y-1. The airplane developed an almost uncontrollable tendency to yaw and roll when the throttles were reduced to operational idle and the speed was reduced. Figure 1 shows the sequence of events during a typical landing. Particularly noteworthy is the amount of left rudder and left aileron required to maintain straight and level flight. This plot shows the difference in propeller speed between the outboard nacelles and the resulting difference in thrust between these nacelles. It is interesting to note that dual-rotation propellers probably create abnormal amounts of lift over the wing section behind a thrust-producing propeller and excessive loss of lift behind a drag-producing propeller. Stall tests at operational idle have shown maximum unstalled lift coefficients far higher than calculated.

► **Asymmetric Thrust**—Figure 2 traces the reason for asymmetric thrust to the fuel schedule required to maintain relatively low turbine speeds at operational idle. The fuel schedule is designed to prevent turbine speed from dropping substantially below 90 percent rated speed. Thus, when the propeller governor signals for any speed other than 90 percent at operational idle, substantial changes in power output occur. The effect of these power changes with turbine speed is translated into terms of thrust in Figure 3. It can be seen that if the throttles are reduced to operational idle at a speed of 140 mph in a normal approach, and one propeller is governing at 13,120 rpm, and the other at 12,600 rpm., there will be asymmetrical thrust of 8000 lb. due to fuel schedule. Turbine speed differences represent only 33 propeller rpm.; the propeller governing problem can be appreciated. The fuel schedule between engines is also subject to tolerances, and when these tolerances are added to the effect of turbine off-speed, the condition shown

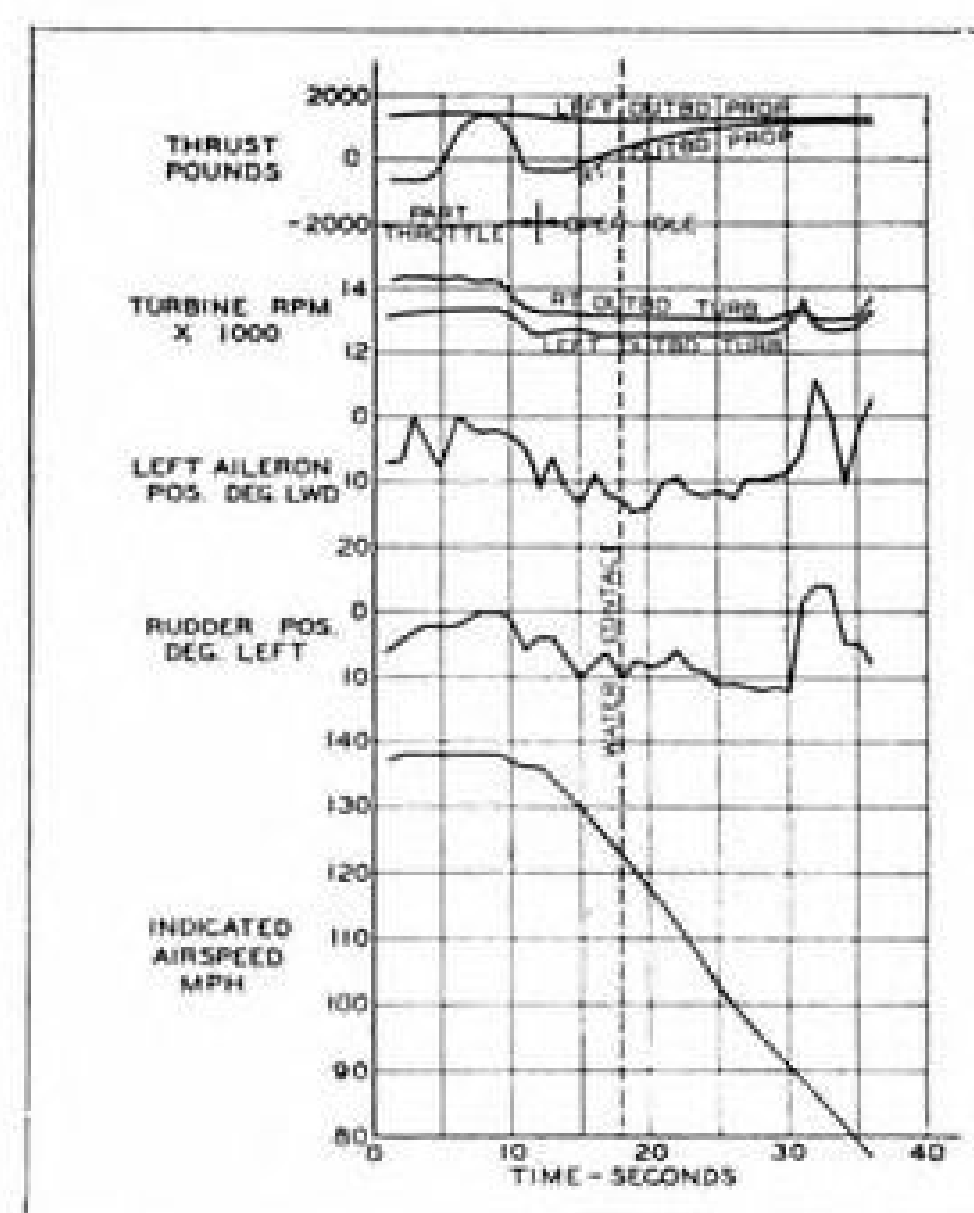


FIGURE 1: Landing history for XP5Y-1 shows high degree of roll and yaw.

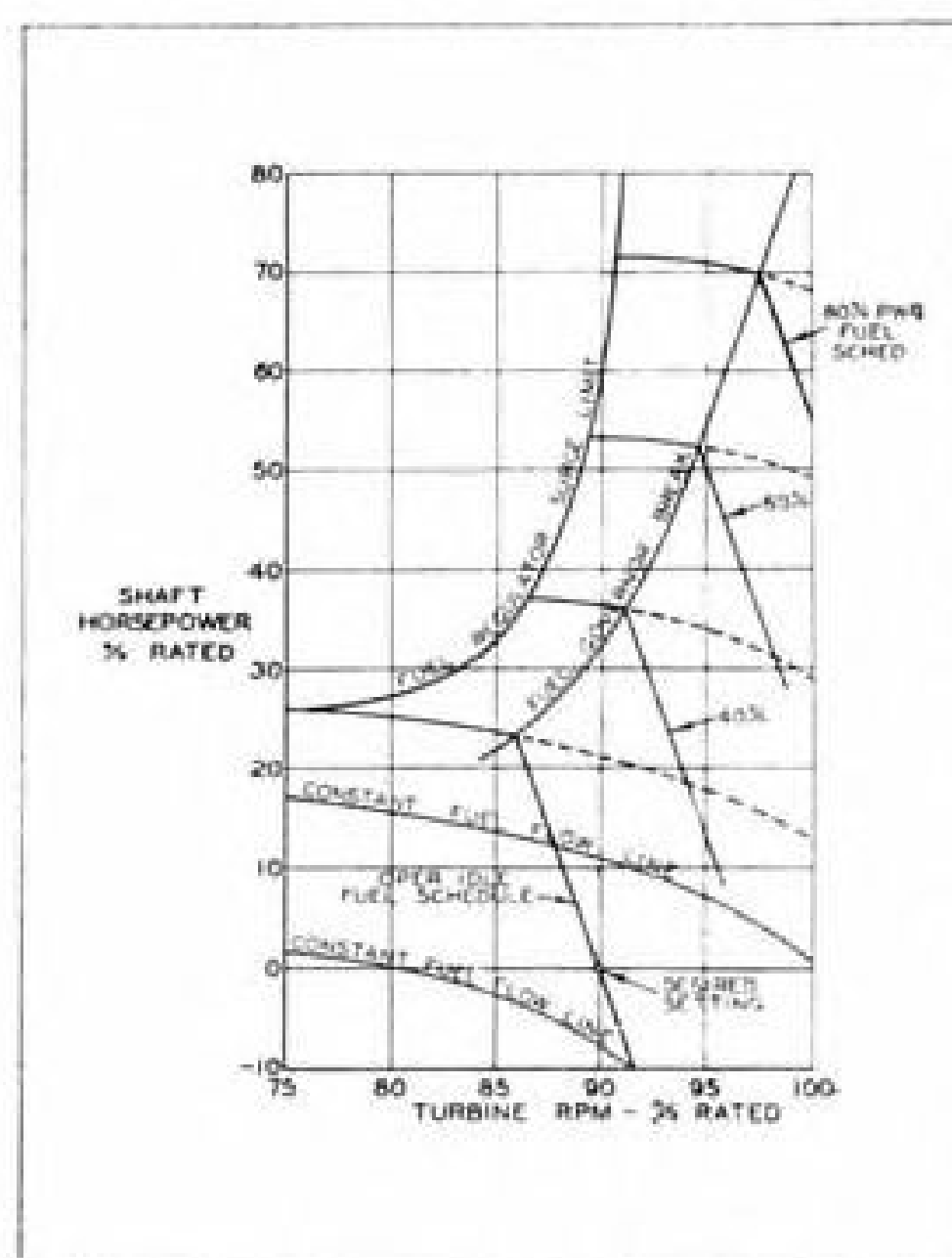


FIGURE 2: Fuel schedule for XP5Y-1 is designed to prevent turbine speed drop to below 90 percent rated speed.

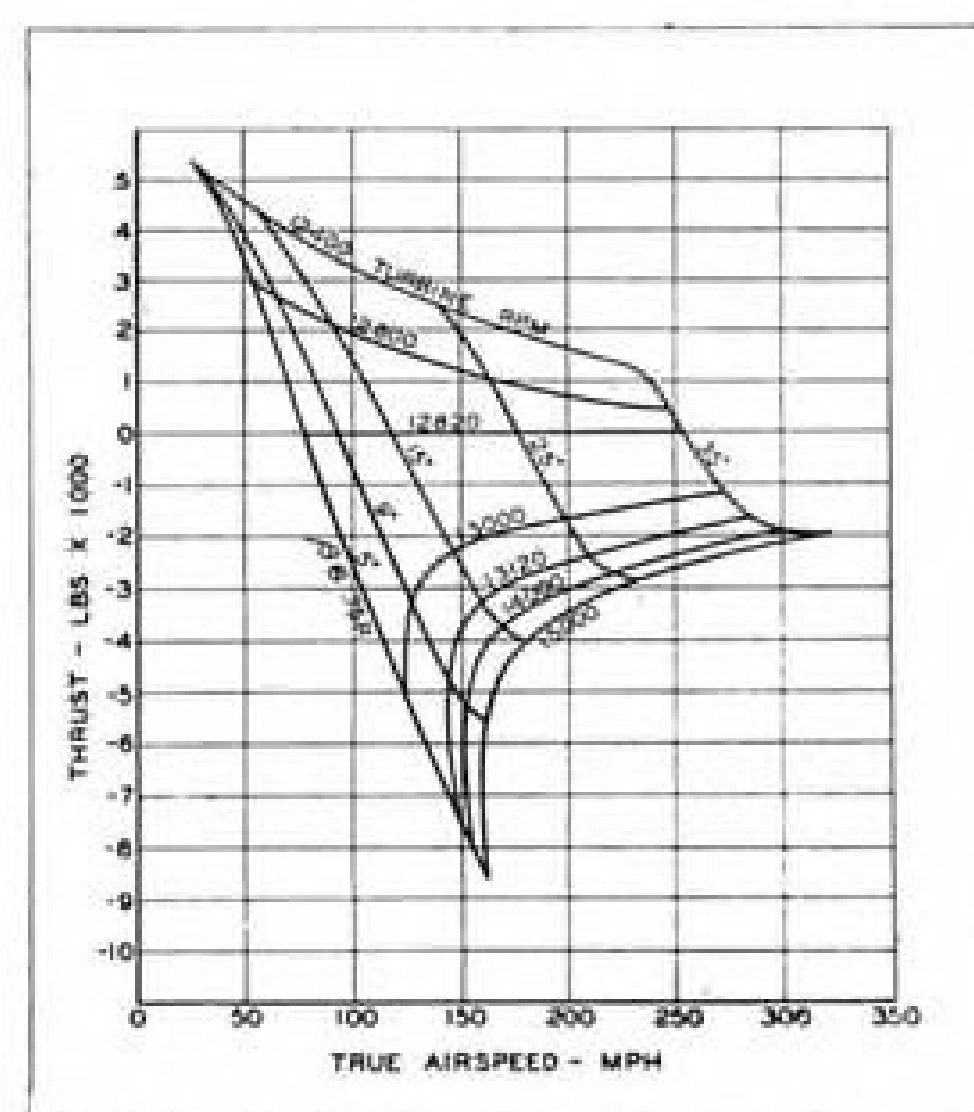


FIGURE 3: Thrust-speed diagram for XP5Y-1 shows governing difficulties.



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IVAN is a dyed-in-the-wool Communist. There are only 6 million party members like him in all Russia, yet these Communist brass-hats enforce the iron dictatorship of the Kremlin over 200 million Russians.

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Right now he's got you in a bad spot. Ivan is afraid of only one thing.

He fears your ability to out-produce him in guns, tanks, planes.

Frankly, he doesn't think you value your free system enough to do it . . . to make willingly the sacrifices he has squeezed out of the Russians.

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... incorporate the famous FLEXLOC self-locking principle and one-piece, all-metal construction. The exceptional reliability of this construction has been proved by the millions of FLEXLOCS used in the aircraft industry.

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Temperature range to +550° F.

No special tools needed—use standard 12-point socket or box wrenches. Designed for use in cramped quarters
Sizes from 1/4" to 1 1/2" NF Thread Series
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The one-piece FLEXLOC is both a stop and a lock nut, due to its resilient segments which lock positively, even under extreme vibration. Torque is unusually uniform—within a few inch pounds. "Thin" and "regular" types; NC and NF threads. Officially approved by many U. S. depts., bureaus, etc., and CAA for aircraft use.

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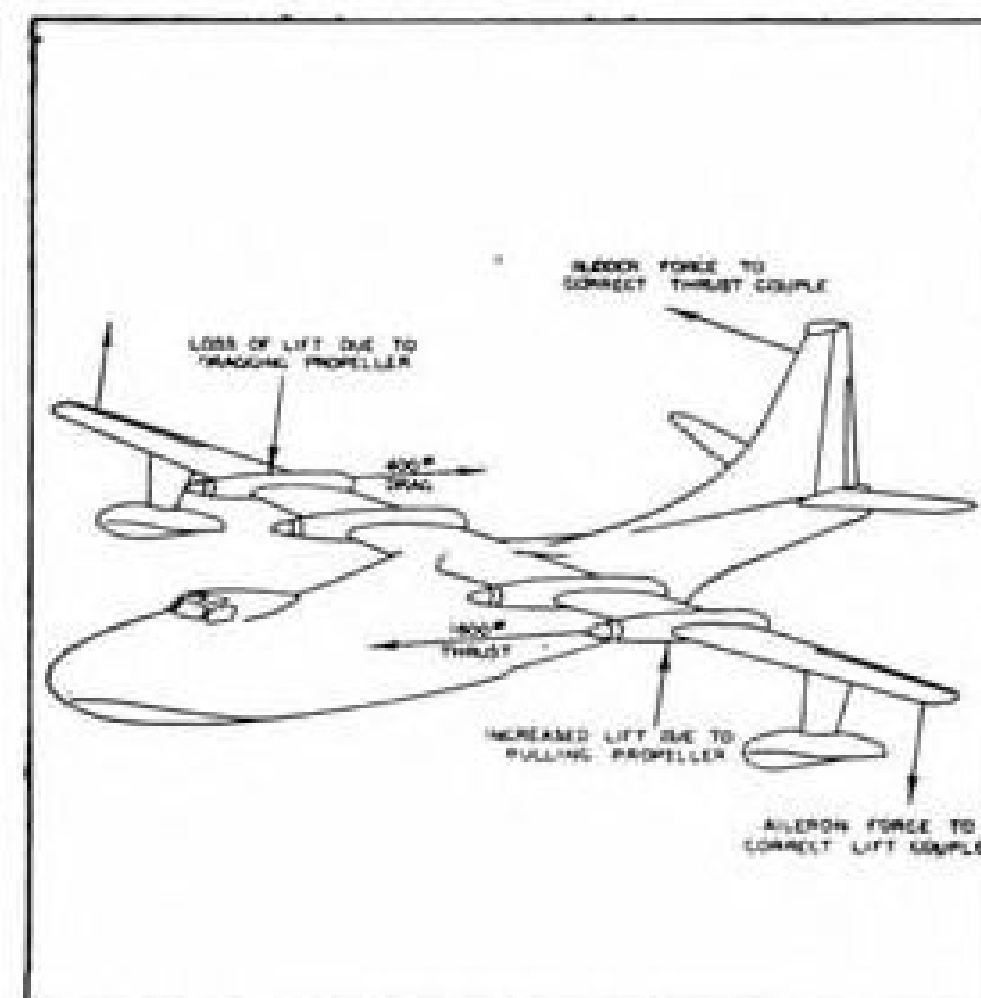


FIGURE 4: Force vectors acting on XP5Y-1 during asymmetric thrust.

in Figure 1 occurs. In this case, the fuel schedule was fortunately off on the high side on the high speed turbine, reducing the asymmetric thrust to 1700 lb. instead of 8000 lb.

The present prop design provides for a hydraulic low-pitch stop of approximately nine degrees; however, this blade angle is biased by the electronic governor which drives the propeller into a much flatter pitch when the speed is off schedule. As can be seen from Figure 3, this further aggravates the asymmetric thrust problem. If we assume perfect fuel scheduling for the flight shown in Figure 1, the right outboard propeller will continue to increase drag as the airspeed drops, as shown by following the 13,120-rpm. line. At the same time the left outboard propeller is producing thrust, as shown by the 12,000-rpm. line. Now, if a mechanical stop be added at fifteen degrees blade angle, the right outboard propeller drag will be limited to 3,000 pounds at 160 mph., since lower airspeeds will cause turbine speed to drop and drag to be reduced. At normal touchdown speed of 120 mph., the asymmetric thrust would be 1600 lb. if both propellers incorporated a mechanical stop at fifteen degrees blade angle, instead of 6200 lb. without the mechanical stop. This stop would have to be pulled out of the way after touchdown to prevent excessive thrust from building up at the lower airspeeds.

Propeller synchronization should materially assist the asymmetric thrust problem, and will be incorporated at an early date. Any synchronizer, however, will probably be unable to cope with large off-speed signals of a malfunctioning propeller governor, so a mechanical low pitch stop is a must.

► **Burnout Hazard**—The hazardous nature of a turbine burn-out was emphasized on one attempted take-off of the XP5Y-1. Just before becoming airborne, the plane swerved violently to the left and the left wing pontoon dropped in

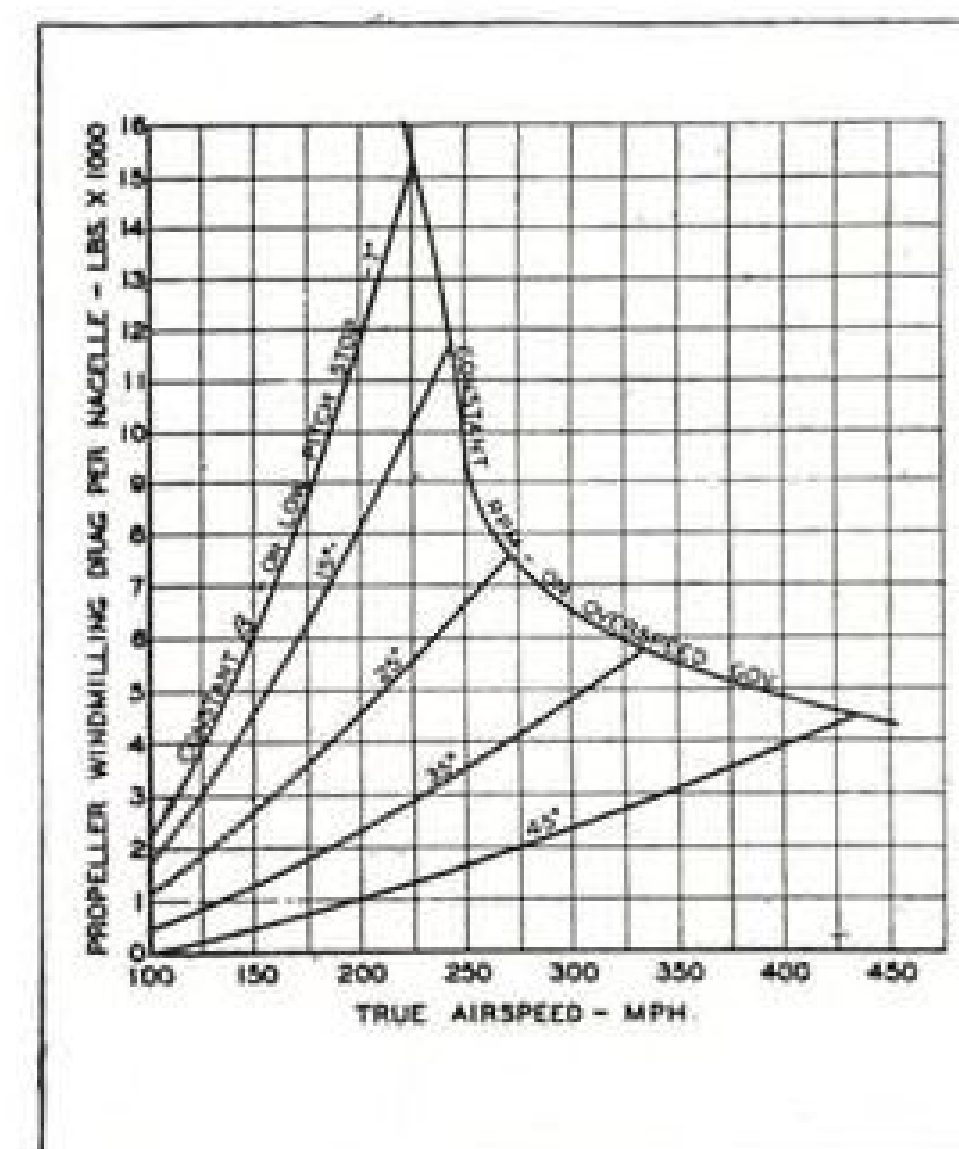


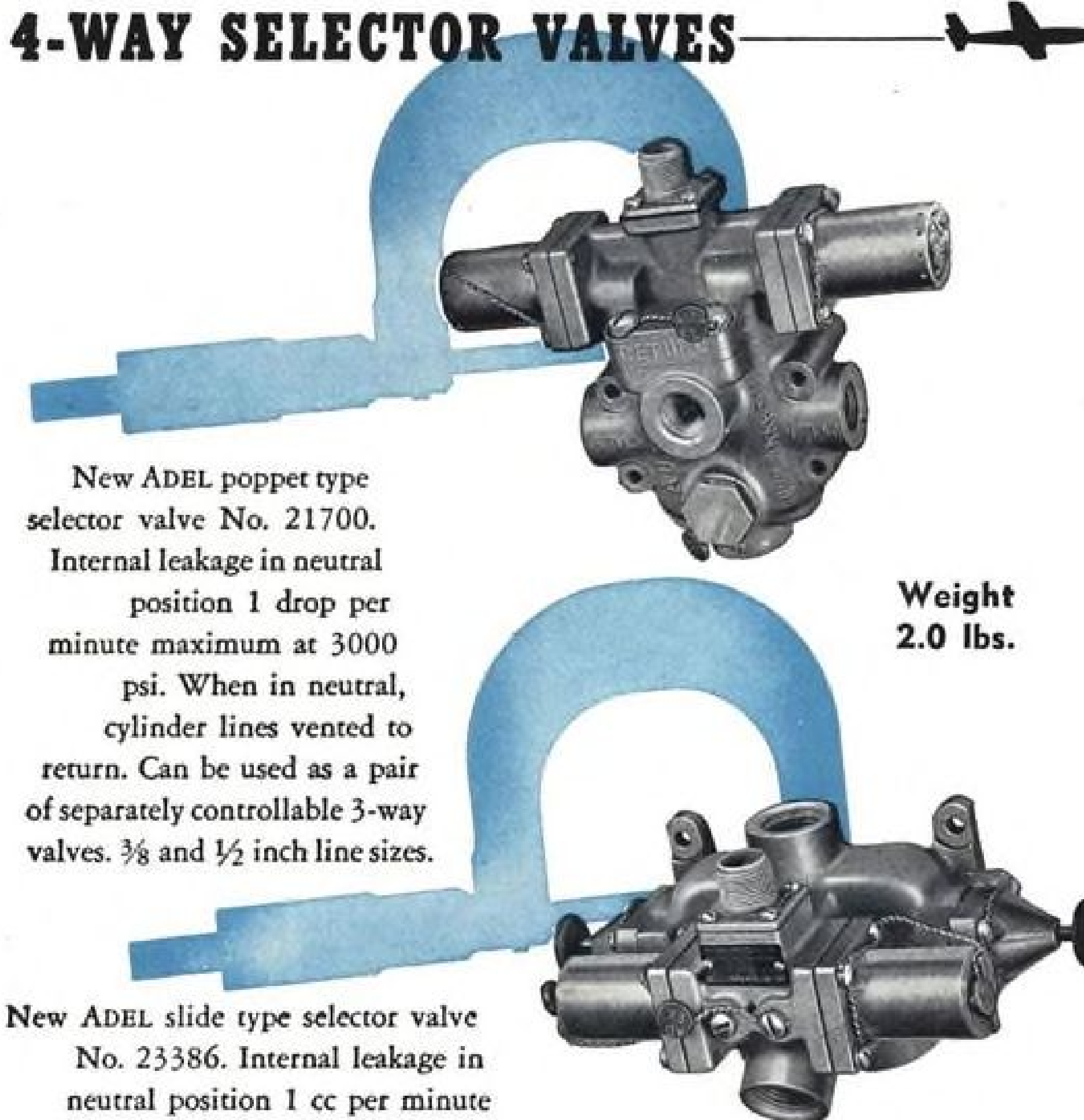
FIGURE 5: Windmilling drag of XP5Y-1 nacelle can exceed thrust from engine.

to the water. The take-off was aborted; and it was apparent that something was wrong in the left outboard nacelle. Examination showed the turbine wheel completely burned out in the left power section of left outboard nacelle.

During this take-off, the heading remained constant until hump speed was reached. Rudder oscillation was normal up to that point to maintain a straight course. An eight degree turn to the left was experienced going over the hump, which while unusual did not cause alarm because a quartering wind was blowing. This was corrected by rudder and a new heading was maintained. Then the aircraft veered to the left at about 80 mph and the throttles were all pulled back when the left turn approached uncontrollability. Records showed that the left outboard engine started to fail at exactly the same time as the first swing to the left. Turbine speed was not affected until the second swing to the left started simultaneously with a drop in turbine speed. It is presumed that the turbine wheel burned out completely at this point, and the drag of the compressor was so great that it not only absorbed all the horsepower from the other power section but dragged the propeller down as well. Analysis of the propeller speed and airspeed indicates that a burned-out turbine wheel at take-off power creates as much or more drag as a propeller which is windmilling both power sections.

A windmilling engine is a distinct possibility during take-off or landing, and turbine burn-out has occurred at take-off. Therefore a simple, reliable auto-feathering system is mandatory for both take-off and landing conditions. It is believed that the best means of achieving this is to install a reliable torque-meter to sense negative torque and initiate a prop-feathering signal when it occurs.

New ADEL Lightweight 3000 PSI SOLENOID, PILOT-OPERATED 4-WAY SELECTOR VALVES



New ADEL poppet type selector valve No. 21700.

Internal leakage in neutral position 1 drop per minute maximum at 3000 psi. When in neutral, cylinder lines vented to return. Can be used as a pair of separately controllable 3-way valves. 3/8 and 1/2 inch line sizes.

Weight
2.0 lbs.

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- ★ No moving seals.
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- ★ 4500 psi. proof pressure on all ports.
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- ★ Produced for 17-30 volts dc, 10 watts minimum; available for other dc voltages.
- ★ Available with or without manual control.

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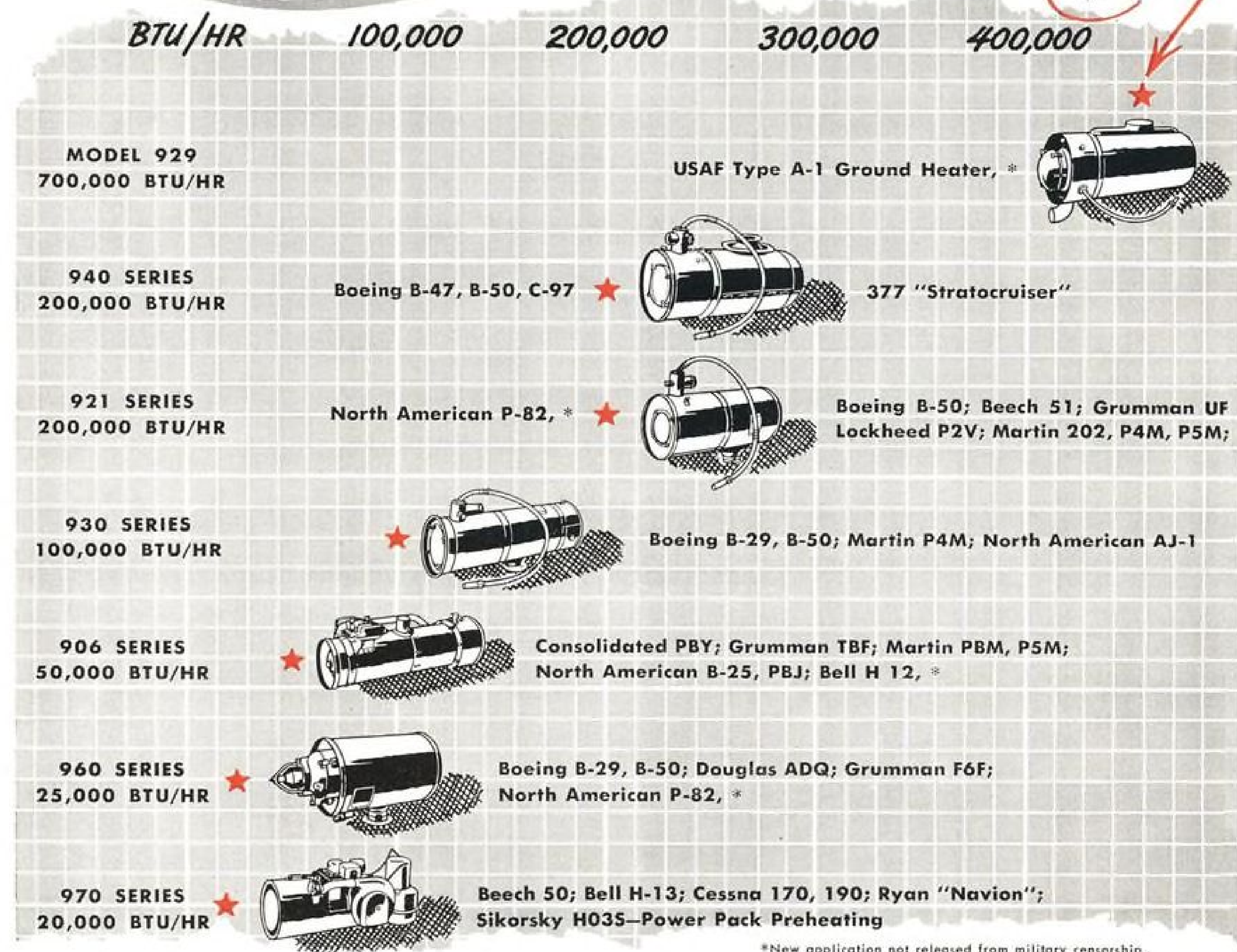


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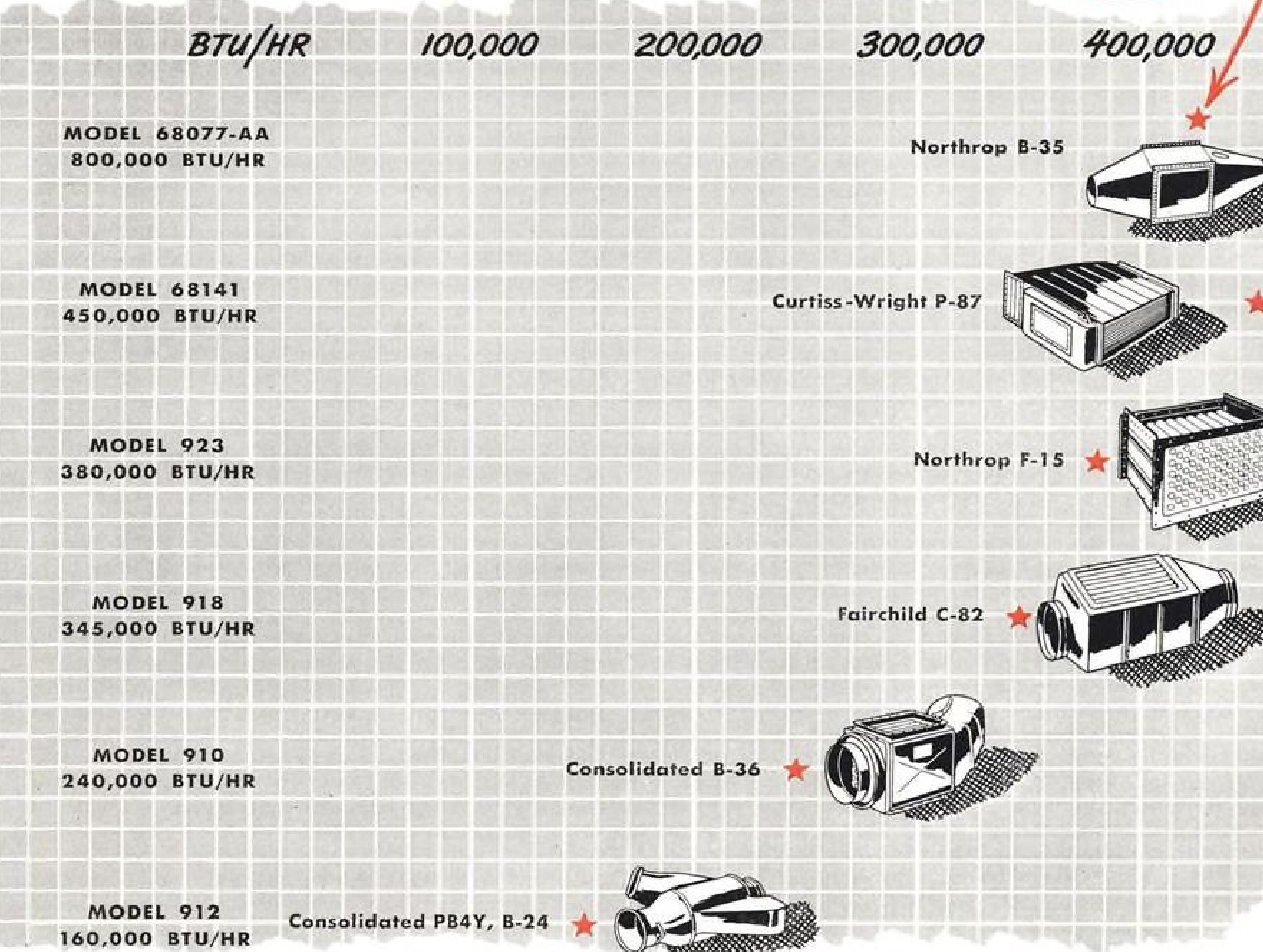
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TEMPERATURES IN AIRCRAFT



AN 5540-2 AN 5541-1 AN 5545-1

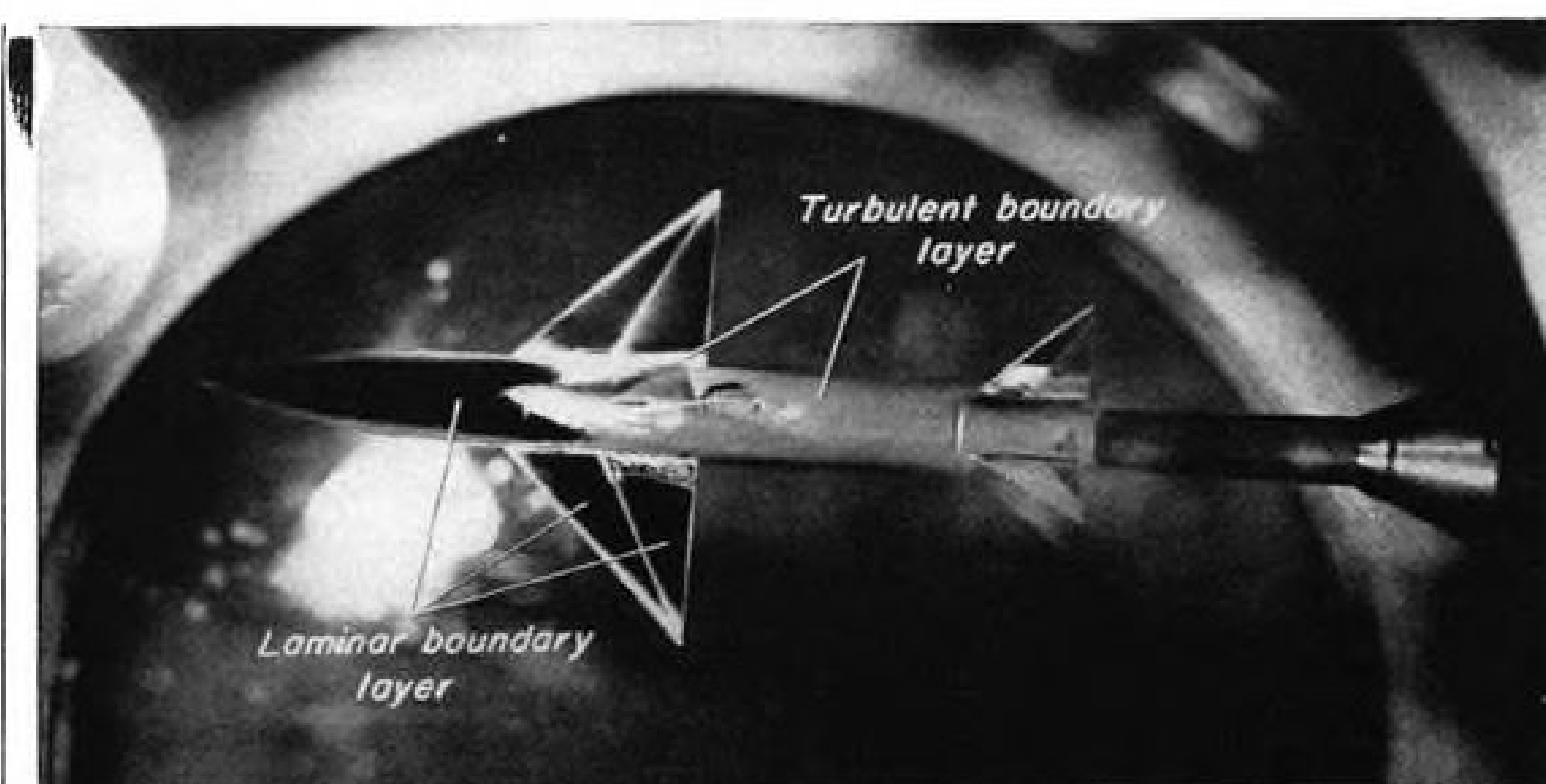
AN5540-1 18 MM. iron-constantan Sparkplug-gasket type thermocouple for measuring cylinder-head temperatures. Also available in copper-constantan and in 14 MM size for either material.

AN5540-2 Iron Constantan Sparkplug-gasket type with copper ring for 18 MM plugs. Wire guard and supporting bracket are stainless steel and conductors are protected with flexible heat-resistant sleeving. AN5539 terminals are silver-soldered to leads.

AN5541-1 Iron Constantan Bayonet Type thermocouple with junction located in silver tip. Spring used with this thermocouple will retain its strength despite high temperatures.

AN5545-1 Chromel-Alumel Tail-pipe Thermocouple. Insulated with a temperature-resistant ceramic and overbraided with stainless steel wire, this thermocouple is built to withstand severe jet engine service. We invite inquiries on your temperature measuring problems.

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New Way to See Boundary Layer

How to see the invisible boundary layer on an aerodynamic shape is a problem which has been solved in several ingenious ways by windtunnel engineers. Recently, the National Advisory Committee for Aeronautics has added another technique to those available for the visual study of boundary layer, and it promises to eliminate some of the shortcomings of earlier methods.

Most of these detection methods depend on the differences in evaporation rates of liquids in laminar, turbulent and separated boundary layers. By wetting a model and then passing air over it, the rates of evaporation in the different regimes of boundary layer will cause parts of the model to dry before others. By proper techniques, these dry parts can be seen or photographed and the pattern of boundary layer distribution determined.

► **China-Clay Method**—One of the best-known techniques for boundary layer observation is the so-called china-clay method. Here a suspension of china clay in lacquer is sprayed on the model. When this dries, the model is evenly coated with a smooth white absorbent film. This film becomes transparent when sprayed with a volatile fluid with the same index of refraction as the china clay. When the liquid evaporates, the china white again becomes visible.

An adaptation of the liquid-film method has been in use at Ames Aeronautical Lab. The model is painted black first, and then coated with a liquid mixture of glycerin, alcohol and a liquid detergent. Glycerin is the indicating agent, alcohol is a diluent for proper spraying and the detergent facilitates wetting of the surface. Visual indication of the wet and dry regions is satisfactory, but photography requires that additional contrast be provided. To do this, the model is dusted with talcum powder, which adheres to the wet sections and blows off the dry ones.

► **Luminescent Method**—The NACA has developed, with the aid of the Vogel

Luminescence Corp. of San Francisco, a different technique which involves the use of a lacquer which bears a luminescent pigment. This mixture has the property of fluorescence only when dry. Any shape which has been sprayed with the lacquer and subjected to airflow, at first appears uniformly dark under ultraviolet radiation. As solvents leave the film and drying begins, the drying areas begin to fluoresce (see photo). This is, of course, a transient condition, and in time, the entire body will be dry and will fluoresce.

In tests performed so far, the drying rate has been slow enough to allow unhurried photography and observation of the patterns. In some cases it has been possible to stop the windtunnel and remove the model to make detailed study of the pattern which persists in still air for several hours.

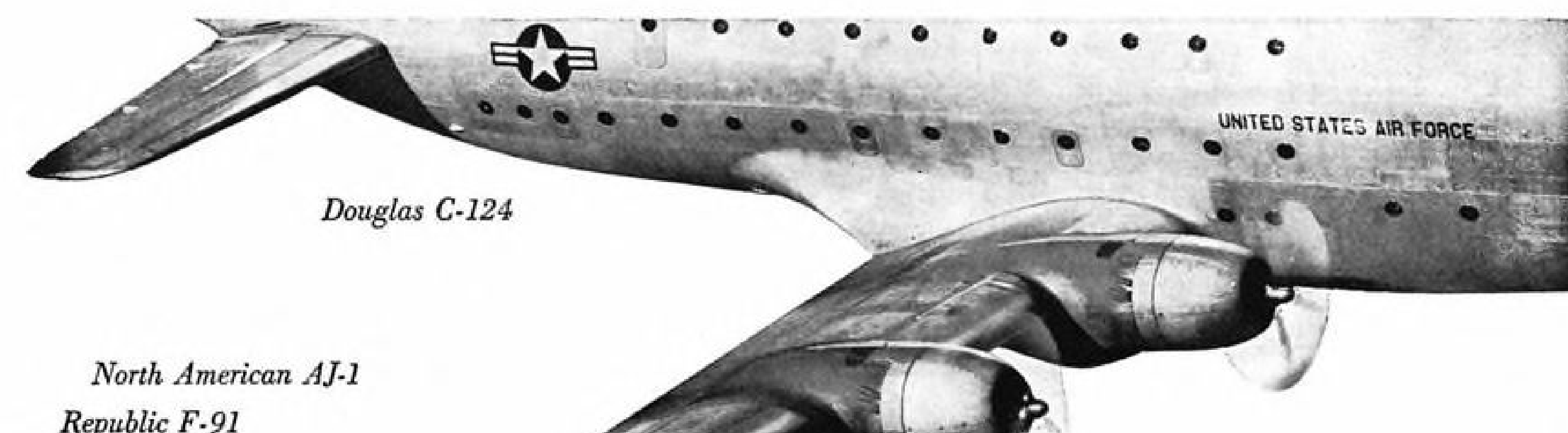
A complete description of the technique, together with the necessary lacquer and pigment designations, has been published by the NACA as Tech. Note 2263, The Use of a Luminescent Lacquer for the Visual Indication of Boundary-Layer Transition, by Jackson R. Stalder and Ellis G. Slack, of the Ames Aeronautical Lab. staff.

France to Build Bristol Engines

(McGraw-Hill World News)

Bristol, England—Bristol Aeroplane Co. has reached an agreement with France's Societe Nationale d'Etude et de Construction de Moteurs d'Aviation (SNECMA) under which the French organization will manufacture Bristol Hercules aero engines, the company announced here.

The agreement covers the supply initially of substantial numbers of Hercules engines from Britain while the new production line is getting under way in France.



Douglas C-124

North American AJ-1

Republic F-91

Common Denominator

WING-FLAP ACTUATORS BY WESTERN GEAR

These are some of the huge birds that "flap their wings" with Western Gear muscles. Wing-flap actuators—small, precision gear units designed and built by Western Gear—are but one type of the mechanical-power-transmission products that are our contribution to the nation's fast, powerful air arm.

Our fifty years of gearmaking experience and our skilled aircraft engineers are ready to serve the aviation industry in war and in peace, with gears and geared products for air-borne and ground installations.

For further information, or for copies of Actuator Bulletin 4811 or Aircraft Equipment Bulletin 4801, write Western Gear Works, P. O. Box 192, Lynwood, California

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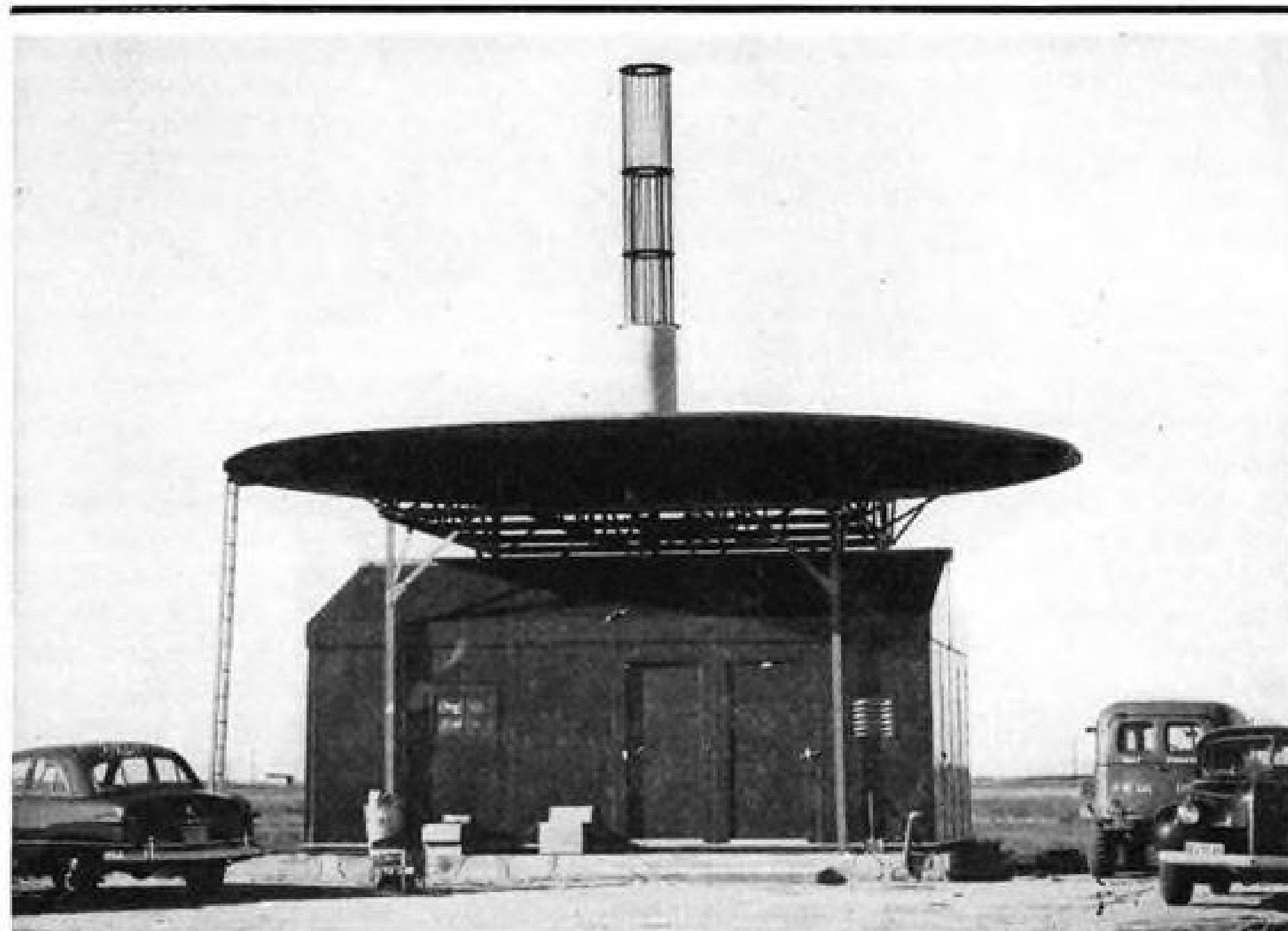
Fairchild C-119

Convair 240

Convair
XPB5Y-1

Lockheed
F-90

AVIONICS



CYLINDRICAL CAGE at top is Federal Telecommunications Lab's new antenna.

High-Purity Polarization for VOR

Quality of signals from new cylindrical transmitting antenna eliminates aircraft attitude error.

An exceptionally high degree of horizontal polarization purity is the outstanding feature of a new type of VOR transmitting antenna developed by Federal Telecommunication Laboratories, Inc., research unit of the International Telephone and Telegraph Corp.

The antenna, a cylindrical array of rods and formers, is a self-contained unit which can be installed rapidly and serviced easily. The addition of DME equipment, for which space is provided, makes the array a complete R-Theta navigational aid.

► **Background**—VOR (VHF omnirange) was standardized by the International Civil Aviation Organization as a short-range navigational aid. In the United States, about 300 VHF omnirange stations are being operated by the Civil Aeronautics Administration.

Omnirange compares the received phase of two audio-frequency signals. One signal, the reference phase, is radiated in all directions with a constant phase modulation. The other signal is radiated rotationally at a speed of 1800 rpm., so that at any constant bearing azimuth angle, the received signal varies in phase.

These two signals are compared in the receiver, and the phase difference between them defines the azimuth bearing angle of the station. (Or in another

sense, it defines the radial location of the aircraft with respect to the station.)

Both these signals are generated from a single station which radiates an infinite number of air routes extending like spokes of a wheel from the hub.

► **Nicknamed**—The new antenna array is lightly referred to as a "cage" because of the obvious resemblance. The antenna comprises a cluster of vertical rods divided by circular formers into two functional (but three geometrical) sections. The lower cage is the antenna proper; the upper cage is referred to as an extension.

Entire assembly is mounted on a circular counterpoise like those currently standard for VOR installations (30 ft. in diameter). Maximum height of the unit is about 15 ft.

Lower cage contains a small dipole mounted on a cylindrical section of tubing concentric with the main cage. This antenna provides the variable phase signal. The tubing is a housing for a synchronous motor (which turns the dipole at a constant 1800 rpm.) and a rotating sleeve joint which transmits VHF energy to the dipole.

A magnetic tone wheel is mounted on the dipole shaft. This wheel generates the 30-cps. reference signal using a magnetic pickup arm on its rim.

By mounting wheel and dipole on the

same shaft, phase slippage between reference phase and variable phase signals is eliminated.

The reference signal is brought out of the bottom of the cage through a transmission line to the transmitter. Here it modulates the radio-frequency amplifier which supplies energy to the omnidirectional radiator.

► **Circular Radiator**—The omnidirectional radiator is a circular disc mounted above the dipole. This radiator emits the reference signal and carries station identification and simultaneous voice transmissions. Electrical coupling between dipole and loop radiators is eliminated by "special and novel methods."

Cage extension space is available for mounting a DME (Distance Measuring Equipment) and an X-band beacon antenna. The addition of the DME antenna makes the array usable as a complete R-Theta navigational system.

When the beacon is used, two vertical rods in the antenna cage are replaced with X-band wave guides for feeding the beacon. The DME coaxial lead can be passed through any of the vertical rods. And other rods may be used to carry power lines for the obstruction lights which can be placed on top of the cage.

► **Pure Radiation**—Primary advantage of the cage antenna is the purity of the radiated signal. There is such a high degree of horizontal polarization purity that no noticeable aircraft attitude errors are present in flying a course. And these errors are important—they run as high as 5 deg. variation from true with earlier designs of antennas.

Attitude errors produce the phenomenon known as "pushing," because the radial course depends on the aircraft attitude. Pushing is primarily confusing when a pilot is trying to fly to intersect a course. In banking flight, the indicator shows the pilot that he is on-course.

He levels off to fly the heading, but finds that his reading has apparently shifted. He then tries again to intersect the course, gets a reading, levels out—and is off-course again. It takes several attempts to narrow the course-finding error to zero, and with impure radiation, the aircraft will zig-zag around the course in attempting to fly it.

There is a structural advantage, too. Without the cage structure, the rotating dipole would be about 4 ft. long, and difficult to rotate synchronously at 1800 rpm. The caged dipole is only 10 in. long, and its electrical radiation efficiency is maintained. The cage acts as an electrical lens and reduces the physical size of the antenna by more than four-to-one.

► **No Ambiguity**—With the new cage antenna, there is a lack of the usual cone-of-ambiguity over the VOR station. The on-course needle will not

hang back and forth when the plane is directly over the transmitter, but will stay dead-on if the pilot is flying carefully. If he is a bit sloppy, the indicator will show an area of ambiguous signal, but this will be only of short duration.

Physically, the cage antenna can show improvements in handling, aligning and erection.

First, the unit is completely adaptable to existing stations, as any replacement antenna should be. It is a one-piece unit which can be installed in considerably less than 24 hours, compared to the several-day period now required. The center housing for dipole and tone wheel is removable from the cage bottom for servicing or replacement. And no tuning need be done above the counterpoise.

Development of the antenna was done by Federal for the USAF Air Materiel Command at Watson Laboratories, formerly located at Fort Monmouth, Red Bank, N. J. Federal is now in production for the Air Force on these new units.

Lockheed Builds Avionic Test Lab

Lockheed Aircraft Corp. has scheduled construction on a new four-story laboratory building representing a \$400,000 investment. The new research facility will be primarily for avionic work.

Antenna research will be quadrupled at Lockheed to solve problems of aircraft design which stem from the increased aircraft speeds and the increased quantities of radio and radar carried in military aircraft.

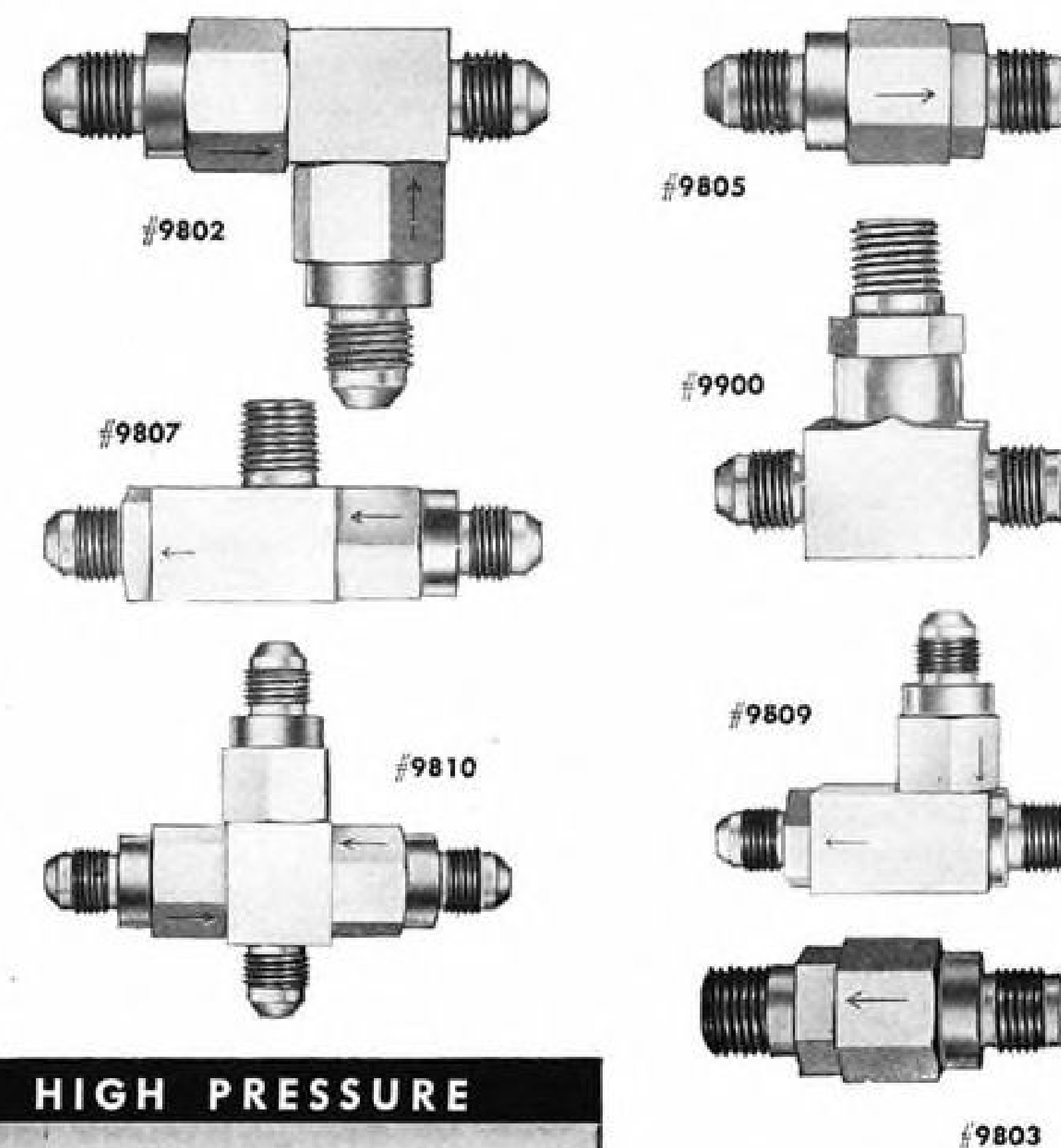
Laboratories and test equipment for avionic research will be on the top floor and roof of the new building. Augmenting these laboratories, a pattern range for checking antenna performance will be erected nearby.

One floor of the building will be devoted to an environmental test chamber to duplicate atmospheric punishment up to altitudes of 75,000 ft.—which Lockheed says is the highest altitude ever simulated in laboratories. Temperature variations from -100 deg. F to 600 deg. F can be staged in the test chamber, as well as subtropical humidity, salt spray, ultra-violet radiation (of intensity such as upper-atmosphere sunshine produces), rain, wind, sand and dust.

Equipment used in conjunction with the chamber will test performance and stability of materials under conditions of thermal shock, vibration, impact, acceleration and explosion.

The new laboratory is scheduled to be operating in the early months of 1952.

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6018-1	E	9755

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AN No.	Style	ARO Part No.
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6031-1	B	9809
6032-1	C	9807
6033-1	D	9802
6034-1	E	9810
6036-1	G	9803
6037-1	H	9900

Now—a complete line of precision-made oxygen check valves developed by Aro in accordance with AN drawings and Performance Specifications AN-V-13a and AN-V-15a.

These valves have been thoroughly tested by Aro according to the AN Performance Specifications, including extreme temperature tests, and have passed all tests within the specification limits.

Low Pressure Oxygen Check Valves constructed from Dural for lightness, and anodized for corrosion resistance. High Pressure Oxygen Check Valves constructed from high-strength Dural for lightness and strength, and anodized for corrosion resistance.

ARO has the modern facilities and know-how—years of experience in engineering and producing high-precision aircraft products. Send for complete information. The Aro Equipment Corporation, Bryan, Ohio.

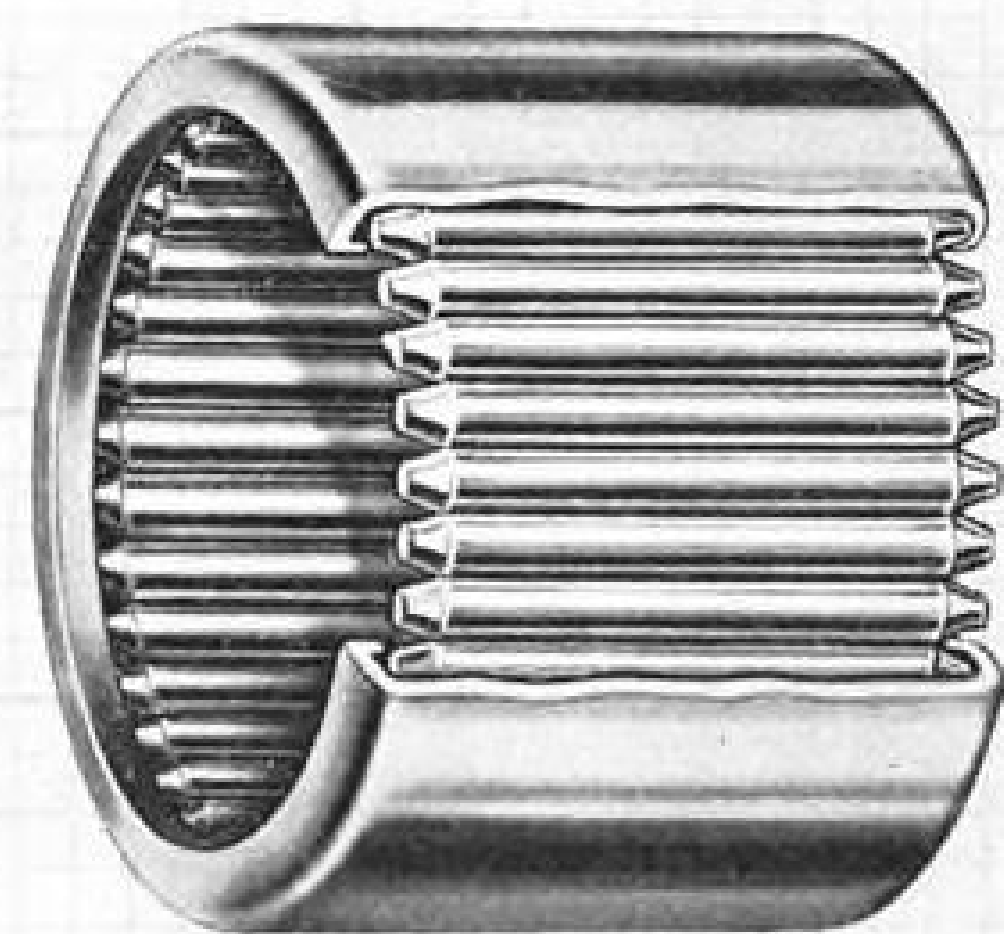
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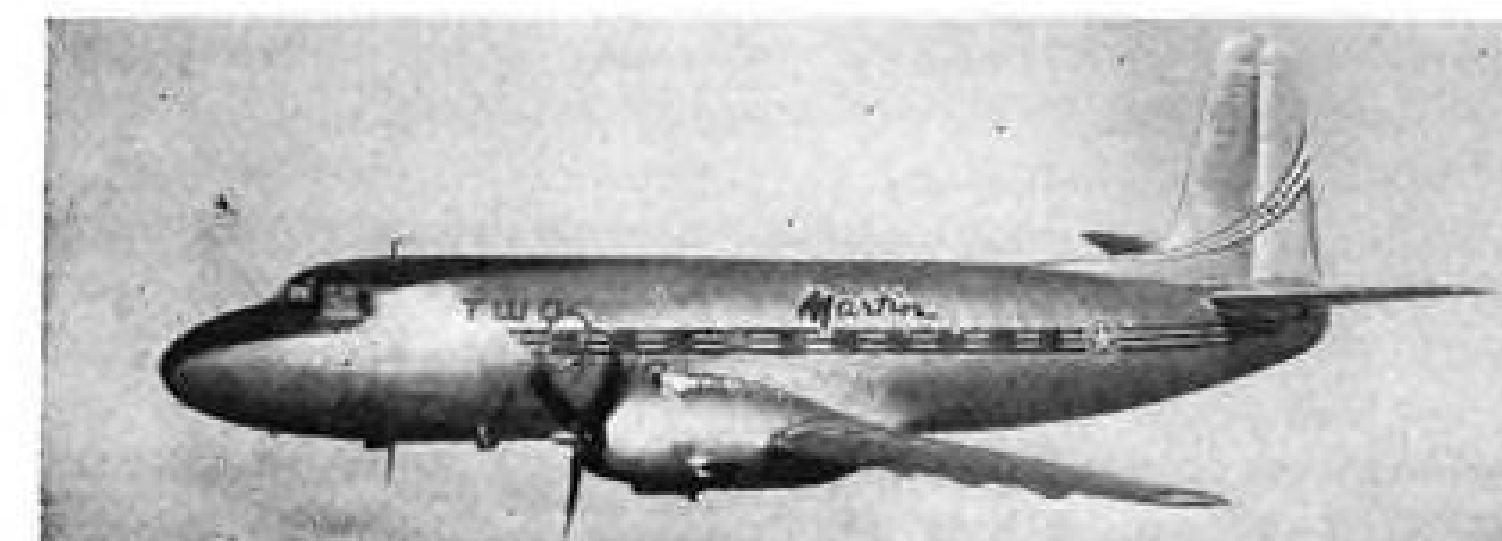
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EQUIPMENT

Exclusive Report on Postwar Airliners

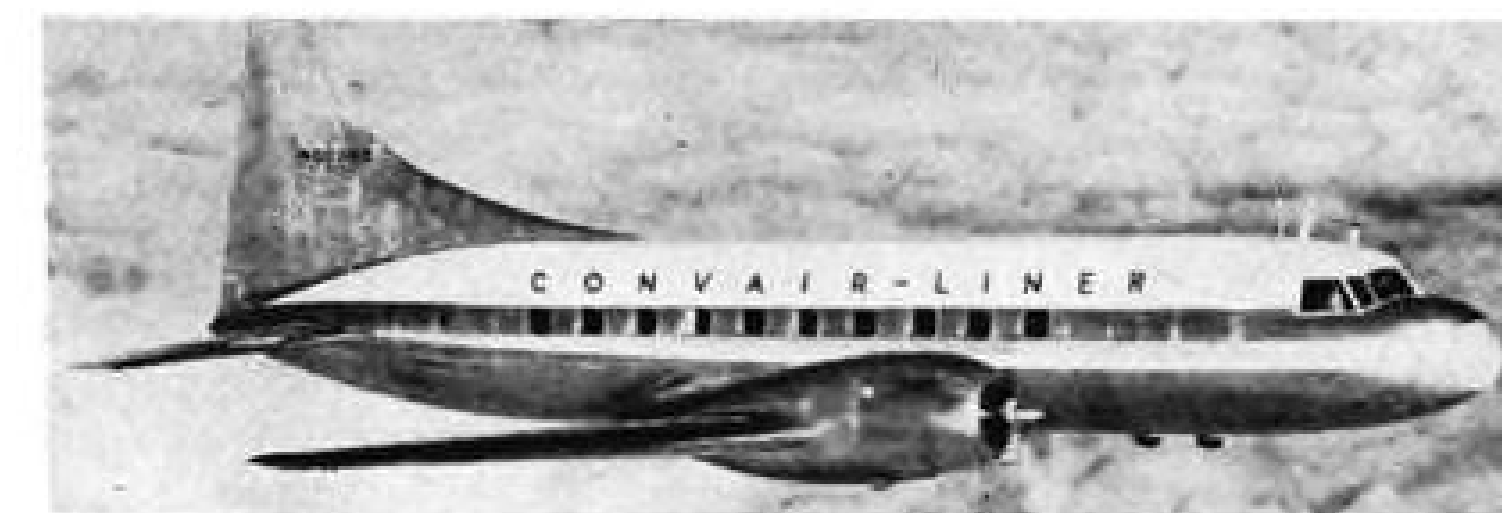
Guide to Equipment Overhaul Times



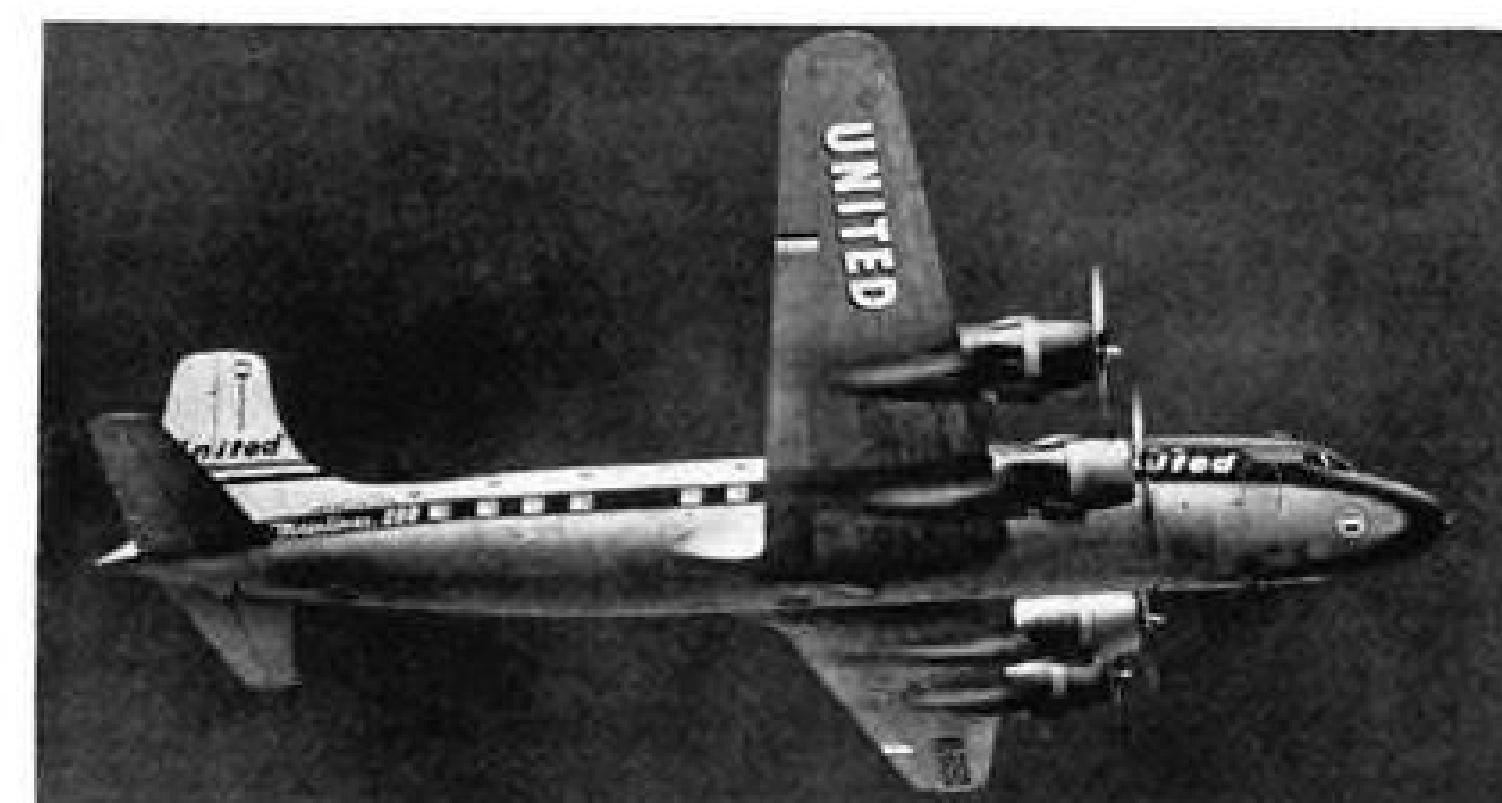
Martin 2-0-2



Boeing Stratocruiser



Convair-Liner



Douglas DC-6



Lockheed Constellation

Equipment is wresting control of aircraft from man. It is essential to successful flight. And it is big business. Maintenance and overhaul of that equipment is one of the airlines' major concerns. Roughly 20 percent of all their expenses are in that category.

The military know equipment is important. They are earmarking as much money for equipment purchase as for airframe purchase.

As a service to the industry, in response to repeated suggestions, AVIATION WEEK presents the first and only correlation in any aviation magazine of the comparative overhaul times in hours set by various airlines for similar equipment on all postwar transport aircraft.

- For airlines this special report can serve as a guide to better overhaul performance. There is much to be learned from studying the discrepancies and consistencies in overhaul times for identical components mounted on identical airframes flying identical routes.

- For airframe manufacturers this report serves as check list on how the equipment in their planes stacks up against that in their competitors' aircraft.

- For equipment manufacturers this report is a valuable index to performance of their equipment as installed vs. their own estimates, and for comparison of their product with that of their competitors.

- For the military services this report can serve as a useful tool based on the experience of commercial operators with equipment which the services also operate.

A lot of money can be saved if airline managements take a long, hard look at the comparative times and bring about equalized overhaul times where practicable and desirable. Differences in operating conditions, overhaul facilities and maintenance philosophies can and do account for a portion of the variation in times shown in the report. But not for all of them.

Equipment is important: airframes are shrunk or stretched to accommodate it. It can control an aircraft with greater precision than man. It is a keener detective in fingering faulty components. If it fails, results can be fatal.

NOTE: In the report on the following pages, complete comparative data for all airlines operating similar equipment was unobtainable because of the different methods individual companies use to present this material. The lists are as complete as it was possible to make them. Super DC-3s were not considered because operated by only one airline. Nor were single-engine planes taken into account. Abbreviations used in the tables are: (B)—Bendix Radio; (C)—Collins Radio; (CE)—Curtiss Electric Propeller; (EO)—Engine Overhaul Period; (G)—U. S. Gauge; (GE)—General Electric; (HS)—Hamilton Standard Propeller; (K)—Kollsman Instrument; (OC)—On Condition; (P)—Eclipse-Pioneer; (RCA)—Radio Corp. of America; (SI)—Simmonds Aerocessories; (S)—Sperry Gyroscope; (W)—Weston Instrument. Overhaul time is in hours if not otherwise stated.

Martin 2-0-2

COMPONENT	AIRLINE	
	TWA (2-0-2A)	NWA
Engines		
Engine (P&W R-2800-CB-16).....	900	1400
Carburetor assy. and inst.....	2nd EO	2nd EO
Tachometer, generator.....	2nd EO	2nd EO
Propeller.....	900 (H.S.)	1300 (H.S.)
Propeller feathering pump and motor.....	2000	
Propeller reversing control panel assy.....	4000	
Spark plug.....		600
Landing Gear		
Landing gear.....	6000	6000
Surface Control System		
Surface control system.....	4000	4000
Hydraulic System		
Hydraulic system.....	4000	4000
Airfoil Anti-icing System		
Wing thermal anti-icing system.....	4000	4000
Windshield anti-icing system.....	4000	4000
Heater.....	500*	200-600
Damper motor.....	Yearly	Yearly
Valve, solenoid.....	Yearly	Yearly
Switch, cut out.....	Yearly	Yearly
ADI system.....	4000	4000
Cabin Heating and Ventilating System		
Cabin heating and ventilating system.....	OC	4000
Heater.....	1000	100-600
Damper motor.....	4000	4000
Blower.....	1000	1000
Pressure differential switch (fuel).....	4000	4000
Agustat.....	4000	4000
Valve, solenoid.....	4000	4000
Fire Detecting and Extinguishing System		
Fire detecting and extinguishing system.....	OC	4000
CO ₂ cyl., weigh and check.....	1000	1000
Oxygen System		
Oxygen system.....	OC	4000
Aircraft Electrical System		
Majority at.....	4000	4000
Control panel, generator.....	1000	1000
Inverter.....	2000	1000
De-icer time recorder.....	OC	4000
Prop. feathering pump and motor.....		2000
Fuel and Oil System		
Fuel and oil system aft firewall.....	4000	4000
Fuel cells.....	OC	OC
Oil tanks.....	3rd EO	
Valve, sequence.....	3rd EO	
Flight Instruments		
Majority at.....	6200	1000
Magnetic compass.....	5000(K)	
Air speed ind.....		2000(K)
Turn and bank ind.....	3000(P)	
Artificial horizon.....	2000(P)	1000(S)
Directional gyro.....	1800(S)	1600(S)
Pitot system.....	OC	
Fluxgate Compass		
MDI.....	4500(P)	
Repeater ind.....	4500(P)	
Fluxgate amplifier.....	3500(P)	
Transmitter.....	3500(P)	
Aircraft Engine Instruments		
Majority at.....	6000	4000
Radio Equipment		
Majority at.....	OC	1000
ADF receiver.....	2000(B)	
Glide path receiver.....	EO	
Localizer receiver.....	EO	
VHF marker receiver.....	2600(B)	
Transceiver HF.....	2000(B)	
Transceiver VHF.....	2000	
Radio control panel.....	4000(B)	3000(B)
Radio magnetic ind.....	4000(P)	
Antenna Tuning unit.....		2000(C)
Dual azimuth ind.....		3000(B)
Deviation ind.....		3000(W)

*Heater operating time.

Boeing 377

COMPONENT	AIRLINE	
	NWA	PAA
Engines		
Engine (P&W R-4360).....	900	900
Propeller.....	EO	1000(CE)
		1400(HS)
Magneto.....	EO	
Generator.....	EO	
Alternator.....	EO	2nd EO
ADI System.....	OC	
Turbosupercharger.....	EO	
Airframe Equipment and Systems		
Seals, cabin pressure.....	OC	OC
Wheels—main, nose, tires and brakes.....	OC	OC
Retract motors, main and nose.....	4000	4400
Hydraulic System		
Nose wheel steering system.....	4000	4400
Rudder boost system.....		4400
Oxygen system.....	OC	OC
Fire extinguishing system.....	OC	OC
CO ₂ fire and smoke detection system.....	OC	OC
Cabin ventilating and temperature control system.....	OC	
Refrigeration system.....	OC	
Electrical System and Accessories		
Electrical system.....	OC	OC
Relays.....	OC	
Main inverters.....	2nd EO	2200
Ignition switch.....	8000	8000
		(resistance ok at ea EO)
Combustion heater.....	500	500
	(Heater plate insp. every 100 hr. after 1st 500 hr.)	(Heater operating time)
Cabin rate of change selector.....	3000	3300
Turbo boost selector.....	OC	
Reverse current relays.....	2000	4000
Voltage regulators, ac. and dc.....	1000	1200
Miscellaneous		
Cabin pressurization system.....	OC	
Overwater emergency equipment.....	OC	
Propeller synchronizer.....	EO	2200(CE) 2000(HS)
Engine Instruments		
Fuel flow ind.....	2000	3600
Fuel pressure ind.....	4000	
Manifold pressure ind.....	2000	
Oil pressure ind.....	4000	
Tachometer ind.....	2000	
Torque meter ind.....	4000	
Exhaust back-pressure ind.....	2000	
Misc. Instruments		
Fuel quantity ind.....	OC	OC
Autopilot system.....	2100	2200(S)
Controller.....	4000	3300
Fluxgate transmitter.....	1000	
Pitch trim indicator.....	2000	
Flight Instruments		
Air speed ind.....	3000	7000(K-P)
Altimeter.....	1000	7000(K)
Gyro syn compass repeater.....	2000	2200
Directional gyro (electric).....	1000	2200(S)
Gyro horizon.....	1000	2200(S)
Flux valve.....	OC	OC
Rate of climb.....	1000	5500(K)
Turn and bank.....	1000	3300(P)
Auto pilot master gyro compass.....	1000(P)	
Radio Equipment		
All radio equipment.....	1400	OC
Interphone amplifier PC 347C.....	2800	
Antenna loading unit.....		3000
VOR frequency control (Collins 314U-1).....	2800	
Dynamotor.....		2000
Radio jack boxes (Benedix MS-92A).....	2800	
Deviation ind. (Weston 888).....	4200	
Indicator, altitude.....		3000
Indicator, ILS.....		3000
Indicator, Radio, magnetic.....		3000
Dual ADF ind. (Bendix MN 58 C).....	4200	
Radio control panel (Bendix MS-151A).....	2800	
Junction boxes.....	4200	
Antenna systems.....	4200	
Circuit breakers and fuses.....	4200	
Other minor items.....	4200	

Convair 240

COMPONENT	AIRLINE					
	NEA	AAL	CAL	PAA	WAL	
Engines						
Powerplant, P&W R-2800.....	1100	1100	1000	1100	1200	
Propeller.....	1600 (CE)	2nd EO (CE)		1100 (HS)	1400 (HS)	
Alternator.....	1600 (CE)	2nd EO (CE)				
Engine Instruments						
Transmitter, fuel, oil, torque, water, manifold pressure.....	3000		3000			
Pressure warning units.....	3000		3000			
Fuel, oil, water.....						
Oil and Water Injection Systems						
Aft of firewall.....	OC		OC		OC	
Cable test.....	OC		OC		OC	
Landing Gear						
Wheels, brakes, and tires.....	OC		OC		OC	
Air Conditioning and Pressurization						
Primary compressor.....	1000				2000	
Secondary compressor.....	1000				2000	
Anti-icing System						
Anti-icing system.....	OC		OC		OC	
Oxygen System						
Oxygen system.....	OC		OC		OC	
Fire Detection and Extinguishing						
Fire detection and extinguishing system.....	OC		OC		OC	
Flare assy. and inst.....	4 yr.		OC		2nd EO*	
Accessories, Electrical						
Actuator, augmentor valve.....	EO		OC		2nd EO	
Actuator, oil cooler flap.....	EO		OC		EO	
Battery.....	OC		OC		OC	
Flasher, position lamp.....	4000		4th EO		4250	
Inverter, 2500 VA.....	4000		4th EO		4000	
Inverter, 2500 VA.....	4000		4th EO		4000	
Fuel booster pump and motor.....	4000		4th EO		4000	
Water injection.....	4000		4th EO		4000	
Synchronizer.....	2nd EO		2nd EO		2nd EO	
Voltage booster.....	2nd EO		2nd EO		2nd EO	
De-icer.....	2nd EO		2nd EO		2nd EO	
Voltage regulator.....	EO		OC		OC	
Mast relays.....	EO		OC		OC	
(Inverter, starter, etc.).....	4th EO		4th EO		4th EO	
Reverse current relay.....	2nd EO		4th EO		4th EO	
Solenoid, oil dilution.....	2nd EO		OC		OC	
Solenoid, throttle reversing.....	2nd EO		OC		OC	
Thermistor.....	OC		OC		OC	
Cabin lamp control.....	OC		OC		OC	
Valve and motor, engine mag.....	4000		OC		4000	
Fire and smoke detector systems.....	EO		OC		OC	

* Test pull mechanism and discharge bottle. Weigh cylinder.

Douglas DC-6

COMPONENT	AIRLINE					
	NEA	AAL	CAL	PAA	WAL	
Engines						
Engine P&W R-2800.....	1100	1300	1200	1200	1400	
Spark plug.....	2500**	OC	OC	OC	OC	
Propellers						
Propeller.....	2200 (HS)	1300	1200 (HS)	2800 (HS)		
Fuel System						
Fuel system (aft of firewall).....	8000	9000	9000	9000	OC	
Tanks, bladder type.....	OC		OC			
Landing gear						
Landing gear.....	8000	9000	9000	9000	11,200	
Wheels, brakes, tires, axles, main and nose.....	OC		OC			
Hydraulic System						
Hydraulic system.....	5000	9000	9000	9000	OC	
Accumulator.....	5000	6000	6000	6000	5400	
Cylinder, brake op.....	4000	4th EO	4th EO	5000	5000	
Pressure reg.....	4000	OC	OC			
Pump and motor aux. (elect.).....	4000	OC	OC			
Wing flap valve.....	4000					
Airframe						
Major airframe overhaul.....	8000	9000	9000	9000	11,200	
Control system.....	8000	9000	9000	9000	11,200	
Accessories, Aircraft						
Anti-icing system, airfoil thermal.....	8000	9000	9000	9000	OC	
Heater, accessories.....	1000	1000	1000	1000	2800	
Heater unit, anti-icing.....	2000	1400	1400	1400	1400	
Ignition box, heater.....	1000	EO	EO	EO	OC	
Anti-icing System, Carburetor						
Anti-icing system, carburetor.....	8000	9000	9000	9000	OC	
Pump.....	4000	4th EO	4th EO	5500	5500	
Cabin Press. and Air Cond. System						
Cabin press. and air cond. system.....	8000	9000	9000	9000	OC	
Supercharger assy.....	1100	EO	EO	1200	OC	
Turbine and fan assy.....	2000	2nd EO	2nd EO	2500	4200	
Valve, cabin auto. emerg. relief.....	4000	4th EO	4th EO	5000	5000	
Fire Extinguishing System						
Fire exting. sys.....	8000	9000	9000	9000	OC	
Test pull mech., weigh cyl.....	1000	EO	EO	1300	OC	
Oxygen System						
Oxygen system.....	8000	9000	9000	9000	OC	
Aircraft Elec. System						
Electrical system.....	8000	9000	9000	9000	OC	
Flasher unit, nav. light.....	4000	4th EO	4th EO	5000	2800	
Inverter.....	1000	1000	1000	2500	1400	
Propeller control.....	1000 (HS)	1600 (CE)	1600 (CE)	1400 (HS)		
Pump, fuel boost and booster.....	3000	3rd EO	3rd EO	5000	5000	
Voltage regulator.....	1000	EO	EO	1300	1400	
Relay, landing light.....	2000	4th EO	4th EO	5000	5000	
Relay, reverse current.....	2000	2nd EO	2nd EO	OC	2800	

* Heater op. time.

** LT ignition.

Lockheed L-649-749						
COMPONENT	AIRLINE			COMPONENT	AIRLINE	
	C&S	EAL	TWA		C&S	EAL
Engines				Landing gear, main and nose.....	8000	9000
				Oil shock strut (main).....	.....	4800
				Hydraulic damper.....	.....	4800
				Wheels, axles, bearings, brakes, tires.....	OC	OC
				Needle (aft of firewall).....	8000	9000
				Firewall ring.....	EO	EO
				Control System		
				Control system components	8000	9000
				Control surface fabric covering.....	OC	OC
Fuel System						
				Lines and fittings (aft of firewall).....	.....	9000
				Lines and fittings (fwd. of firewall).....	EO	EO
				Exhaust manifold assy. and installation.....	2000	2250
				Controls (fwd. of firewall).....	EO	EO
				Oil System		
				Lines, fittings, oil radiator, tank temp. regulator and installation.....	EO	EO
				Oil screens.....	OC	OC
				Change oil.....	EO	400
Propellers						
				Propeller.....	1100	2250
Airframe						
				Major airframe components	8000	9000
				Fuelage interior structure.....	OC	OC
				Exterior covering installation.....	OC	OC

Lockheed L-49						
COMPONENT	AIRLINE			COMPONENT	AIRLINE	
	CAP	PAA	TWA		CAP	PAA
Airframe				Electrical System		
				Aircraft electrical system, general.....	8000	OC
				Heating and Ventilating System		
				Heating and ventilating system.....	OC	OC
				Cabin supercharger.....	1000	EO
				Cabin heater.....	1000	1000
				Cabin pressure control unit and valve.....	OC	.....
				Fuel and Oil System		
				Flush oil tank, remove and clean hopper.....	EO	.....
				Fuel and oil system (aft of firewall).....	8000	9000
Hydraulic System						
				Flight Instruments		
				Airspeed ind.....	6200	6200(P)
				Altimeter.....	6200	6200(K)
				Turn and bank ind.....	2000	2800(P)
				Rate of climb ind.....	6200	6200(KP)
				Compass, magnetic.....	5000	5000(P)
				Gyro horizon.....	1000	1500(S)
				Directional gyro.....	1000	1600(S)
				A-3 autopilot bank and climb.....	2000	1600(S)
Accessories, Aircraft						
				Master Direction Indicator.....	1000(S)	3300(P)
				Indicator.....	OC(S)	4000(P)
				Fluxgate.....	.....	(Magnasyn ind.)
				Amplifier.....	1625(P)	3000(P)
				Transmitter.....	3300(P)	3000(P)
				Pilot system.....	OC	OC(K)
				Autopilot servo.....	9000	6000(S)
				Autopilot speed control valve.....	8000(S)

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Aviation
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For over a quarter century, Wittek has specialized in hose clamps, devoting craftsmen's skills to producing hose clamps of uniform accuracy in clamping action combined with superior physical strength, for dependable leak-proof hose connections. This experience is yours when you place your aircraft hose clamp requirements with us.



WITTEK FB55
(Radial Type)
Made of stainless steel and utilizing the Wittek Floating Bridge. Tested and proved for dependable service on all types of aircraft applications. Long accepted as the standard of the industry.

WITTEK WWD (Tangential Type)

Made of stainless steel and available in all standard aircraft sizes. Also furnished in diameters up to 12" for duct and other special applications. Permits easy installation when hose is in place.



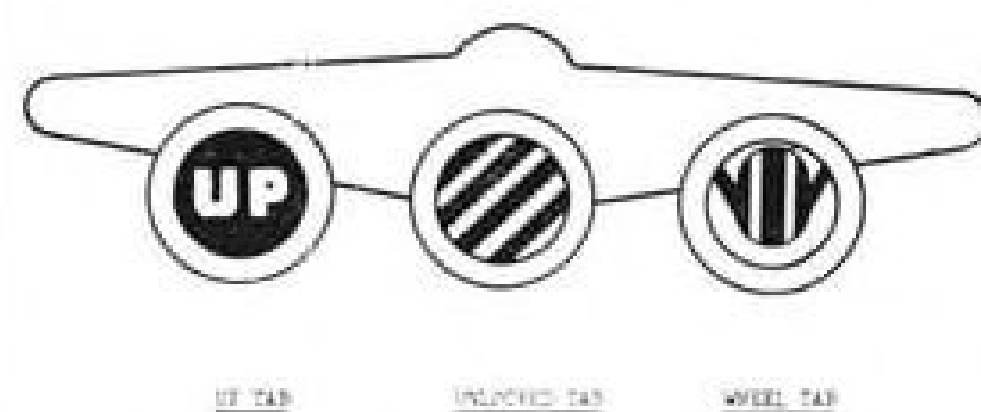
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4308 West 24th Place, Chicago 23, Illinois

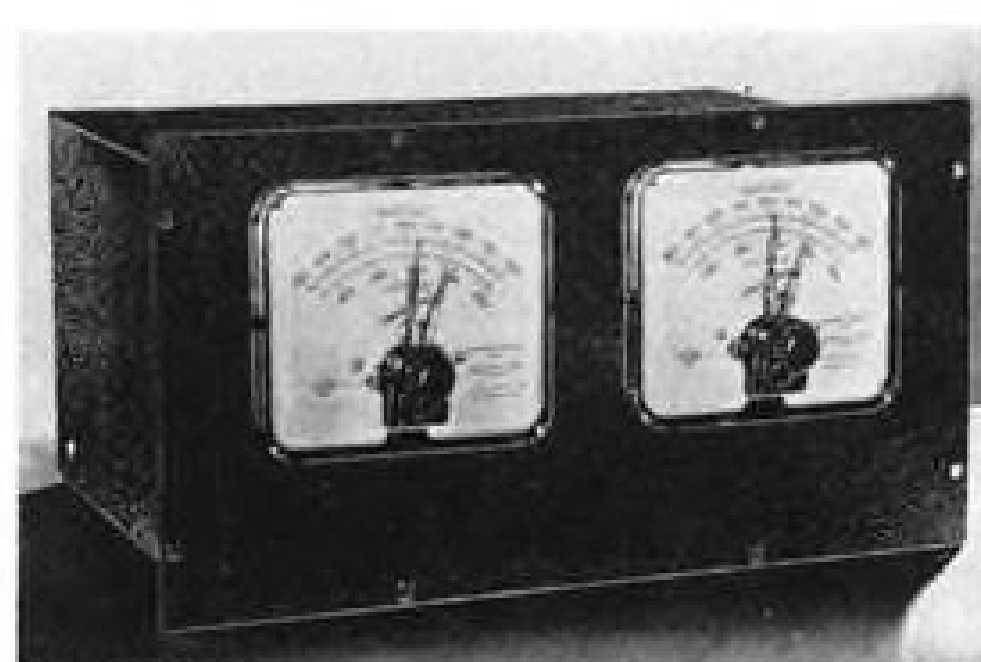
NEW AVIATION PRODUCTS



Position Indicator

A new landing gear position indicator developed by the Riverside Metal Co. puts that company in the aircraft instrument manufacturing field.

The indicator for each landing gear has three easy-to-read, rotating positions. Separate solenoids actuate the "up" and "down" flags appearing in the indicator dials as shown above. When neither solenoid is energized, an unsafe condition is indicated by a face with diagonal lines. Indicators are designed for mounting in banks of three, one for each wheel. Address: Riverside, N. J.



Hot Dimple Control

Latest hot dimple control on the market is the "Automatic Pyrometer Control" developed by Assembly Products, Inc., Chagrin Falls, Ohio.

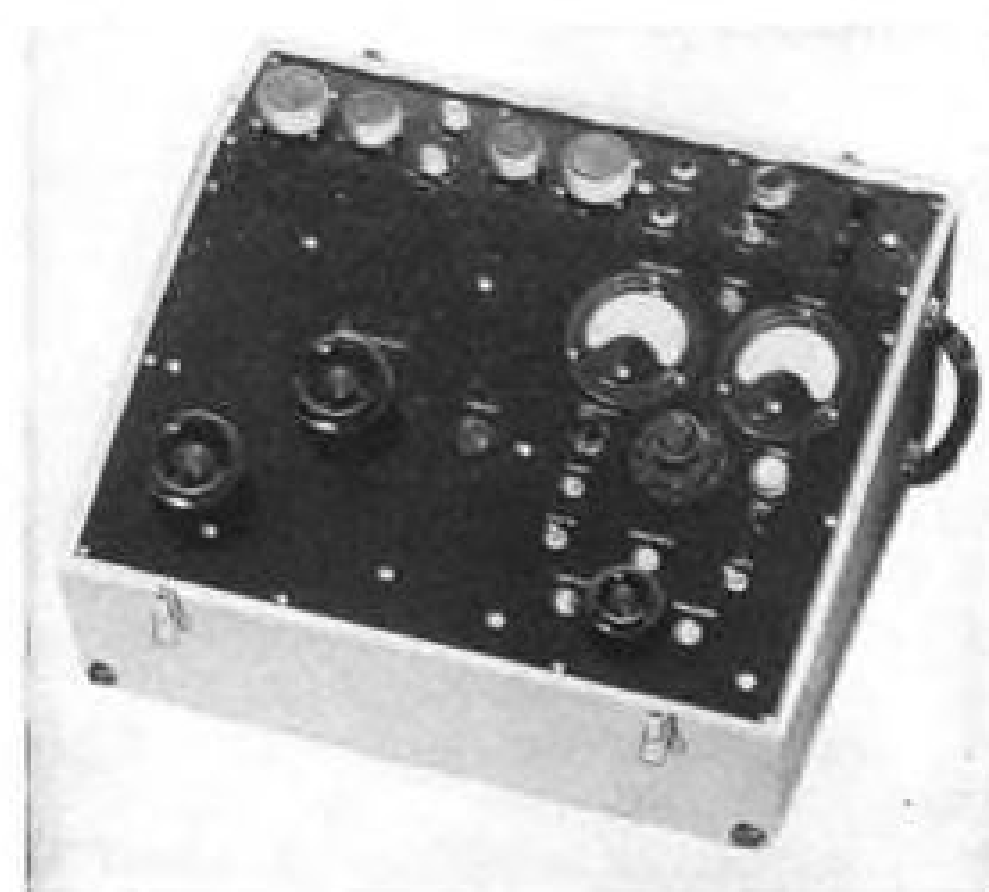
Keynoting simplicity, the company has provided the unit with two "Simplytrol" double-contact meter relays, one for each section of the die. Each has an on-off contact for regulating heat of die and a low limit contact for safety shut-off. Controls permit adjustment to any setting through a temperature range from 350 to 750F.

No vacuum tubes are used in the instrument. It is available as a single unit for control of individual dimpling machines or in a "Polypoint" model for independent control of a number of machines.

Rugged Switch

Meletron Corp. reports it has developed a pressure switch with a new diaphragm configuration which better withstands high frequency vibration encountered in various aircraft and rocket engine applications.

Tests have shown, says the firm, that response characteristics of the new switch, Model 710, "are consistent over a larger pressure range than before." Also, design approach has made possible construction of a unit that is smaller and lighter in weight, it adds. The device is available with a stainless steel pressure sensing element for use with most corrosive liquids and gases. Address: 950 N. Highland Ave., Los Angeles 38.



Speeds Wiring Tests

The time it takes to test multi-conductor cables in aircraft can be cut down as much as 90 percent by using a new test set recently placed on the aviation equipment counter.

That's the claim made by Welch Electric Co. for its "Universal Cable Harness Tester." This unit, says the firm, meets specifications drawn up by the Air Materiel Command. It is specially designed to check out multi-conductor cables used with aircraft radio, radar, lighting, instruments, control units and other equipment.

The set's effectiveness in cutting maintenance time and costs is well demonstrated in its use with the B-36. Wiring in this bomber now can be checked out in eight hr.—instead of 500 hr. formerly required to do the job, asserts the maker.

Operation of the tester, a portable type, is said to be quite simple. Cables are connected, type of test selected, then each conductor is checked out in rapid sequence by turning a contact selector which visually indicates the conductor being tested.

The instrument is equipped with a pair of co-axial cable connectors for testing RF and co-axial leads, a pair of 47-contact connector receptacles and a pair of 35-contact connector receptacles.

For continuity testing, a full ampere is passed through the conductor. If



...ULTRA-MODERN AVIATION FUELING

**Cities Service joins with Eastern Air Lines
to inaugurate another great advance**

The *Flat-Tops* are on duty now—making notable service records. With these remarkable new tank trucks, Cities Service is fueling Eastern Air Lines planes at LaGuardia, Newark, and Boston's Logan Airport. Never before has there been any approach to the safe, speedy, convenient fueling now made possible by Cities Service *Flat-Tops*.

You'll be interested in major *Flat-Top* features listed here. Each one adds evidence that Cities Service is in the forefront of aviation progress. That's why fields offering Cities Service products are winning preference today, among those eager for topnotch quality and service.

A FEW FLAT-TOP FEATURES

NO REELS . . . All hose lies flat—out of sight—on wide, flat metal grating above tank.

UTMOST SAFETY . . . Remote hydraulic drive from tractor engine, to slave pump, to high-speed fuel pump, keeps prime power far away from fuel outlets.

HINGED LADDER . . . Rises from flat position on grating; elevates and rotates as required; locks in place, with hose lifted on guide rails. No more auxiliary ladders to cause injury or damage.

SINGLE VALVE TO DE-FUEL . . . This is just one of many features for new simplicity and surety . . . for definite savings of time and labor with this extremely efficient tank truck equipment.

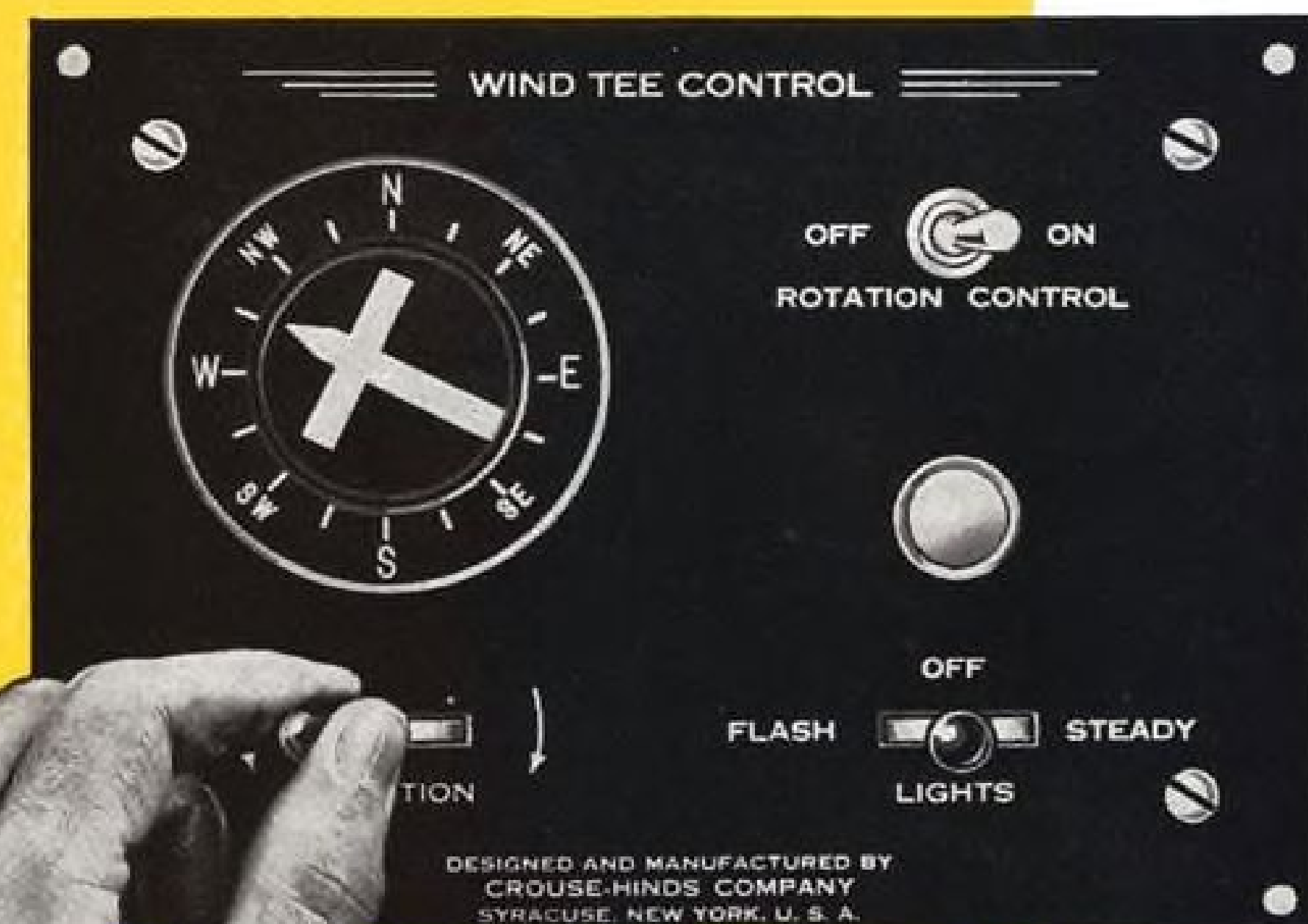
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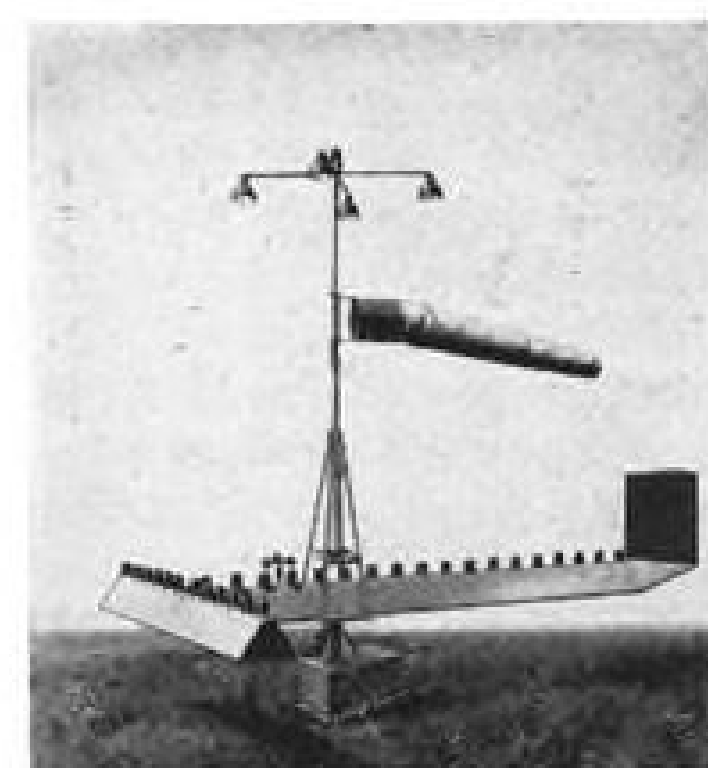
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CROUSE-HINDS WIND TEES

INDICATE THE
Best Landing Direction
DAY and NIGHT



Remote Operator Control Panel



Combination Wind Cone and Wind Tee

Crouse-Hinds Wind Tee serves as a continuous day and night indication of wind direction or preferred landing direction. It can be furnished either as a simple wind tee responsive to the wind only, or with accessories which make it completely automatic or controlled by a remote operator.

The wind tee gives the appearance of a single green "T" when viewed from above at night and a single stroke yellow "T" when viewed from above in the daytime.

- 1 **Standard Free Floating Wind Tee:** Responds only to flow of air. Constructed to meet CAA Specification L-808.
- 2 **Standard Free Floating Wind Tee with Position Indicating Transmitter:** Responds only to flow of air. Selsyn position indicator system shows true position of tee to operator in control tower.
- 3 **Wind Tee Complete with Automatic No-Wind Return and Position Indicating Transmitter:** Responds only to flow of air above predetermined low velocity (cutout velocity). The cutout velocity is adjustable between 5 and 15 mph. When wind drops below the cutout velocity, a motor automatically rotates the tee to the predetermined no-wind position (usually the preferred direction on the longest or preferred runway). The predetermined no-wind position is set mechanically in the base of the tee. The tee is held in the no-wind position until the wind velocity exceeds the cutout velocity when it again floats freely with the wind. The tee is complete

with selsyn position indicating transmitter.

- 4 **Wind Tee with Operator Control and Selsyn Position Indicating Transmitter:** Tee responds to remote operator control when wind velocity is below cutout velocity. When wind exceeds the cutout velocity, motor is automatically disconnected from the circuit and the tee floats freely with the wind, preventing damage to the tee in strong winds. Tee is complete with selsyn position indicating transmitter.

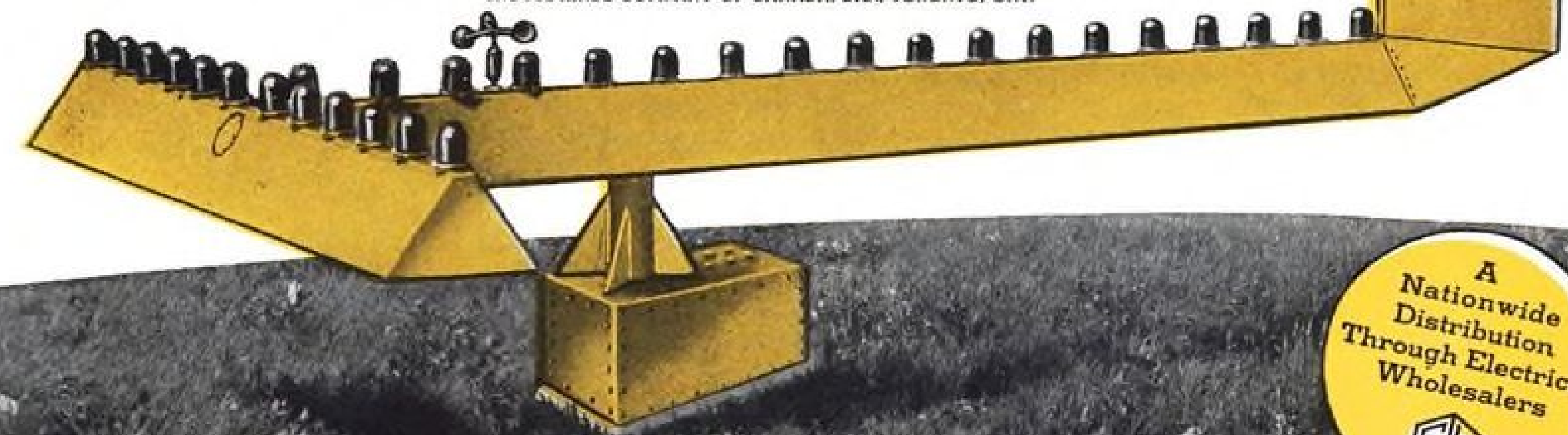
- 5 **Combination Wind Cone and Wind Tee:** It is always desirable to have a wind cone in addition to a wind tee. The wind cone is extremely sensitive and indicates wind velocity and true wind direction at all times. The addition of the wind cone is particularly recommended for the operator controlled tee and the no-wind return tee. If the wind cone and wind tee are mounted adjacent to each other on the ground, the pilot's view of the tee is obstructed by the wind cone at certain angles. Where the wind cone is mounted on top of the wind tee, a pilot can quickly and easily determine the best landing direction and also the actual behavior of the wind.

Special Features: A flashing mechanism and controls can be added to the wind tee circuit to provide operation of the lights either steady burning or flashing. Red lights can be furnished in addition to the green lights on the wind tee, which is sometimes desired for traffic control.

Write for additional information.

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NEW CLASS H* MOTORS PROTECTED BY DOW CORNING SILICONES

... the insulation that has already saved industry millions of maintenance dollars plus the hourly output of hundreds of thousands of men!

This most timely announcement caps the test program we started 8 years ago when silicone resins were introduced by Dow Corning Corporation. First we proved by accelerated life testing that silicone insulated motors had a good 10 to 1 advantage in life expectancy and wet insulation resistance. Then we sold silicone (Class H) insulation to the manufacturers of electrical equipment ranging from lift truck and traction motors to solenoid and brake coils. We also encouraged the better rewind shops to rebuild hard working industrial motors with Class H insulation.

Now we can proudly refer American industry to this goodly list of electrical manufacturers, all able and willing to supply electric machines protected by Class H insulation made with Dow Corning Silicones.

Take your special problems to the application engineer representing any of these companies or to our Product Development Engineers.

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* "Class H" insulation is the kind of insulation that keeps motors running in spite of "Hell and High water." (language dictionary)

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less than $\frac{1}{2}$ amp. passes, a pilot light indicates "open circuit." A separate light indicates a closed circuit. In insulation resistance checkouts, every conductor but the one being tested is grounded and 1500v. dc. applied. Leakage is positively indicated. Resistance is measured in megohms. The instrument is designed also for insulation breakdown tests, point to point checkout of any cable or part of the wiring system and similar work.

The device has luggage-type handles, weighs 62 lb., measures 24 $\frac{1}{2}$ x19 $\frac{3}{8}$ x10 in. Maker's address is 1221 Wade St., Cincinnati 14.

Terminal Seals

To be assured of positive, permanent sealing of electrical terminals used in the presence of gases or fluids, Franklin C. Wolfe Co. advises use of its rubber "Termin O Seals."

They are designed to prevent entry or escape of fluids or gases, depending on the application. The sealing glands are made of neoprene for installations where temperatures range from -67 to 225F.

Silicone rubber is used for temperatures from 100 to 500F. Termin O Seals, complete with studs and insulators, are available for high frequency applications and voltages up to 12,000v.

According to the company, the method of sealing is based on the principle that rubber released from pressure tends to return to its original shape. Actually, the sealing gland is a rubber ring compressed into a square section. The resulting configuration insures maximum recovery tension with a minimum of rubber volume, says the firm. Address: 407 Commercial Center, Beverly Hills, Calif.

Packing Case Hooks

To speed loading of heavy cargo and to cut handling costs, Neilson Wheel Co. is marketing a lift hook which is built right into the packing case as a permanent fixture.

Now, instead of wasting time lashing the load prior to lifting, the hooks on the box can be attached to the hoisting sling immediately and the load rapidly hauled away. Neilson says its hooks are the only ones "officially approved by the Air Force for engine packing cases."

Four hooks used for a single load are designed to lift 20,000 lb., says the company. General Electric Co., however, has established the breaking point for a single hook of this type at 13,000 lb., Neilson says. They are made of alloy steel, heat treated and zinc plated. Address: 1614 N. 12 St., Milwaukee 5, Wis.

Finest Buy in the Land...on Every Count!

NEW 1951 CHEVROLET Advance-Design TRUCKS

These new 1951 Chevrolet trucks are tops in value. They're tough and rugged. They're loaded to the brim with power. They're thrifty... move massive loads... handle like no other truck. Chevrolet's latest haulers have 51's finest new features, too. Features like new, super-effective brakes that are extra-safe and easy to operate. Features like Chevrolet's Dual-Shoe parking brake, Chevrolet's new Ventipanes and new cab seats that bring you comfort with a capital "C." Visit your Chevrolet dealer and look over these great new trucks. You'll find the right truck for *your* job!

CHEVROLET MOTOR DIVISION, General Motors Corporation
DETROIT 2, MICHIGAN



ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the 105-h.p. Loadmaster or the 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURATOR — for smooth, quick acceleration response • DIAPHRAGM SPRING CLUTCH—for easy-action engagement • SYNCHROMESH TRANSMISSIONS—for fast, smooth

shifting • HYPOID REAR AXLES—for dependability and long life • NEW TORQUE-ACTION BRAKES—for light-duty models • PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES—for medium-duty models • NEW TWIN-ACTION REAR BRAKES—for heavy-duty models • NEW DUAL-SHOE PARKING BRAKE—for greater holding ability on heavy-duty

models • NEW CAB SEATS—for complete riding comfort • NEW VENTIPANES—for improved cab ventilation • WIDE-BASE WHEELS—for increased tire mileage • BALL-TYPE STEERING—for easier handling • UNIT-DESIGN BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.



TEMCO Modifies C-54 for Air Evacuation

Modification by TEMCO of the familiar C-54 transport into flying hospitals for the Military Air Transport Service is proceeding at top speed. Designated as the C-54 M it was developed for the rapid evacuation of sick and wounded personnel from overseas bases.

These planes were previously used on the Berlin Air Lift to fly coal and more recently to fly supplies to our troops in Korea. Designed to provide stateside hospital accommodations to our fighting forces in any part of the world, they can be quickly converted into troop or freight carriers.

Features Greater Comfort and Better Medical Care

Nothing has been overlooked to make these planes comparable to the finest hospitals. They are outfitted with 32 litters in four banks of four each on each side of the fuselage. Aft of the litters is a galley, a nurses' medicine cabinet and complete toilet facilities. The ship is completely insulated and soundproofed with the outside top half of the fuselage painted with a special solar heat resisting white lacquer. Automatic disinsection and a revised oxygen system are significant among the many innovations that make for comfort in this new flying hospital.

Production Line Overhaul Is Unique with TEMCO

TEMCO has developed overhaul, modification and conversion on a production line basis to a point where it is the country's outstanding resource for this type of work.

Nearly five hundred Air Force Skymasters have been reconditioned or modified in the past two years. TEMCO craftsmen have fabricated over 1800 parts unobtainable from regular sources. Many planes destined for the scrapheap have been rebuilt by TEMCO and put back in service.

TEMCO to Manufacture Assemblies for Lockheed P2V Neptune

TEMCO has started work on an undisclosed quantity of major assemblies for an advanced version of the Lockheed Navy P2V Neptune patrol bomber. This is the plane made famous by the Navy's Truculent Turtle.

TEMCO
ENGINEERS AND MANUFACTURERS
FOR THE AIRCRAFT INDUSTRY

CONVERTS COAL CARRIERS TO
Flying Hospitals

Hospital accommodations comparable with the finest medical institutions are now available for the care of sick and wounded military personnel anywhere in the world. Carefully designed for every comfort and care including such innovations as automatic disinsection, the planes are capable of carrying 32 patients plus a medical crew of three. Formerly coal carriers on the Berlin Air Lift these planes are just a part of over 500 C-54's converted, modified or overhauled by TEMCO in the past two years.



Texas Engineering and Manufacturing Co., Inc.
DALLAS, TEXAS

Code Tape

Electrical wiring, tubing, fuse boxes, motors, spare parts and other components for aircraft can be conveniently identified through use of Lablon pressure sensitive tape, made by Lablon Tape Co., Rochester, N. Y.

Any part number or code designation can be written or typed on the tape before it is applied to the part to be identified. The material has "built-in" writing qualities, depending only on pressure. A nail could be used, for example, to raise sharp colored numbers or lettering. This provides a label which cannot be affected by water or oil, that is smudge-proof and resistant to acids and weathering, says the company.

The tape is designed to adhere at temperatures from -40 to 150 F. It is made of two layers of acetate with a white, waxy substance sandwiched between, and can be moved from one surface to another repeatedly without leaving a sticky residue or destroying its adhesive qualities, according to the maker. The tape is available in various widths and lengths and reportedly is being used in large quantities by the Air Force.

Limit Drive Load

Type AYLC torque limit actuators now being marketed by Barber-Colman Co. are designed to stop operation when load on driven part exceeds rated capacity.

These units are claimed to give positive, accurate positioning and are available with a wide range of gear reductions for loads up to 500 lb. in. Travel from a few degrees up to several hundred shaft revolutions is possible with no adjustment.

Designed to meet all applicable AN specifications, they can be supplied with various mounting arrangements as desired, different types of drives and with or without radio noise filters. Address: Rockford, Ill.

ALSO ON THE MARKET

Angle saw guides, for standard "DoAll" band saws of 16- to 60-in. throat capacity, enable all models to cut work of as much as 15 in. diameter to any length and desired angle. Made by DoAll Co., Des Plaines, Ill.

Plier-type toggle clamp is hand tool designed to provide positive holding pressure with firm toggle locking action. Unit has forged steel jaws and handles, weighs 5 oz. Detroit Stamping Co., 302 Midland Ave., Detroit 3.

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AMPHENOL

CABLES

AMPHENOL coaxial cables made with Teflon dielectric have low loss and perform satisfactorily at temperatures as high as 500° F. Covering the Teflon dielectric are two silver coated shields and two wrappings of Teflon tape. The jacket consists of two fibre glass braids impregnated with silicone varnish which is oven baked to provide maximum moisture and abrasion resistance.

CONNECTORS

Because impedance specifications of Amphenol RF Connectors can be depended on, no line unbalance is inserted, nor is the standing-wave ratio increased. Amphenol RF Connectors meet the exacting requirements of laboratory applications—have longer leakage paths, lower loss.

The 82 series connectors illustrated are weather-proof type HN connectors for use with 50 ohm cable. These connectors have full 4Kv. rating when used with Silicone Compound and may be used with 70 ohm cables when impedance is not critical.

The 83 series UHF connectors illustrated are low cost general purpose connectors ideal for laboratory applications. Not constant impedance, but suitable for general RF transmission below 160 megacycles.

Teflon inserts are standard on the connectors illustrated and will be supplied with any AMPHENOL RF connector on special order.



AMERICAN PHENOLIC CORPORATION
1834 SOUTH 54th AVENUE CHICAGO 50, ILLINOIS

PRODUCTION



INTEGRALLY STIFFENED skin section, forged in one piece on Wyman-Gordon Co.'s 18,000-ton Mesta press, replaces part usually made of 25 individual pieces.

Tests Show Value of Press-Forging

Lockheed and Wyman-Gordon complete preliminary study on forming integrally stiffened structures.

Lockheed Aircraft Corp. and Wyman-Gordon Co. have finished their USAF development contract calling for preliminary investigation of press-forging methods of manufacturing integrally stiffened structures. Now they are negotiating for a contract to study the method further.

William Schroeder of Lockheed's engineering staff tells AVIATION WEEK he is confident present work can be improved greatly with additional research, and more and bigger machines. Not all the problems of press-forging are yet understood.

► **Need for Bigness**—Machines are the most pressing problem. The only machine big enough to press-forge parts is Wyman-Gordon's 18,000-ton Mesta. (The Germans used a 30,000-ton press.)

Bigger machines will be forthcoming under Air Materiel Command's heavy-press-forging program at Adrian, Mich.

The progressive program calls for several 25,000-ton and 50,000-ton presses and a giant of 75,000 tons. Reported cost of the latter is in the neighborhood of \$6 million, and construction probably is several years away.

When these machines are built and the press-forging process perfected, Lockheed engineers think integral stiffened panels can be press-forged in sizes up to about 8 x 10 ft.

► **What's Being Done**—Here is the story of Lockheed and Wyman-Gordon's progress to date.

When they started two years ago, the forging of integrally stiffened structures seemed highly impracticable because of

the extremely thin-skin thickness required. First trials consisted of forging panels two feet square from round billets. These trials resulted in failure of the dies by deflection. Next, plates ranging in thickness from $\frac{1}{8}$ to $\frac{1}{4}$ in. were pressed, and final skin thickness of .006 in. reached.

Other tests consisted of attempting to press this typical panel to that proper thickness, but because of the lack of sufficient pressure it was not obtained. For example, a 14S plate .364 in. thick was pressed to a skin thickness of .180 in. Ultimately a $\frac{1}{8}$ -in. sheet was pre-forged to desired shape, then in the final forging operation reduced to .140 in. with vertical legs as much as one inch in height. Biggest panels attempted were about 3 x 4 ft.

► **Power Problem**—The first big problem the engineers bumped into was the tremendous power required to press-forge—which proved much greater than anyone imagined when the program was begun. This was another reason for accelerating the Adrian program.

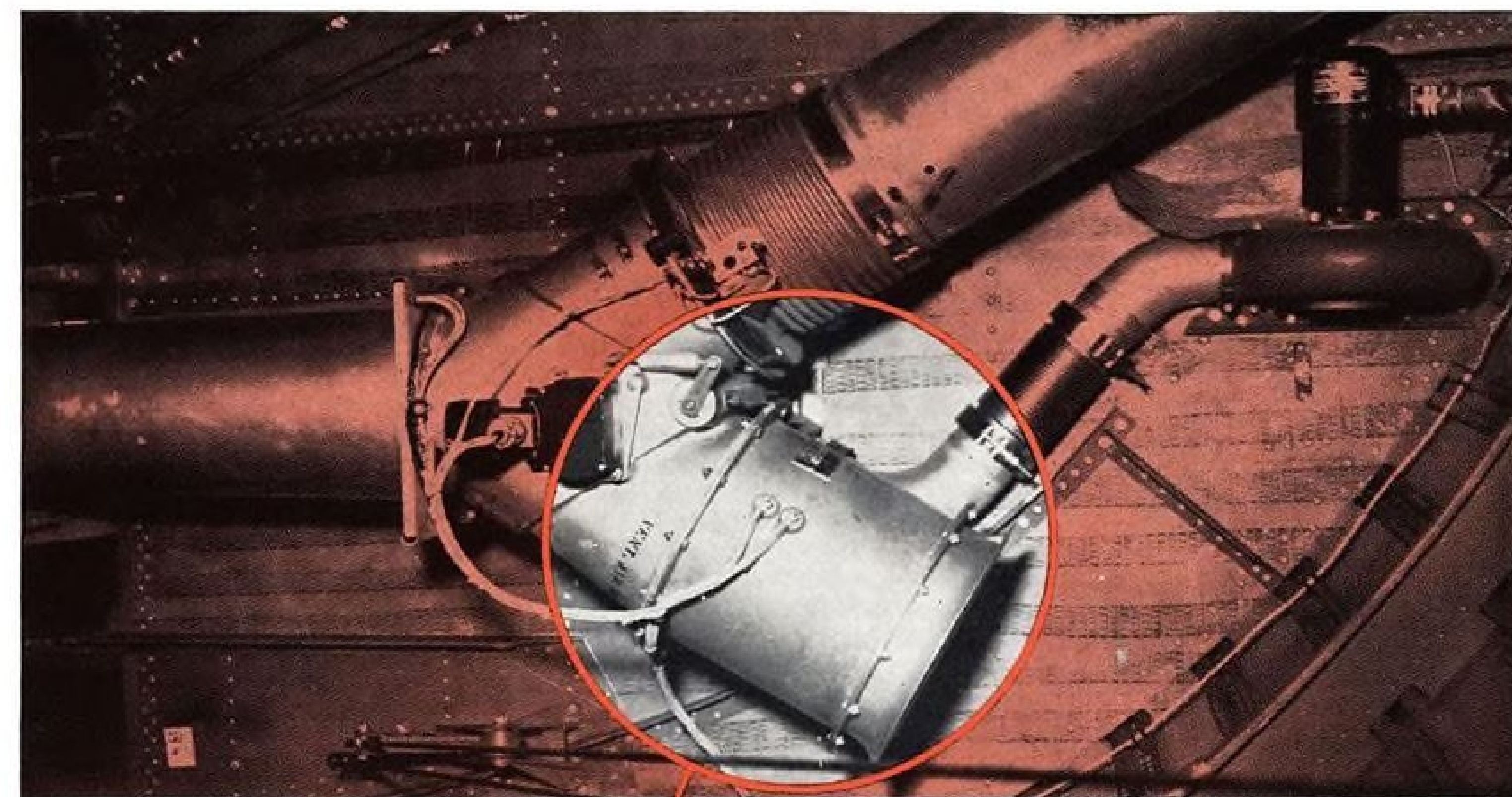
The other problem was that of the die and bed deflections, which resulted in non-uniform skin thickness. This has not been satisfactorily solved yet, but Schroeder points out the process is just in its infancy.

For the moment, Lockheed believes it is more economical to forge flat than to finish contour. One reason is that forging dies that will produce a part to finished contour are more expensive than dies producing only a flat blank. Also, as long as the non-uniform skin thickness problem is with us, the press-forged parts are going to require considerable machining.

The problem of machining for desired accuracy at joints and other attachments would be more difficult in a formed part than in a flat. Also, press-forged parts require a certain amount of machining under an circumstances, as with all forging processes. With better press-forging methods, less machining will be required.

► **Hot Forming**—Fortunately, the strong aluminum alloys such as 14S and 75S, as well as the newcomer to aircraft, titanium, lend themselves well to hot forming techniques. And, by hot forming, heat and treat warpage and spring-back are eliminated. Tighter bends are obtained with a corresponding reduction in weight, and for the very notch-sensitive alloys, the tendency to crack is avoided.

Lockheed learned that press-forged parts, like other types of integrally stiffened structures, save considerable weight. A typical wing panel weighing 76 lb. in conventional construction weighs only 56 lb. as an aluminum alloy forging. If forged from magnesium alloy, weight would be 46 lb. With practical exploitation of the press-forging



JOY AXIVANE[®] AIRCRAFT FANS

warm airborne troops before take-off

To protect our airborne troops in frigid areas before take-off, Joy AXIVANE Aircraft Fans are installed in these huge troop-carriers to blow heated air into the main cabin while the plane is on the ground. Ram effect is utilized for this purpose after the carrier is airborne. Air from the fan is mixed with a metered stream of air from the heater to provide the desired air temperature in the duct. Thus, cold weather is no hindrance to the fast, efficient transportation of our fighting men to any theatre.

This highly-efficient 1.5 H.P. fan produces 1100 C.F.M. at 5.5" static pressure, yet weighs only 22 pounds and is only 9" in diameter. A & N design specifications. Superior features of all Joy Aircraft Fans are compact design, shock-resistant strength, minimum operating noise, and the most favorable air volume-to-weight and electric-to-air power ratios.

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Here are some of the many uses for Joy AXIVANE Aircraft Fans: Windshield de-frosting, windshield or wing de-icing, cabin heating, cabin ventilating, cockpit heating, cooling radio and electronic equipment, cooling voltage regulators, oil cooling, gear-box cooling, instrument cooling, air recirculation, and high-altitude pressurizer boosting.

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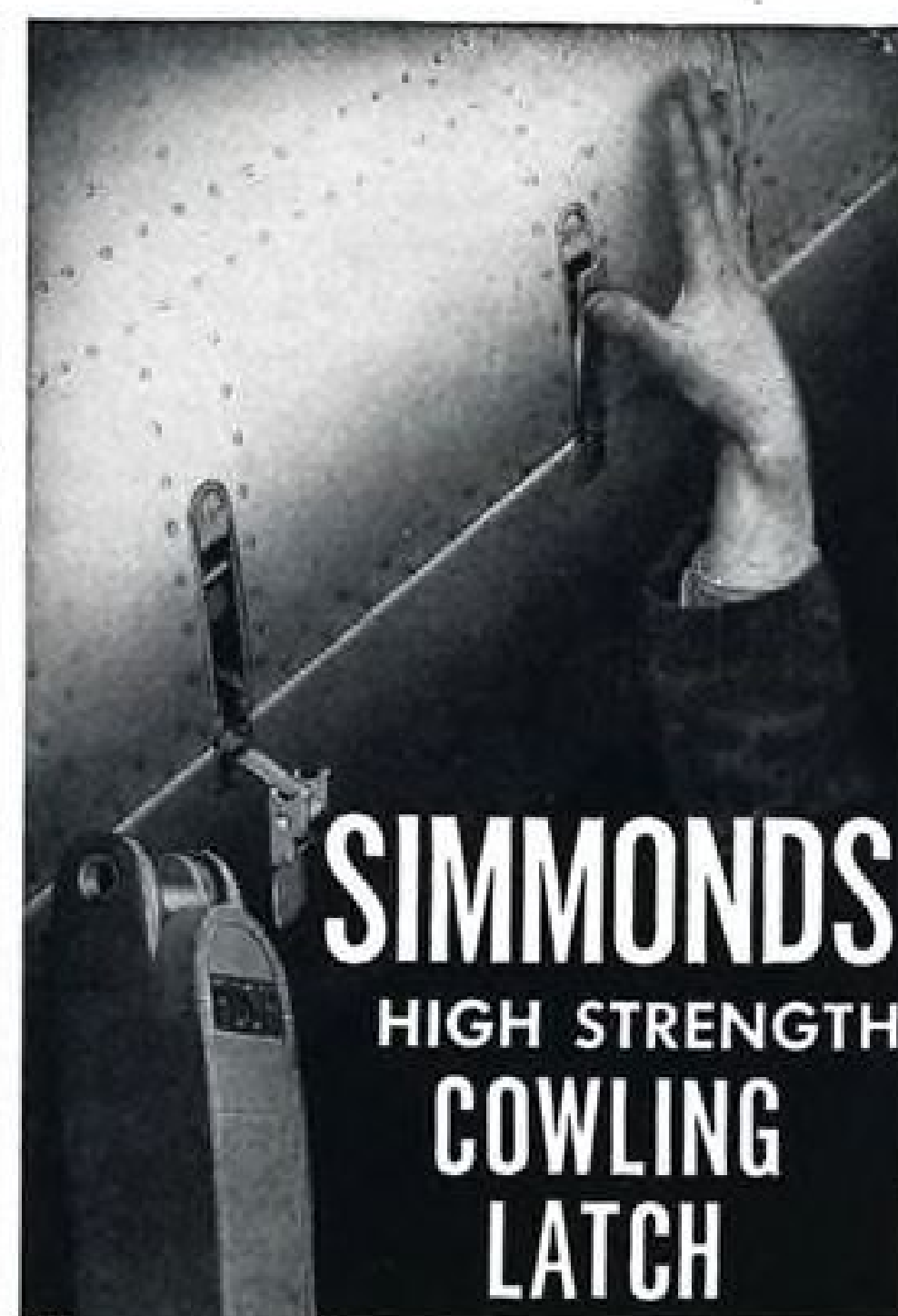
The precision process originated by Austenal Laboratories, Inc. for the production of castings of intricate design using the high melting point alloys where surface smoothness and dimensional uniformity are mandatory, requiring little or no machining. Write for literature and complete information.



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SIMMONDS

HIGH STRENGTH COWLING LATCH

Can take quite a beating **AND**
You can't beat it for . . .

- POSITIVE LOCKING
- FLUSH FITTING
- TOGGLE ACTION
- HIGH SHEAR LOAD
- DURABILITY

This compact, light Cowling Latch assures a flush exterior at all times and is unusually simple in operation. There are no loose parts, just a housing and a toggle assembly.

Four sizes accommodate all cowling curvatures from 23 inches diameter to flat. Suitable for either hinged or detachable panels. Positive safety lock. Just four bolts required for installation.

The Simmonds High Strength Cowling Latch weighs from 6 to 8 ounces and carries an ultimate load of about 7,000 pounds in tension and 9,000 pounds in shear.

Although designed for engine cowlings, this unique device is finding practical applications on cargo doors, access panels, armament compartments, propeller spinners and other places where high strength fastening is required.

Our engineering and development division is ready to study your aircraft fastening problem and adapt this product to your standard or special requirements. We will be glad to send complete details and specifications.

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"S" MONEL

A casting alloy offering extra hardness at elevated temperatures, pronounced resistance to galling and seizing, and excellent corrosion resistance.

One of the hardest and strongest of the non-ferrous casting alloys, "S" Monel is particularly suitable for parts subject to high stress and severe friction under corrosive conditions.

"S" Monel's low coefficient of expansion, high density and corrosion resistance enable it to give excellent service where clearances are small and operating temperatures subject to considerable variation.

The principal characteristics of "S" Monel are:

Typical Applications of "S" Monel

valve discs	bushings
valve seats	sleeves
impellers	ejector nozzles
wear rings	direct-acting pump liners

Mechanical Properties of "S" Monel*

(Age-hardened)

Yield Point	80-115,000 psi
Tensile Strength	120-145,000 psi
Elongation in 2-in.	4-1%
Hardness (Brinell)	300-375
Coefficient of Thermal Expansion (32°-212°F.) in./in./°F. . . . .	.0000068

Hardness of "S" Monel at Elevated Temperatures*

(As-cast condition)

Temperature, °F.	Brinell Hardness
Room	321
700	321
800	311
900	311
1000	321
1050	335
1100	293

*Average properties—not to be used for specification.

Hardness: "S" Monel can be age-hardened to 300-375 Brinell. It retains this hardness even at elevated temperatures. (See table.)

Resistance to Galling: "S" Monel is superior to most other hard metals in its ability to resist galling under severe conditions of pressure and friction. Often where lubrication is poor or absent entirely, "S" Monel has shown unusual resistance to seizing.

Corrosion Resistance: "S" Monel is relatively unaffected by most commonly-encountered corrosives . . . reducing acids, organic acids, acid and neutral salt solutions, strong alkalis, dry gases, and most atmospheres.

Erosion Resistance: Because of high hardness and toughness, "S" Monel resists damage caused by cavitation, erosion, "wire drawing," and particle abrasion.

Machinability: "S" Monel can be machined as-cast, and preferably so when only a moderate amount of machining is to be done. For extensive machining, the castings may be softened to 235 Brinell by heat treatment. Subsequent heat treatments can restore hardness to the level of 300-375 Brinell.

Weldability: "S" Monel is *not* recommended as a weldable material.

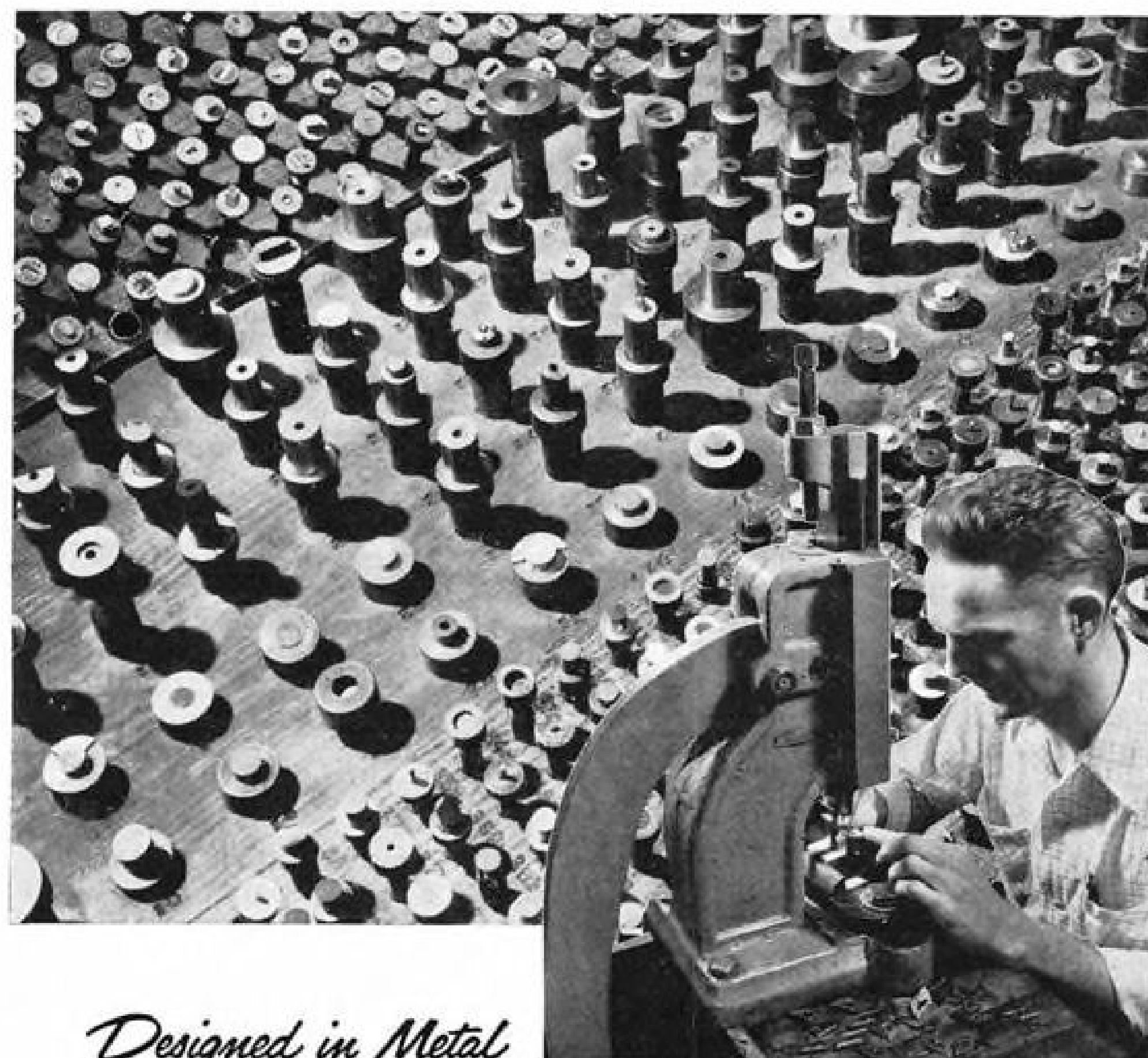
Additional Engineering Data Available

If you think that a corrosion-resisting casting might solve one of your operating problems, write to INCO's Technical Service Section outlining the problem. They will help you in every way they can.

THE INTERNATIONAL NICKEL COMPANY, INC.
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MONEL® • "R"® MONEL • "K"® MONEL • "KR"® MONEL • "S"® MONEL
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Designed in Metal

TO GIVE YOU SAMPLES *before* BLUEPRINTS

Every new SPEED NUT design is worked out on manual presses to provide samples for testing and approval BEFORE blueprints of the part are drafted.

SPEED NUT time-savings begin early. Experimental samples are created faster because Tinnerman engineers streamline the design process.

A design-in-metal is created with only a rough draft as a guide. Dies that pierce, bend, trim are selected from thousands like those illustrated above. These are set up in a series of manually operated presses to shape bits of metal into fasteners engineered for specific fastening functions. The samples produced are accurate prototypes of the finished fasteners, and can be used for mock-up assemblies.

These parts are then tested and approved by the customer before blueprints are drafted and the fastener is put into production.

In times like these, high-g geared fastener engineering saves valuable production hours and profit dollars. Proof of Tinnerman's ability to serve you is outlined in a new 20-page booklet, "A Story of Quality." Write for your copy. TINNEMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, Ohio. In Canada: Dominion Fasteners Ltd., Hamilton. Distributor: Air Associates, Inc., Teterboro, New Jersey.



process several years away, Lockheed is going ahead with other methods of making the integrally stiffened structures, particularly milling on a machine. Lockheed plans to spend between \$350,000 and \$400,000 for one machine to mill wing and fuselage skins with surface stiffeners from aluminum billets.

► **Present Uses**—In addition, Lockheed is increasing greatly its application of integrally stiffened structures. The F-94C will have the integrally stiffened panels from the leading edge to the beam and from the root to the wheel well section of the wing. The newest Constellations rolling off the assembly lines soon will employ integrally stiffened skins over most of fuselage area.

As another example, the Navy wants to hang yet another 1000 lb. of electronic gear on the P2V. That means Lockheed engineers will have to trim the weight out of the structure of the airplane, and that of course calls for more weight-saving integrally stiffened structures.

Reynolds To Manage Adrian Pilot Plant

Management of the \$20-million government-owned USAF Manufacturing Methods Pilot Plant, Adrian, Mich. has been taken over by Reynolds Metals Co. from the Gerity-Michigan Co. The facility, which will be operated by Reynolds on a no-fee, no-profit basis, will be used for developing forging and extrusion techniques and the proving of theoretical designs in light metal parts for aircraft of advanced design.

Facilities at Adrian have already been used to work out problems of a number of large firms. One recent instance were the experiments Curtiss-Wright conducted there on extruded hollow steel propeller blades (AVIATION WEEK, Mar. 19).

Equipment already in the plant consists of 15 hydraulic presses, one of 5500-ton capacity. Others include three 3850-ton, three-2750 ton and four 1650-ton presses. Now being installed are four forging presses brought from Germany, formerly belonging to the I. G. Farben Co., one of which has a capacity of 15,000 tons. The others are of 7000, 2000 and 600-ton capacity.

California High In USAF Awards

California was away out in front of every other state dollarwise in garnering competitive and unclassified USAF contracts awarded between Nov. 15, 1950 and Feb. 15, 1951, as listed in the privately-published quarterly, U. S. Bid Information.

The aviation center is listed as having

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Always first

Aeroquip FLEXIBLE HOSE LINES are by far the most widely used in the aircraft industry. Symbol of dependability, Aeroquip has consistently met the exacting requirements of major

aircraft manufacturers. Aeroquip's progress is paced by competent research and engineering staffs, alert to every new development in the aircraft industry.

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CONVAIR
B-36

by
Swedlow

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

- Boeing Airplane Co.
- Hiller Helicopters, Inc.
- Lockheed Aircraft Corp.
- McDonnell Aircraft Corp.
- North American Aviation, Inc.
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PLASTICS CO.

The Consolidated-Vultee B-36, world's largest bomber, can carry a heavier load of bombs for a greater distance at a higher altitude than any other aircraft in existence.

This superlative weapon in the arsenal of democracy is a masterpiece of precision manufacture. Every component part must achieve a peak of perfection worthy of the great role the Convair B-36 is to play in our armed forces.

SWEDLOW was selected to produce the laminated acrylic enclosures for the B-36 because of a 15-year record of leadership in acrylic fabrication, specializing in aircraft applications for the Air Force and Navy of the United States.

- We also serve the industry with improved fuel cell backings in accordance with applicable Air Force, Navy and customer specifications.

LOS ANGELES, CALIFORNIA • YOUNGSTOWN, OHIO

gotten \$195,822,876 in AF awards, runners-up being Michigan (\$33,266,695) and New York (\$33,257,796). New York, however was credited with the largest number of announced contracts, 173, with California and Ohio trailing with 135 and 108 respectively. A total of 21 states are listed in the directory as having gotten no competitive and unclassified USAF contracts in this period. Four of the states—Arizona, North Dakota, South Dakota and Wyoming—did not participate at all in the announced awards listing.

Announced USAF contract awards in order of total dollar values are as follows:

- Calif., \$195,822,876.
- Mich., \$33,266,695.
- N. Y., \$33,257,796.
- Ohio, \$32,228,031.
- N. J., \$11,583,895.
- Ind., \$10,481,882.
- Pa., \$7,449,719.
- Kan., \$3,129,119.
- Minn., \$4,114,175.
- Conn., \$3,489,901.
- Ill., \$3,481,156.
- Mass., \$3,382,996.
- Md., \$2,687,833.
- Tex., \$1,545,565.
- Mo., \$1,534,227.
- Wash., D. C., \$1,308,354.
- Wis., \$870,876.
- Ky., \$594,904.
- R. I., \$444,995.
- Wash., \$372,564.
- Neb., \$286,383.
- Okla., \$203,194.
- Me., \$141,366.
- N. C., \$95,371.
- Iowa, \$91,339.
- N. H., \$63,735.
- Va., \$43,073.
- Del., \$34,761.

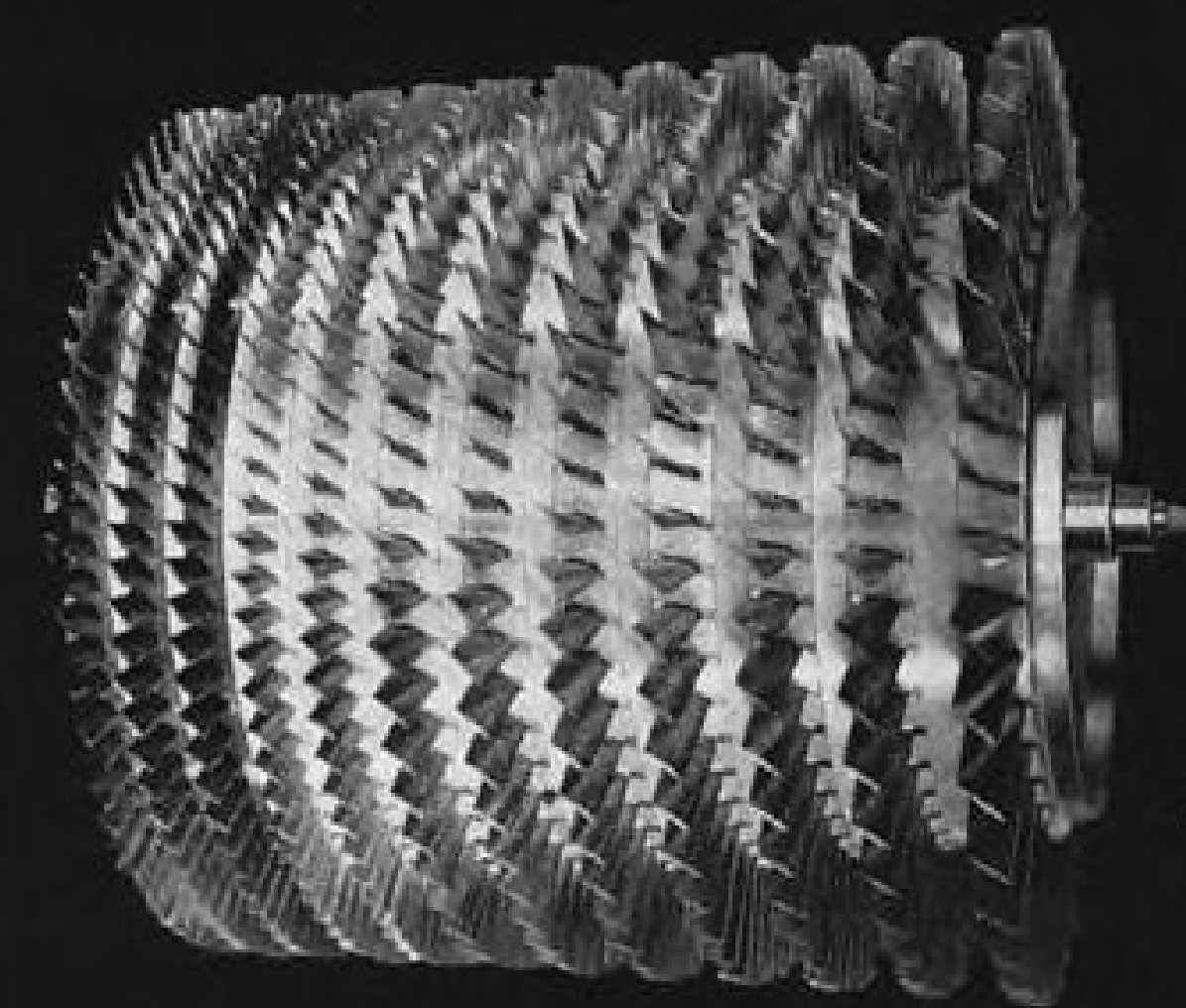
Boeing Plans More Equipment Spending

Boeing Airplane Co. will spend \$5.5-million for new machinery and equipment at its Seattle and Renton, Wash., plants, in addition to orders totaling \$4.5-million already placed for machinery, tools and mobile equipment, President William M. Allen has announced.

New buildings may be required to house some of the equipment. The Austin Co., engineering and construction firm which built Boeing's main Seattle plant, is conducting surveys in conjunction with Boeing's plant engineering department to determine the building needs. The firm for some time has been considering construction of a flight-test center on Boeing Field across the street from its main Seattle plant.

The expansion program has been brought about by production orders for two B-52s and the acceleration of work programs already under way,

Jet Compressor Parts



Above: Complete rotor assembly for turbojet engine, manufactured by the Robbins Engineering Company.

Below: Compressor blades for turbojet aircraft engines. Robbins Engineering specializes in the production of rotor components and complete rotor assemblies.



Machined and Assembled to Rigid Specifications

The machining of jet compressor parts and the assembly of complete rotor units require an organization having specialized tooling and inspection equipment and plenty of aircraft know-how. Turbojet engine builders are enthusiastic about the work of the Robbins Engineering Company, a subsidiary of Ex-Cell-O Corporation.

The Robbins organization is cooperating whole-heartedly with the program to build up air power for the defense of our country. All its efforts will be directed toward this end in the present emergency.



ROBBINS ENGINEERING COMPANY
Subsidiary of

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

the fast, easy
way to solve your
temperature control
problems

Consult your **VAPOR** engineer
with 50 years background and experience
in engineering research and
manufacturing controls for transportation

VAPOR controls
are tailor-made
to meet specific
requirements

Whether the system requires Vapor's basic Mercury Tube or the more critical Electronic controls, Vapor engineering offers the only advancement in controls... Smooth Pulse Modulation. Through current applied intermittently to the actuator, "Smooth Pulse" action on valves and actuators insures longer life and dependable, trouble-free service.

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☐ CARBURETOR TEMPERATURE CONTROLS, Bulletin No. 549
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Name Title
Company
Address
City () State

Allen said. These programs include the production of B-50s and C-97s and the modification of B-29s and B-50s. The present modification contract is expected to be completed by June but new orders are expected.

Deliveries on equipment already ordered will begin in April. Some of the 4800 machines and tools on order include a 7000-ton hydro press costing \$250,630; a horizontal Keller milling machine, 7x16-ft., \$114,055; an air-treat furnace to handle sections up to 5x11x22-ft., \$100,000; equipment to hot-form magnesium, \$67,000; spar cap milling machine, \$100,000; automatic-contour milling machine, \$90,000; two 15-ton overriding bridge cranes, \$47,000.

Ordnance Exhibits For Industry

Taking its cue from the highly successful contractors exhibit the USAF ran in New York during February to attract small business firms into essential defense subcontracting (AVIATION WEEK, Mar. 5), Army Ordnance is setting up somewhat similar displays at its 14 offices throughout the country.

Ordnance exhibits will include samples of representative components of ammunition and other materiel, display boards, photos and other essential manufacturing information pertaining to Army military needs.

A further purpose of the shows will be to emphasize that Army contracts are negotiated in the District offices and not in Washington.

PRODUCTION BRIEFING

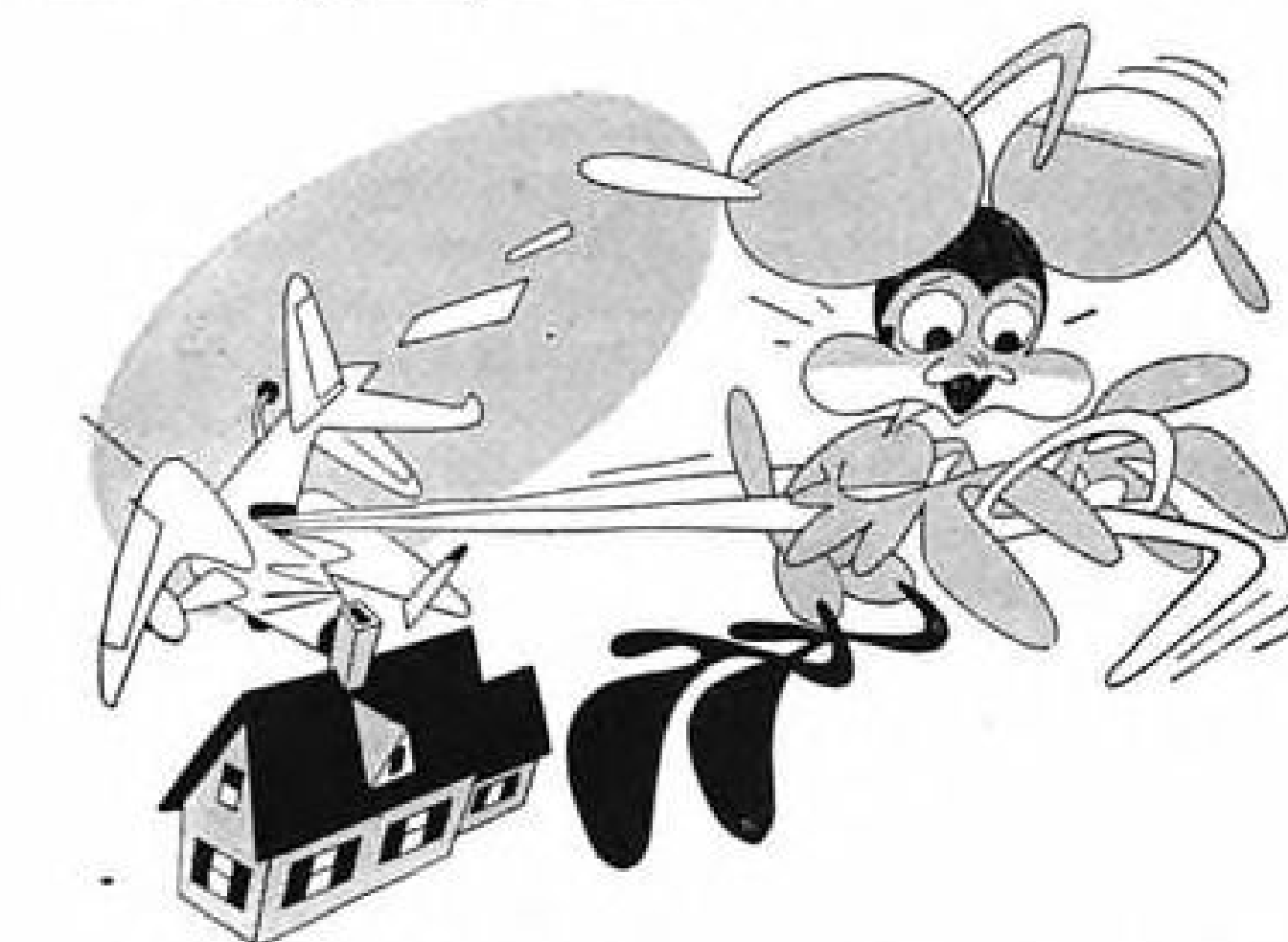
► **Aeroquip Corp.**, Jackson, Mich., has purchased all the outstanding stock of one of its substantial subcontractors, Metalco, Inc., also of Jackson. The new acquisition will continue as a subsidiary. The parent firm is negotiating for lease of a larger plant in Cheboygan, which will more than triple present Metalco floor space.

► **Boeing Airplane Co.** employment at its Renton and Seattle plants has passed the 25,000 mark, with a continuing need for many tool designers and production planners... Pratt & Whitney has hired its 20,000th worker, a more than 5000 increase in the past 12 months.

► **Ontario Hughes-Owens Co. Ltd.**, has been purchased for over \$1 million by Sperry Corp. of New York and its Canadian subsidiary, Sperry Gyroscope Co. of Canada Ltd. The facility will be used for sales, service and repair of



Hold tight, Kiddies, the safety boys are at it again, and as usual making plenty of sense!

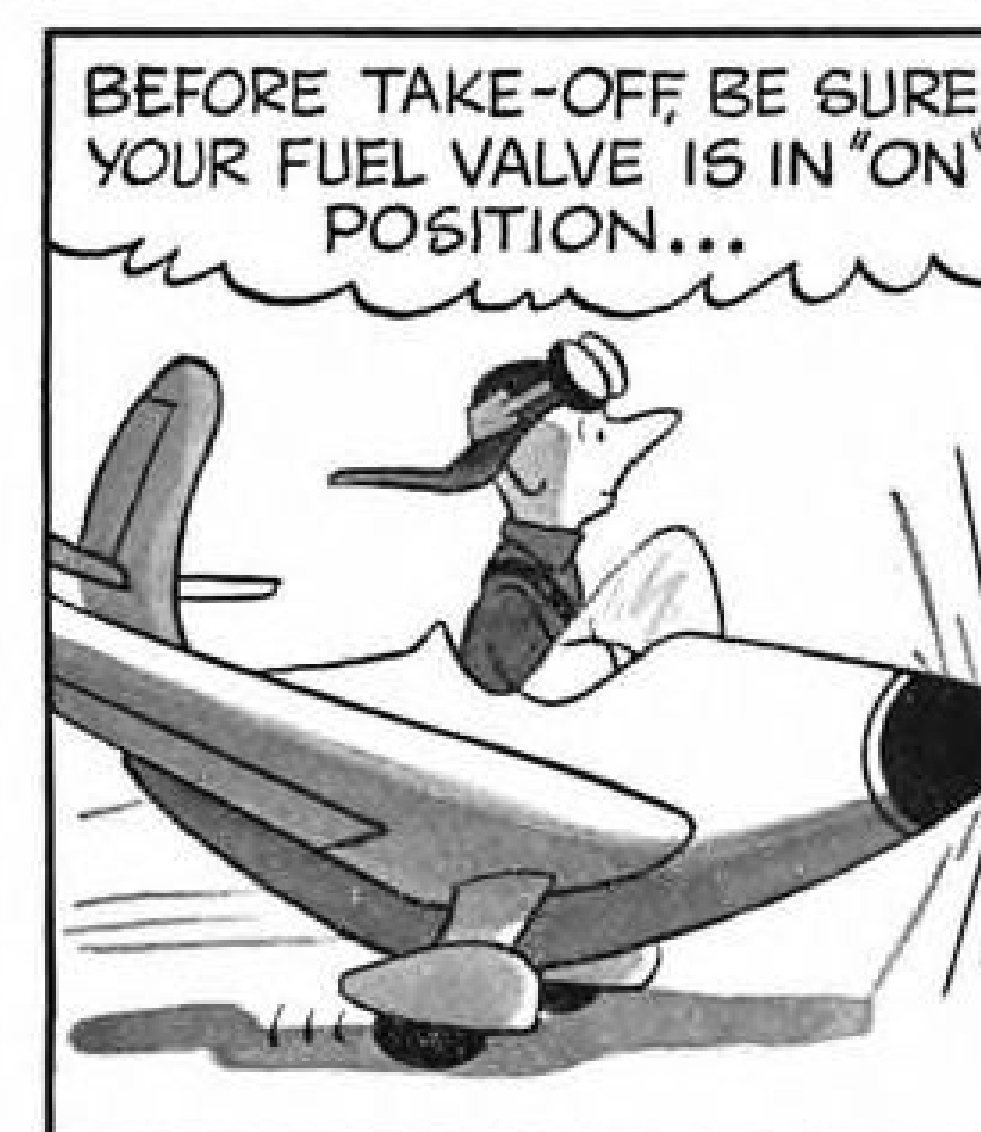


This time it's shoulder harnesses, those ingenious little devices that keep a pilot from folding up like a Parker House Roll if he crashes.

Sure, your safety belt will reduce the danger of an accident, but it can't hold a candle to a shoulder harness when it comes to over-all protection.

Now, let's assume you're coming in for a crash landing wearing a shoulder harness. Oops, watch that house, look out for those trees! CRASH!

See—what did we tell you! Instead of doubling up like a two-bit jackknife, you just sat there and let the harness take up



Gulf Oil Corporation . . . Gulf Refining Company

most of the shock. And notice, Ferdie, your head's still against the seat instead of bumping against the instrument panel. Hey, Ferdie, speak to me!

But all kidding aside, shoulder harnesses are sure to reduce the seriousness of a good many mishaps!



AND ANOTHER THING!

Don't expect that power plant of yours to purr like a kitten on just any old oil.

Use psychology! Gulfpride Aviation Oil—Series D—is the finest detergent dispersant oil for horizontally opposed engines in the world. It's seen in the best crankcases!

Pamper those valves and rings with the only aviation oil put through Gulf's exclusive Alchlor process to remove those extra carbon and sludge formers!

Dividends! Why, brother, use Gulfpride Aviation Oil—and increase those periods between overhauls up to 100%! Yes, 100%!



"WE DO SEE THE TREES, SIR"

Even though the forest of demand for TMI stainless steel tubing is punctuated by the fever of the national emergency and aviation's extraordinary requirements, TMI places its prime emphasis on the fundamental reasons which are responsible for its steady growth "before Korea": Consistent Quality and the Ability to meet Delivery Deadlines. These are the "trees" . . . and your guide to



STAINLESS STEEL TUBING

Our triple-capacity plant is devoted exclusively to the production of small diameter cold-drawn stainless steel tubing with the same consistent skill which built TMI's reputation for more than a decade. This production is at the service of today's great aviation industry . . . obligated to unexcelled performance and greater horizons of accomplishment.

TUBE METHODS INC.
METALLURGISTS • ENGINEERS • MANUFACTURERS
BRIDGEPORT (Montgomery County), PA.

"You should be on our mailing list. Tell your secretary to send your name today."
DOC T.M.I.



the company's products in Canada, along with Lewis and Kollsman products.

► Lockheed Aircraft Service's facilities at Burbank, performed 841,360 work-hours on 352 aircraft last year, with military work accounting for 65 percent of the total.

► Modglin Co., Inc., Los Angeles, sheet metal workers, is setting up a Metal Working division to contain 50,000 sq. ft. for handling aircraft subcontracts in stainless steel, aluminum, aluminum alloys and magnesium parts and sub-assemblies.

► North American Aviation has set up an "earn while you learn" school in Inglewood, Calif., to indoctrinate new engineers in aircraft procedures. The school can handle 70 students every three weeks. NAA's engineering staff numbers 4500, highest in firm's history.

► Warner division of Clinton Machine Co., has completed new manufacturing facilities for hydraulic units at 21535 Groesbeck Highway, E. Detroit, Mich.

► General Aircraft Supply Corp., Detroit, has added 3000 sq. ft. to its warehouse facilities at Detroit City Airport.

Model GYLC has maximum torque limit of 50 pound inches.

Model EYLC has maximum torque limit of 100 pound inches.

Model AYLC has maximum torque limit of 500 pound inches.

NEW!

Torque-Limit ACTUATORS

Torque-Limit Actuators automatically stop when the end of the stroke of an aircraft component is reached. *Overload damage is prevented.* Limit switch cams are replaced by a switching mechanism which de-energizes the motor when the load exceeds a set value. Torque-Limit Actuators also have all the other distinctive features of Barber-Colman Actuators — light weight, durability, quality construction, high torque with low power input, conformance to all applicable specifications—and are backed by skilled engineering service.

Write for "Aircraft Products" Bulletin 7-4141

BARBER-COLMAN COMPANY, 1252 ROCK ST., ROCKFORD, ILL.

REPRESENTATIVES IN: LOS ANGELES, SEATTLE, DALLAS, CHICAGO, DETROIT, BUFFALO, PHILADELPHIA, BALTIMORE, NEWARK, NEW YORK, MONTREAL

LOW-COST PROTECTION for Airborne Electronic Equipment



New LORD *TEMPROOF Mountings

- Exceed AN-E-19 Drop Test Requirements
- Designed for JAN-C-172A Equipment
- Maintain Efficiency from -80°F to +250°F

*Temperature-proof Here is reliable vibration protection for base-mounted airborne electronic equipment . . . and for other apparatus which must function properly above and below usual temperatures. And TEMPROOF Mountings are priced to meet the needs of manufacturers in competitive markets.

TEMPROOF Mountings provide superior protection by maintaining their high vibration-isolating efficiency from -80°F to +250°F. Selective-action friction dampers prevent excessive movement at resonant frequencies. Equipment does not sag or droop . . . mounting drift is negligible. The unusually wide load range of TEMPROOF Mountings makes it possible to standardize on one mounting for several types of equipment, and to effect additional economies in purchasing, storage and assembly.

For complete information on TEMPROOF Mountings, or for specific recommendations concerning their use, write to Product and Sales Engineering Department. A quantity of Vibration Isolation and Natural Frequency Charts in full color is available. Copy of each will be sent free upon request.

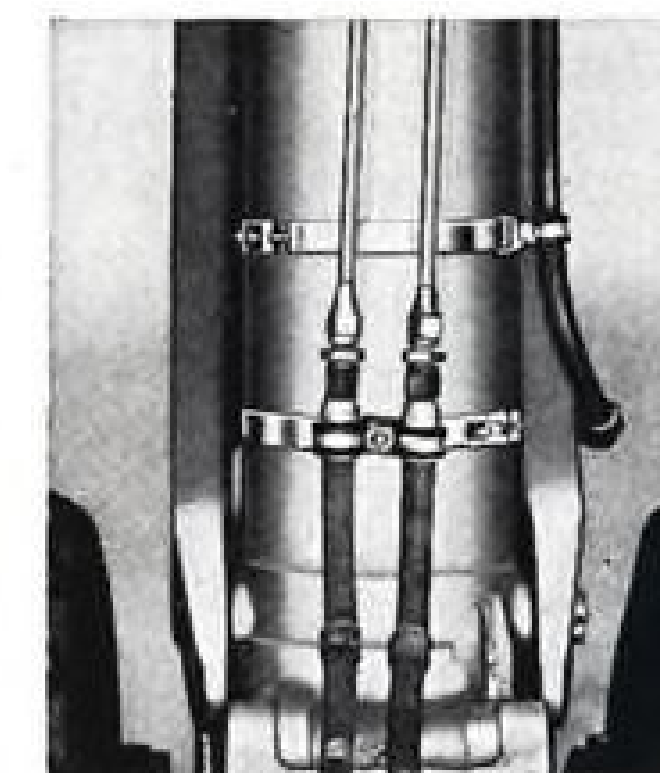
LORD MANUFACTURING COMPANY
ERIE, PENNSYLVANIA



Vibration-Control Mountings
... Bonded-Rubber Parts

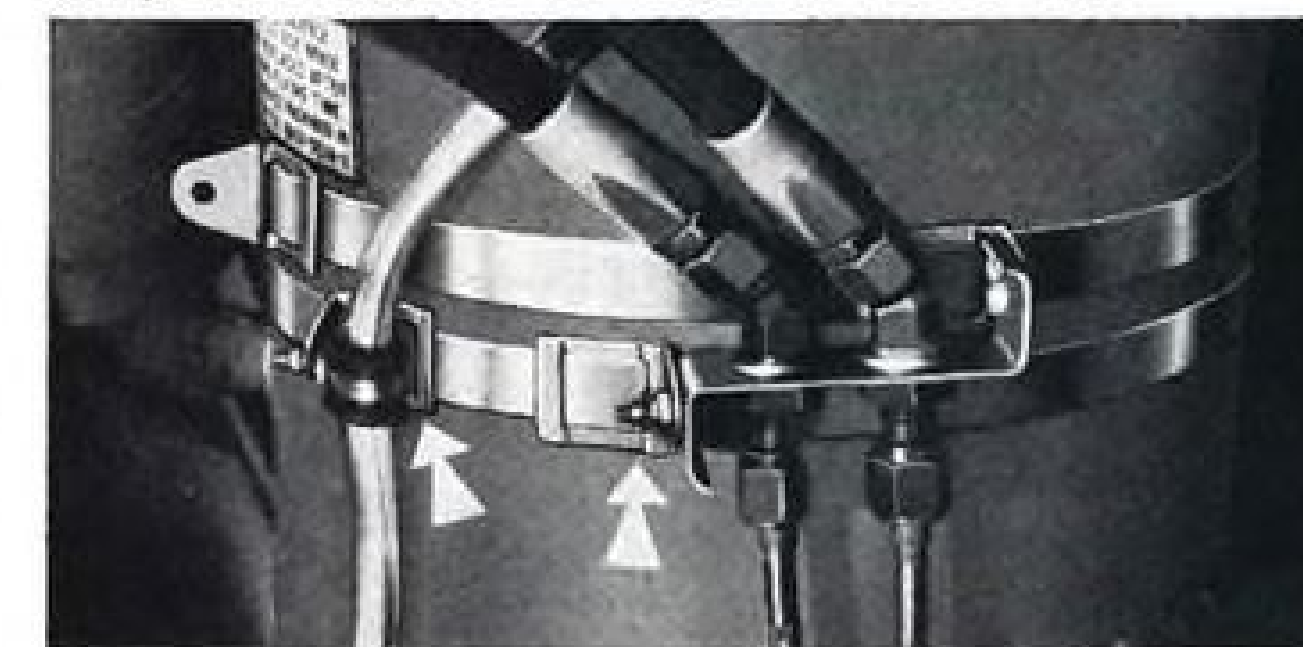
ENGINEERS NOTEBOOK

Fast, efficient, positive attachment for hydraulic lines, wiring accessories.



Marman support clamps perform an infinite variety of tasks. The lug support clamp illustrated fastens hydraulic lines to the main landing gear on a large bomber. It is ideally suited for applications where a highly stressed machined part prohibits the use of welded lugs.

The clip support shown below accomplishes a similar purpose except that it holds hydraulic lines farther away from the strut and provides a lighter assembly with slightly less strength. Its use may be preferred where many such supports are required on one ship.



Throughout the airframe structure lug and clip supports find many applications. Line support clips, wiring harness clips, attachment of ducting, are just a few of the many light duty installations for which they are suited.

By specifying one of the many highly adaptable standard Marman designs, of which these are typical, you achieve significant savings in development and production costs. In addition you gain the benefit of maximum service tested performance.

Save cost and design time with Marman...

Standardized Clamps for Specialized Applications

For information, write Dept. W-4

MARMAN
PRODUCTS CO. INC.

940 W. FLORENCE AVENUE
INGLEWOOD, CALIFORNIA

ENGINEERS

wanted at once

for

LONG-RANGE MILITARY AIRCRAFT PROGRAM

by

**NORTH AMERICAN
AVIATION, INC.**

Los Angeles, California

Unusual opportunities for Aerodynamicists, Stress Engineers, Aircraft Designers and Draftsmen, and specialists in all phases of aircraft engineering. Engineering skills other than aircraft may be adaptable through paid training program. Also openings for

**Recent Engineering College
and Technological Graduates**

Long-range military program offers fine chance for establishing career in aircraft while aiding defense effort. Transportation to California and established training time. Salaries commensurate with experience and ability.

Please include summary of education and experience in reply to:

Engineering Personnel Office

SECTION 3

**NORTH AMERICAN
AVIATION, INC.**

Los Angeles International Airport
Los Angeles 45, Calif.

AF Invitations

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

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

Procurement field office locations: Boston Army Base, Boston 10, Mass.; Government Aircraft Plant No. 4, Ft. Worth 1, Tex.; 1660 E. Hyde Park Blvd., Chicago 15;

Wright-Patterson AFB, Dayton, Ohio; West Warren and Longo Aves., Detroit 32; 155 W. Washington Blvd., Los Angeles; 67 Broad St., N. Y. 4.

INVITATIONS

Former, 1-2 items, bid invitation No. 51-1633, issue date 29 Mar., delivery starting within 45 days, complete within 190 days.

Refrigerator, 40 ea., bid invitation No. 51-1636, issue date 4 Apr., delivery starting within 45 days, complete within 150 days.

Washer, 1-21 items, bid invitation No. 51-1637, issue date 2 Apr., delivery starting within 60 days, complete within 120 days.

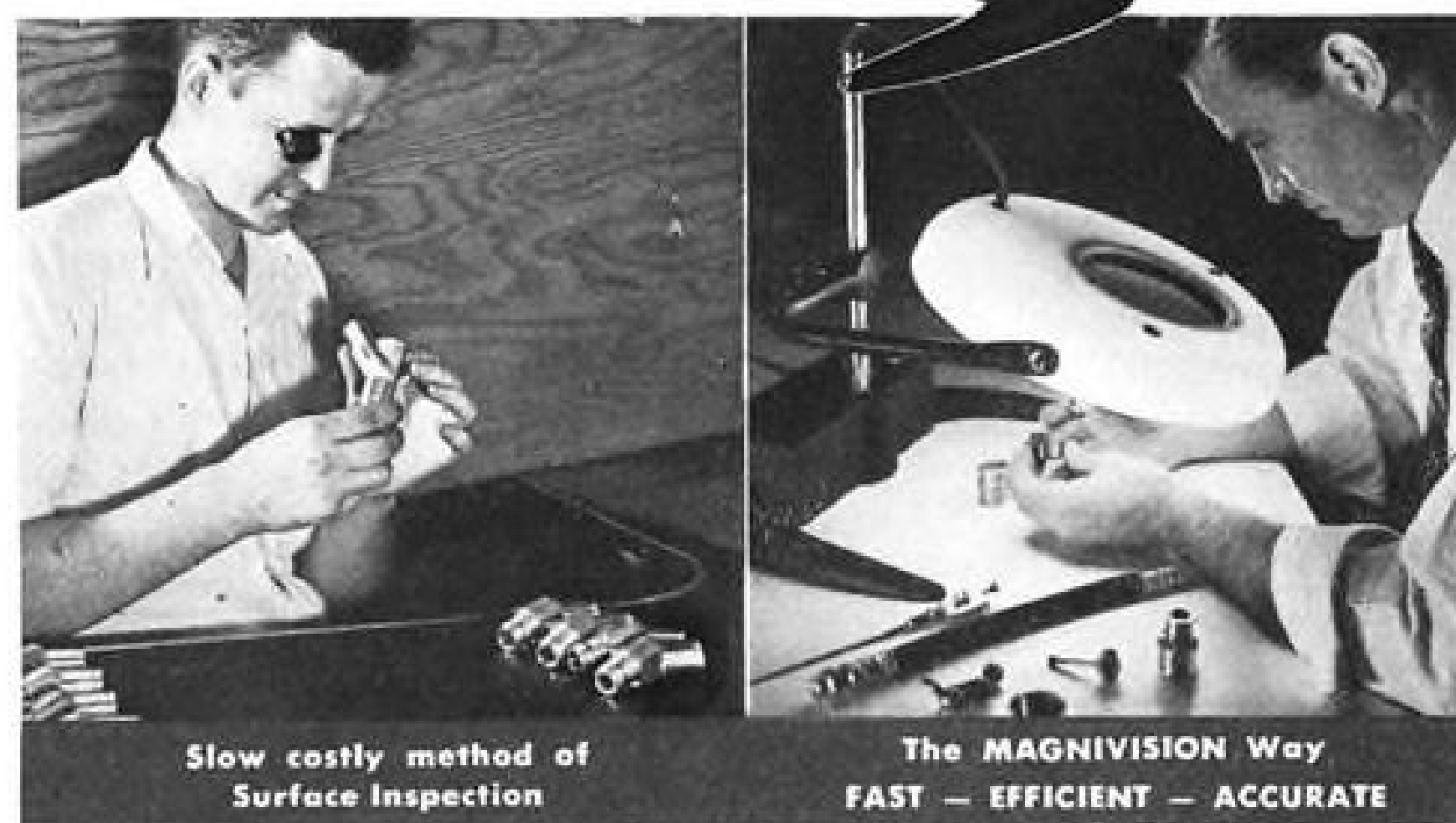
Clip, 1-62 items, bid invitation No. 51-1638, issue date 2 Apr., delivery starting within 60 days, complete within 120 days.

Bolt, 1-33 items, bid invitation No. 51-1639, issue date 6 Apr., delivery of 30 percent within 60 days, 40 percent within 90 days, 30 percent within 120 days.

Shear, 1-13 items, bid invitation No. 51-1587, issue date 16 Mar., delivery start-

MAGNIVISION FOR SURFACE INSPECTION

A PRODUCTION INSPECTION TOOL — DOES THE JOB OF
COSTLY INSPECTION DEVICES IN LESS TIME.



Slow costly method of
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The MAGNIVISION Way
FAST — EFFICIENT — ACCURATE

Surface inspection of machined parts is only one of the many and varied uses for MAGNIVISION in your shop.

The use of MAGNIVISION will give improved vision to all your workers and they will find many uses for it. They will use it more and more for fine detail and accurate work and it will increase production, improve efficiency and decrease work fatigue caused by improper lighting.

WRITE TO DEPT AW FOR COMPLETE INFORMATION

ENGINEERING DEVELOPMENTS INC.
Portsmouth, Newport, Rhode Island

ing within 45 days, complete within 240 days.

Saw circular, 25 ea., bid invitation No. 51-1588, issue date 16 Mar., delivery starting within 60 days, complete within 120 days.

Saw, hack, 1-4 items, bid invitation No. 51-1590, issue date 19 Mar., delivery starting within 60 days, complete within 180 days.

Shaper, electrical, 1-5 items, bid invitation No. 51-1593, issue date 19 Mar., delivery starting within 60 days, complete within 315 days.

Machine, rivet, cold heading, 2 ea., bid invitation No. 51-1595, issue date 19 Mar., delivery starting within 90 days, complete within 120 days.

Die, dimpling, 1-14 items, bid invitation No. 51-1596, issue date 19 Mar., delivery starting within 30 days, complete within 120 days.

Reamer, 1-10 items, bid invitation No. 51-1597, issue date 19 Mar., delivery starting within 30 days, complete within 90 days.

Drill, 1-73 items, bid invitation No. 51-1598, issue date 19 Mar., delivery starting within 30 days, complete within 120 days.

Saw, 1-2 items, bid invitation No. 51-1603, issue date 19 Mar., delivery starting within 60 days, complete within 150 days.

Saw, band, 1-9 items, bid invitation No. 51-1604, issue date 20 Mar., delivery starting within 45 days, complete within 210 days.

Jointer, wood, 1-6 items, bid invitation No. 51-1606, issue date 22 Mar., delivery starting within 90 days, complete within 180 days.

Hoist, 1-2 items, bid invitation No. 51-1615, issue date 23 Mar., delivery starting within 30 days, complete within 210 days.

Machine, wire marking, 1-4 items, bid invitation No. 51-1616, issue date 23 Mar., delivery starting within 30 days, complete within 180 days.

Shear, metal, 19 ea., bid invitation No. 51-1617, issue date 23 Mar., delivery starting within 45 days, complete within 180 days.

Lubricator, 350 ea., bid invitation No. 51-1618, issue date 23 Mar., delivery starting within 30 days, complete within 180 days.

Furnace, 1-7 items, bid invitation No. 51-1620, issue date 23 Mar., delivery starting within 90 days, complete within 150 days.

Oven, 1-8 items, bid invitation No. 51-1621, issue date 23 Mar., delivery starting within 60 days, complete within 120 days.

Plate, 1-9 items, bid invitation No. 51-1622, issue date 23 Mar., delivery starting within 30 days, complete within 180 days.

Cotton thread, 1-8 items, bid invitation No. 51-1623, issue date 23 Mar., delivery starting within 60 days, complete within 120 days.

USAF Awards

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

ABSTRACTS

For cloth (51-1094):

Lampports Co., Cleveland, on a bid of \$6375, and George Wood, Sons & Co., Philadelphia, on a bid of \$2261.35.

For helmet tree jump (51-645):

Companies sharing: Lite Mfg. Co., Inc., New York, on a bid of \$19,440; H. Bernstein & Co., Chicago, on a bid of \$16,704, and Aviators Clothing Co., Inc., Beacon, N. Y., on a bid of \$21,168.

For exposure photographic meters (51-768):

General Electric Co., Dayton, on a bid of \$14,776.

For connector plugs (51-876):

Companies sharing: Waltham Horological Corp., Waltham, Mass., on a bid of \$756; East Coast Electrical Supply Co.,

**THE LIGHTWEIGHT ANSWER
TO A HEAVY
PROBLEM...**

**THE GLA IGNITION SYSTEM
FOR THE Panther**

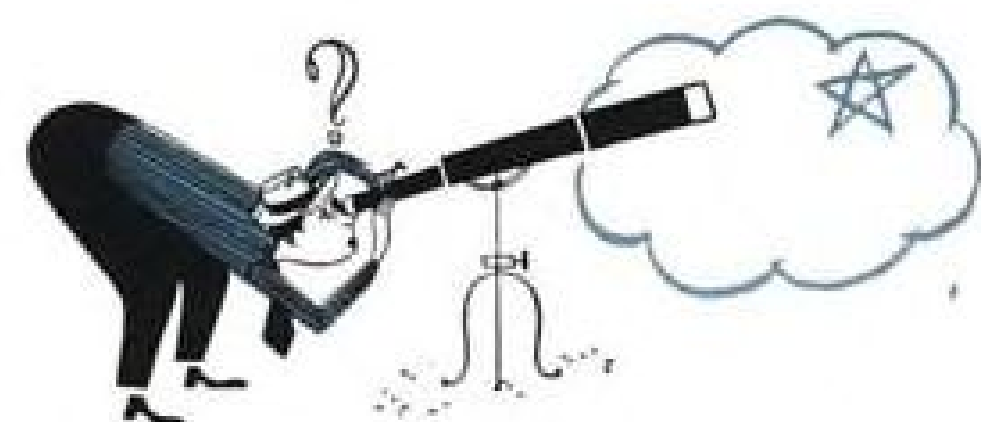


On the Grumman F9F, ounces count; that's why you'll find the lightweight GLA high energy condenser discharge system doing a real heavyweight job! The Model ACD2-6 system for the Panther incorporates reliable performance from advanced electronic development with the latest weight and space saving design. Engineering and building this component for the Pratt & Whitney Nene jet engine is another example of GLA's leadership in solving the complex problems of electronic design involved in jet and supersonic aircraft.

An experienced technical staff with production facilities invites your inquiry. **Write today.**

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NORWICH, NEW YORK

AIRCRAFT AND ELECTRONIC PRODUCTS



TWINKLE, TWINKLE LITTLE STAR
HOW I WONDER WHERE YOU ARE

Stop
Wondering
about your
freight!

when you ship
Flying Tiger
it carries top priority
from door to door

Advance Manifest System keeps tab
of your shipments constantly.

No competition from mail, passengers
or air express — air freight is
our exclusive business.

Overnight service to most large cities
— 48-hour service to farthest points.

Multiple daily schedules.

REMEMBER... Air Freight is a
lot cheaper than Air Express
and as fast or faster.

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throughout the world.

Call your nearest Flying Tiger
representative for a free air
freight analysis of your products.

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... a better way of shipping,
a better way of buying,
a better way of selling,
anywhere, anytime, anything.

*The Flying Tiger
Line Inc.*

General Offices: Lockheed Air Terminal
Los Angeles, California

WORLD'S LARGEST OPERATOR
OF AIR FREIGHT AIRCRAFT

Inc., New York, on a bid of \$3840; Culver
Stearns Mfg. Co., Worcester, Mass., on a
bid of \$288, and Howard B. Jones Div.,
Cinch Mfg. Corp., Chicago, on a bid of
\$756.

For glove inserts (51-1147):

Companies sharing: M. Shapiro & Co.,
New York, on a bid of \$23,763.30, and
Gates-Mills Inc., Johnstown, N. Y., on a
bid of \$89,800.26.

For aircraft generators (51-1148):

General Electric Co., Schenectady, on a
bid of \$23,652.

For transmitters (51-1150):

Eclipse-Pioneer div., Bendix Aviation
Corp., Teterboro, N. J., on a bid of
\$172,922.70.

For connector plugs (51-1159):

Companies sharing: American Phenolic
Corp., Chicago, on a bid of \$465; Harwood
Co., div. of Avia Products, Los Angeles, on
a bid of \$2457; U. S. Radio & Television
Supplies, Inc., Chicago, on a bid of \$834;

Peerless Radio Dist., Inc., Jamaica, N. Y.,
on a bid of \$515; Westinghouse Electric
Supply Co., Dayton, on a bid of \$882;
Howard B. Jones div., Cinch Mfg. Corp.,
Chicago, on a bid of \$476.40; Kings Elec-
tronics Co., Inc., Brooklyn, N. Y., on a bid
of \$5190, and Electric Supply Corp., Chi-
cago, on a bid of \$11,130.

For connectors (51-1175):

Cannon Electric Development Co., div.
Cannon Mfg. Corp., Los Angeles, on a bid
of \$59,142.80.

For 4 grinder discs (51-1216):

Companies sharing: United States Elec-
trical Tool Co., Cincinnati, on a bid of
\$4272, and Charles H. Besly & Co., Be-
loit, Wis., on a bid of \$3429.30.

For 1 grinder knife (51-1218):

Hanchett Mfg. Co., Big Rapids, Mich., on
a bid of \$3075.

Companies sharing: Wyzenbeek & Staff,
Inc., Chicago, on a bid of \$1850.88; Brad-
ford Products Co., St. Louis, on a bid of

Easy on the Ears...

Telex Twinset CAA

APPROVED



Yes sir, it's a fact! Telex Twinsets are CAA approved. Actually, you won't know how light a headset can be until you try a Twinset. There's no pressure on the ears whatsoever, yet all background noise is blocked out.

The Twinset weighs only 1.6 ounces, completely eliminates fatigue and discomfort.

TELEX Earset—Slips onto the Ear

Weighing only ½ oz., Earset's flat plastic frame slips onto the ear, holds the sensitive receiver securely in place. User's other ear is always free for phone calls or conversation.



TELEX Monoset—Under Chin Headset

Stethoscope design of the Telex Monoset eliminates tiresome pressure—instrument swings lightly under the chin. Wear it for hours without fatigue!



TELEX Pillow Speaker

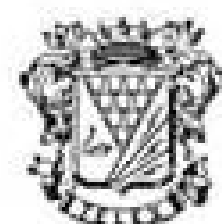
permits private radio listening. Palm-sized, weight 1.1 oz., shockproof, sterilizable.

Write for Colorful FREE Specifications Folder Today!

TELEX

DEPT. K-20-13, TELEX PARK
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In Canada, Atlas Radio Corp., Toronto



More Power for the world's largest bomber



Biggest in size and tops in performance, the Air Force's B-36D long-range bomber, built by Convair, can speed more than 435 miles per hour, above 45,000 feet.

... THERMOFLEX BLANKETS shield 4 new jets added to B-36D

Four new J-47 turbojet engines have recently been mounted under the wings of the Convair-built B-36D to nearly double the available horsepower and give this 179-ton sky giant unparalleled performance possibilities.

Shielding its two power-pods from the searing heat generated by the jet engines are Thermoflex® Blankets—the same highly efficient Thermoflex insulation that is standard protection for most other first-line Navy and Air Force jets today.

These flexible blankets meet the most critical thermal and physical requirements for modern jet design. The blanket is fabricated with the Thermoflex felt sealed between sheets of corrosion-resistant Inconel or stainless steel foils, which are then edge-folded and seam- or spot-welded.

The inner foil on all Thermoflex Blankets is specially grooved to facilitate installation, and insure precision fit around cylindrical and conical surfaces. Careful attention is also given to the precise location of cutouts for thermocouple leads and

fuel, air, igniter and hydraulic lines, which may be clip-mounted directly on the blanket.

Thermoflex Blankets are custom made to insulate the turbine casings, exhaust cones, afterburners and tail pipes of turbojet, turboprop and auxiliary power units. Special preformed shapes are also available to insulate, protect and fireproof heating systems, de-icing ducts, fluid storage tanks and many other applications.

For the latest data on Thermoflex Blankets, write for new booklet AV-1A, "Johns-Manville Aviation Products." Address Johns-Manville, Box 290, New York 16, N. Y.

*Reg. U. S. Pat. Off.

NEW! RF-300 THERMOFLEX FELT

This homogeneous refractory fibre provides exceptional thermal efficiency, greater flexibility and a 25% saving in weight over previous insulation blanket fillers. Write for complete details.

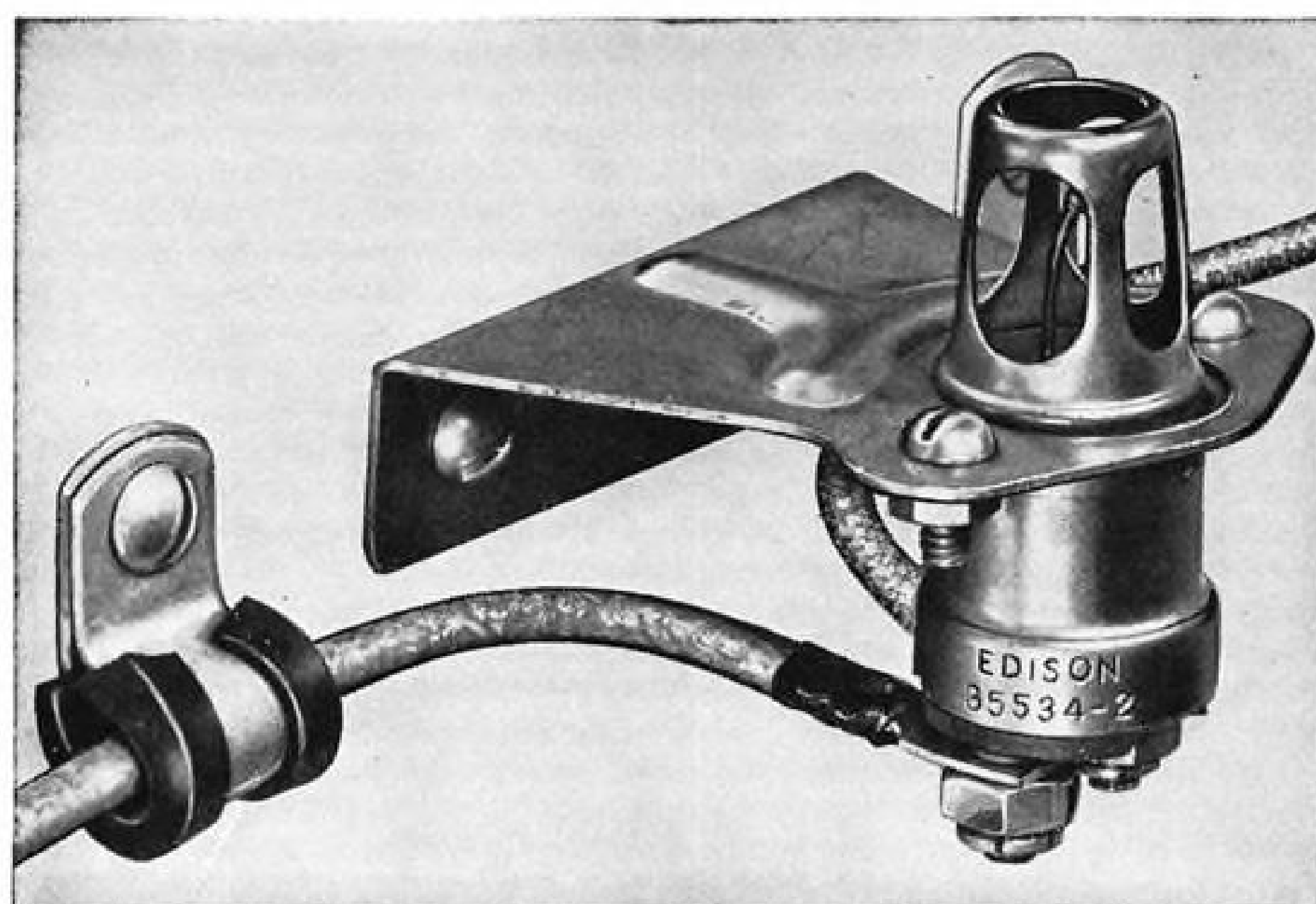


Johns-Manville

PRODUCTS for the
AVIATION INDUSTRY

How the EDISON Fire Detector

Meets **3** BASIC REQUIREMENTS*



**Only the EDISON Thermocouple Type
FIRE DETECTOR**

**1. Always
Fails Safe**

Gives no scare alarm in event of circuit failure.

**2. Has No
Moving Parts**

to be affected by vibration.

**3. Uses No
Battery Current**

which might create a secondary fire hazard.

False Alarms caused by vibration or circuit failure are no longer a necessary evil. Ask Edison how to get the utmost in dependable, false-alarm-proof service. At your request a nearby Edison representative will call on you.

*Aircraft Industries Assoc.
ARC Subcommittee on Aircraft Fire Detection, Airworthiness Project No. 7

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—MANUFACTURERS OF—

Temperature Indicators • Electrical Resistance Bulbs
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Time Delay Relays • Engine Gauges • Sealed Thermostats

—YOU CAN ALWAYS RELY ON AN EDISON—



Silicone RUBBER PARTS

Only Silicone rubber parts retain their physical, chemical, and dielectric properties at temperatures ranging from -110° to $+500^{\circ}$ F. In addition, they feature excellent resistance to many chemicals, weathering, oxidation, moisture, ozone, and other factors that damage or destroy organic rubbers.

Today, Silicone parts are meeting the exacting demands of innumerable applications in the aviation, automotive, electrical, and other original equipment manufacturing industries.

Stalwart Rubber is equipped to produce a wide range of precision parts from Silicone rubber stocks to meet individual specifications.

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Catalog 51SR-1
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Physicists Engineers

The Boeing Airplane Company has exceptional openings at Seattle for outstanding physicists and engineers. Are *you* one of them?

The work is in Boeing's expanded Physical Research Unit—on some of the nation's most vital projects: research and development on *electronic and microwave circuits, flush antennas, servomechanisms and computers, radar systems and components, and instruments and gyros.*

These positions offer challenging work in a professional environment with a company of highest renown. You'll live in the Pacific Northwest with its equitable climate and unparalleled recreational possibilities.

Opportunity for advancement is essentially unlimited in the rapidly expanding fields of guided missiles, airplane control and industrial machine and process control. Salaries are based on semi-annual performance review.

To qualify, you must already have demonstrated outstanding experimental or analytical abilities. Or you must have recently received the M.S. or Ph.D. degree with high honors in Electrical Engineering, Physics or Applied Mathematics.

If you qualify, write today for application form. Address:

JOHN C. SANDERS
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SPECIAL OPENINGS FOR ENGINEERS

Boeing's Engineering Division needs experienced and junior engineers in the following and allied engineering fields: mechanical, aeronautical, electrical, electronic, civil, acoustical, and structural. Write today for application forms to address indicated above, right.

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MINIMUM VOLTAGE DROP

PLUS

- Moisture Proof
- Pressure Tight
- Radio Quiet
- Single-piece Inserts
- Vibration Proof
- Light Weight
- High Insulation Resistance
- Easy Assembly and Disassembly
- Fewer Parts than any other Connector
- No additional solder required

The ability to carry maximum currents with only a minimum voltage drop is an outstanding characteristic of Bendix Scinflex Electrical Connectors. This important feature is only a part of the story of Bendix success in the electrical connector field. The use of Scinflex dielectric material, an exclusive Bendix development of outstanding stability, increases resistance to flash over and creepage. In temperatures from

−67°F. to +275°F. performance is remarkable. Dielectric strength is never less than 300 volts per mil. All in all, no other electrical connector combines as many important exclusive features as you will find in Bendix Scinflex connectors. For higher efficiency in your electrical connectors be sure to specify Bendix Scinflex. Our sales department will gladly furnish additional information on request.

PLUS



SHELL
High strength aluminum alloy . . . High resistance to corrosion . . . with surface finish.

CONTACTS
High current capacity . . . Low voltage drop.

SCINFLEX ONE-PIECE INSERT
High dielectric strength . . . High insulation resistance.



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A SAFE FLIGHT pre-stall warning system, precisely engineered to your requirements, automatically endows any airplane with perfect stall characteristics.

SAFE FLIGHT
INSTRUMENT CORP.
WHITE PLAINS,
NEW YORK

Minneapolis-Honeywell uses MET-L-FLEX MOUNTS



First All-Metal • All-Weather VIBRATION & SHOCK MOUNTS

Minneapolis-Honeywell specifies Robinson mounting systems for maximum protection and minimum maintenance cost. MET-L-FLEX mounts meet specification JAN-C-172A and AN-E-19 plus CAA approval for air carrier! Write today.

ROBINSON AVIATION INC.
TETERBORO, NEW JERSEY
Vibration Control Engineers

Magnesium

It's the ultimate in metal lightness. So—naturally—it's becoming used everywhere possible in aircraft and airborne products. Magnesium facts—



MAGNESIUM FACTS

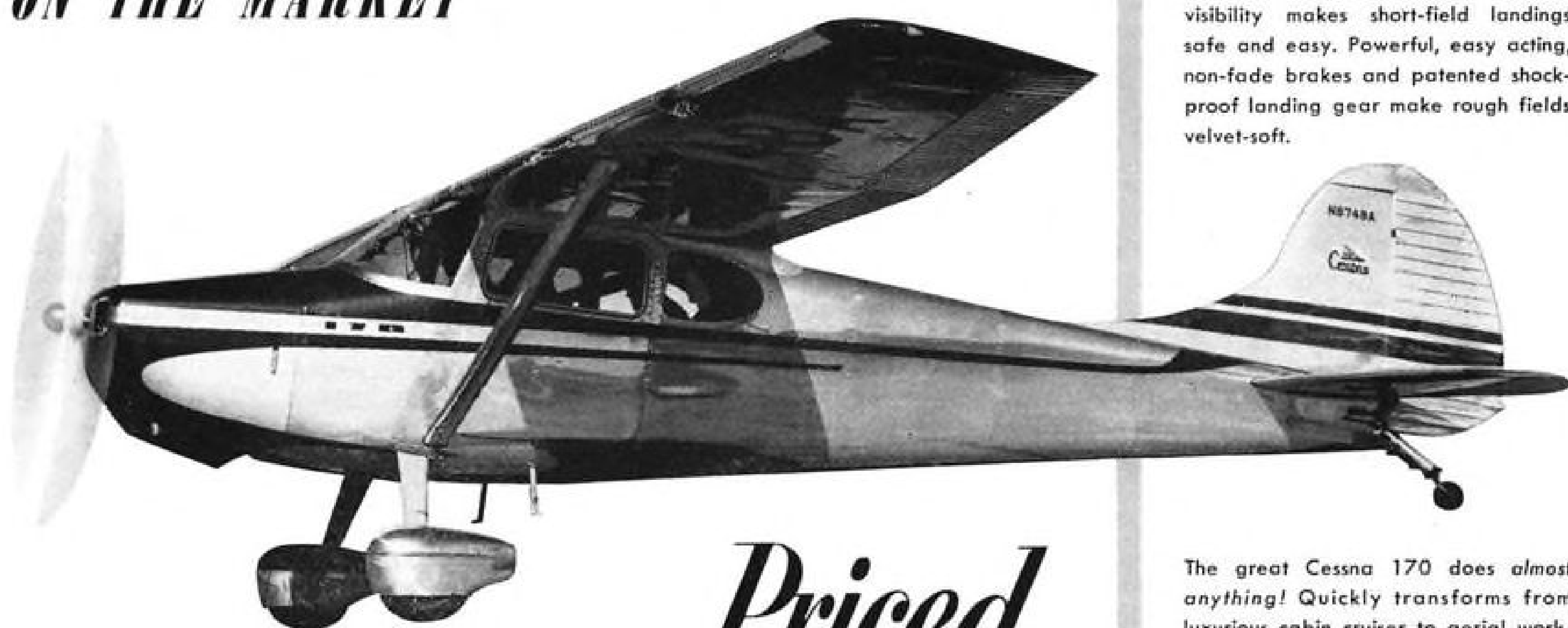
worth knowing are yours for the writing (on your letterhead, please). Address

BROOKS and PERKINS Inc.
Pioneer Magnesium fabricators

DETROIT 16, MICHIGAN

Most Practical Versatile, Economical

4-PLACE, ALL-METAL PLANE ON THE MARKET



... Priced
Several Thousand
Dollars Lower
THAN ITS NEAREST COMPETITOR!

Cessna
190 SERIES



ON DISPLAY AT YOUR CESSNA DEALER'S... CESSNA 190 Series

This bigger, more beautiful Cessna is perfect for business use. Over 160 m. p. h. comfort for 5. Easy to operate, economical to use.

Airline-type engines and Hamilton Standard Constant Speed Propellers. See its multiple advantages!

*During 1950, the Cessna 170 outsold all other four-place airplanes, regardless of price.

The Cessna 170 gives amazing comfort with four roomy, adjustable, foam rubber seats, large luggage compartment. Your transportation problems solved. Fly 500 miles non-stop at a fast cruise and average 15 non-expensive miles to the gallon.

No more shouting during flight. Improved engine mount, glass insulation, airtight door seal and new type mufflers enables normal conversation.

Maneuvers like a small ship yet has "big ship" feel and stability. Tapered semicantilever high-wing design is the answer! Selective-action 50 degree flaps, adjacent trim control and better visibility makes short-field landings safe and easy. Powerful, easy acting, non-fade brakes and patented shock-proof landing gear make rough fields velvet-soft.

The great Cessna 170 does almost anything! Quickly transforms from luxurious cabin cruiser to aerial work-horse. Remove rear seat for cargo-sized hold in 3 minutes, or: install floats for an outstanding seaplane... skis for winter weather... cross-wind wheels for single-strip all-wind conditions... a stretcher for rescue work... spraying equipment for farm-crop use.



Mail This Coupon Now!

Cessna Aircraft Co.
Dept. AW-3, Wichita, Kansas

Please send free literature giving complete description of the Cessna 170.

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AIR TRANSPORT

Here is how the Mar. 5 cut affects . . .

ANDB's New Programs Budget

	ORIGINAL BUDGET		REVISED BUDGET	
	Authorized	Canceled* (Mar. 5 directive)	Obligations Incurred or Planned	Cash Paid or to be Paid
1950	\$6,946,000	\$979,000	\$5,967,000	\$3,000,000
1951	5,365,000	2,039,000	3,326,000	6,000,000
1952	6,500,000	4,910,000	1,590,000	1,883,000
	\$18,811,000	\$7,928,000	\$10,883,000	\$10,883,000

Source: Commerce Dept. Budget.

Break in ANDB Overcast Possible

Hope held for reconsideration of projects list slash which may delay all-weather program two years.

By F. Lee Moore

Avionics experts in Washington predict at least a two-year delay in development of the ultimate common system of all-weather navigation, traffic control, and automatic landing for Air Force, Navy, CAA and Army.

These four agencies have cut the Air Navigation Development Board program back to a list of short-term projects only (AVIATION WEEK Apr. 2). Official reason is that national emergency policy requires concentration of all research and development of 1951-52 projects as insurance against the possibility of an early war with Russia.

► **The Good Side**—But the dark outlook for ultimate common system development may brighten next month. Top brass have taken another look the past few weeks. When the orphan inter-agency ANDB was partly scrapped Mar. 5, there appeared nobody ready and strong enough to save it. But two yet unannounced high-up resignations in the research and development field, plus publicity of the schism in the Apr. 2 AVIATION WEEK, have brought the affair to the attention of such offices as Deputy Defense Secretary Lovett, Defense Research and Development Board Chairman William Webster, and the Budget Bureau of the President. New meetings between the four agencies concerned with ANDB are scheduled this month—at the top level.

The ANDB technical development group has been preparing a recommendation of its own to revise the slap-dash project-slash list handed it a month ago.

► **Inconsistent**—Observers close to the Washington-Pentagon scene see a great inconsistency between the policy and the action on future all-weather flight development.

• **The policy:** Finish up present short-term development projects of ANDB and cancel work on long-term development. The method is to cut the list of ANDB projects.

• **The action:** Actually, many long-term projects will go on—without the unified control formerly exercised by the ANDB technical staff.

These staff electronic engineers were not consulted on the project list cut last month, although they have devoted over three years and almost \$10-million to developing an interim all-weather system. And they have launched the master development program for the ultimate system.

Originally, the joint Defense-Commerce idea in setting up the ANDB was this: Hire a group of competent electronics engineers to develop a system so aircraft can fly in any weather, safely and on time. The problem is the same for Air Force, Navy and civil planes and traffic.

The ANDB technical staff did this, despite some pulling and hauling on specifications, primarily between Navy and Air Force.

Now Air Force, Navy, CAA and Army are going on developing all-weather devices on their own, without ANDB. ANDB becomes a fifth, and largely impotent, agency.

► **Information Exchange**—Instead of one specialist group coordinating avionic research and development, there may

now be "exchange of information at the top."

Idea here is this: Cooperation between the services has become almost impossible at the working level. Each service group is so intent on its own tactical operating needs it has lost sight of the fact that all-weather navigation, traffic control and automatic landing (AVIATION WEEK Jan. 1, p. 35) are one problem—the same for a DC-4, F-86, B-36 or P-51. So one proposal to keep coordination is this new idea of periodic meetings at the level of department under secretaries and assistant secretaries, who may be able to agree to trust the independent ANDB rather than duplicate each others' work on the common problems of all-weather flight.

► **How It Happened**—On Mar. 5, electronics research and development specialists from all agencies concerned, including the Defense Research and Development Board, met with CAA Administrator Donald Nyrop, Air Force Assistant Secretary Harold Stuart, Navy Assistant Secretary for Air John Floberg, and Army Undersecretary A. S. Alexander. They went down the ANDB program list, tentatively throwing out all projects not calculated to help the U. S. in a war in 1952. Idea was to push immediate projects—the "transition program."

There was little then left for the ANDB technical staff and board of directors to do but execute projects, rather than planning research and development contracts for the ultimate program.

What has happened to armed forces unification through ANDB of the all-weather operations development program has also happened in the Defense Department Research and Development Board, observers say. Now that the individual services can get more money to do their own research and development, they plan to entrust much less to a coordinating group.

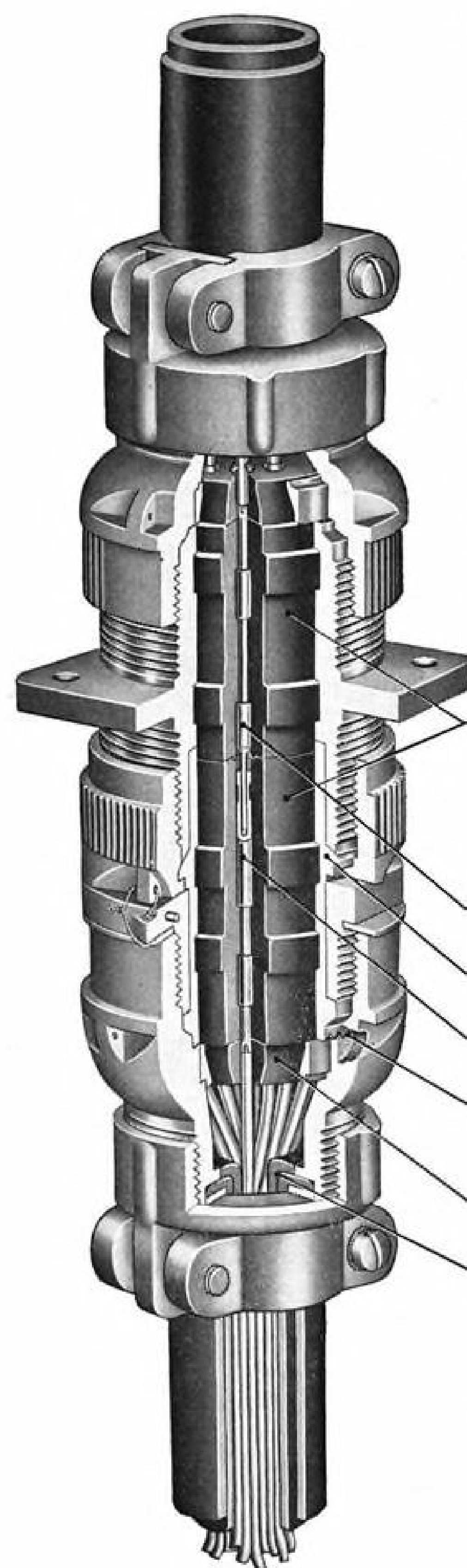
Research and development is being decentralized among the services. The end of ANDB control over avionic navigation, traffic control and landing development is part of that trend. The services each want to run their own development projects, not have an independent technical group do it for them. Military research and development in fiscal 1951 comes to over one billion dollars.

Air Force and Navy want no ANDB control over their pet projects during the emergency. Development of all-weather flight electronics will go forward, but it will not be for a common system. For instance, Air Force evaluation of 5000mc. and 1000mc. instrument landing system at Wright Field will go ahead, but ANDB no longer participates. So ILS will be evaluated for

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the Air Force by the Air Force. It is not assured of evaluation as a potential part of the all-weather common system for Air Force, Navy, Army and airlines.

► **Why It Happened**—Observers cite the following reasons for ANDB's loss of control of all-weather program development:

- **Working level view.** Since few generals and admirals are familiar with all-weather electronics in detail (the military and cabinet leaders of today got their experience in daylight warfare), all-weather flight electronics development policy is worked out at the working level. The colonel or commander sees his all-weather requirements as specifically Air Force or Navy. He lets contracts to fill those needs.

- **Tactical emphasis.** In the war emergency, two things make coordination of separate agencies through an independent technical staff like ANDB difficult: Quick demands to fill tactical requirements may mean letting contracts to fill one tactical need, instead of working on a common system that will meet all needs. Also, getting four agencies to agree on one specification sometimes takes months. The man at Patuxent River may not want to trust an independent group to see that his needs are met.

- **Missiles.** An Air Force or Navy development team working on guided missile development may be using electronic guidance systems akin to those planned by ANDB for common system aircraft guidance on long-range navigation. The service would rather apply the development direct to its planes, rather than have the ANDB technical staff adapt it for planes of all services, as well as civil use.

- **Money.** In the lean years for defense procurement, up to 1950, ANDB had money to use on research and development. The four separate agencies were glad to cooperate so each could share the funds. Now, more money is available to the services direct, without the need of control by the ANDB.

CAA Announces Avionics Program

Civil Aeronautics Administration has cut the 1950-55 avionics installations program in the continental U. S. as follows:

- **ILS.** Instead of about 330 instrument landing systems called for in the SC-31 program by 1955 there will be 180. These 180 systems, however, will service about 95 percent of U. S. passenger traffic, as judged by the 1949 traffic pattern.

- **ASR.** Air search radar installations are cut from about 150 originally called

for to 83. The 83 will cover about 84 percent of passenger traffic.

- **PAR.** Precision approach radar installations are cut from about 150 planned to 57. The 57 PARs will cover about 74 percent of traffic.

Reason for the cut is a second look at the economics and operational problems of the traffic situation. Emphasis at CAA is now on speedy installation

of essential terminal aids at major traffic centers. The national emergency makes speed an important consideration.

The aim of the so-called "interim program" is to reduce operating weather minimums to 100-ft. ceiling and 1/4-mi. visibility, handling nearly 40 landings an hour at major traffic points.

CAA is concentrating on the airports handling 75-85 percent of the traffic.

U. S. Transport Planes in Service*

(STANDARD TYPES)

Scheduled Airlines	Douglas DC-6	Douglas DC-4	Douglas DC-3	Lockheed Connie	Convair 240	Martin 2-O-2	Curtiss C-46	Boeing 377
Domestic Trunk and Local Only.....	42	67	373	45	24	12	1	0
Cargo.....	0	0	4	0	0	0	44	0
Intrastate.....	0	1	9	0	0	0	0	0
International Only.....	6	69	56	19	16	0	8	35
Ind'l and Domestic.....	72	76	22	45	79	20	0	10
Non-Scheduled Airlines.....	0	44	34	0	0	0	77	0
Total Transports.....	120	257	498	109	119	32	130	45

SOURCE: CAA *On Mar 1, 1951

Despite the fact U. S. airlines have about 300 new planes on order for delivery the next two years, they are still getting along on a 1950-sized fleet, while traffic is up more than 25 percent.

Changes in number of standard operating transports for the three months since Dec. 1 are: DC-6s up there; DC-4s down four; DC-3s down eight; Constellations up six; Convairs unchanged; Martin 2-O-2s down one; Curtiss C-46s up two; Stratocruisers unchanged. Net re-

sult is that the fleet has actually declined by two airplanes the past three months.

First big lift in the U. S. airline fleet should start as soon as the Douglas DC-6Bs and Martin 4-O-4s are rolling and ready to use this spring and summer. Then next year come the Lockheed 1049 Super Connies and the Convair-Liner 340s. By early 1953 there should be about 300 new-type planes delivered to the airlines, according to present trends.

Now on Order: 466 U.S. Transports

Recent orders for big new standard-type transports from U. S. manufacturers raise the backlog for delivery within two years to: U. S. airlines, 292; foreign airlines, 31; U. S. military, 137; and executive use, 6, making a grand total of 466.

Orders the past two months are as follows:

- **Convair-Liner 340s:** Delta 10, Mid-Continent 6, Finland 3, Pratt & Whitney 1.
- **Douglas DC-6Bs:** Western 5, National 8, American 6.
- **Douglas DC-6As:** American 3.
- **Martin 4-O-4s:** Eastern 25, Coast Guard 2.

Here is the breakdown by buyer:

- **American Airlines:** 5 Convair-Liner 240s, 17 Douglas DC-6Bs, 3 Douglas DC-6As.
- **Braniff:** 3 Douglas DC-6Bs, 20 Convair-Liner 340s.
- **Chicago & Southern:** 1 Lockheed 749.
- **Continental:** 7 Convair-Liner 340s, plus option for 3 more.
- **Delta:** 10 Convair-Liner 340s.
- **Eastern:** 14 Lockheed 1049s, 60 Martin 4-O-4s.
- **Hawaiian:** 4 Convair-Liner 340s plus option for 2 more.
- **Mid-Continent:** 6 Convair-Liner 340s.
- **National:** 8 Douglas DC-6Bs.
- **Pan American:** 18 Douglas DC-6Bs.
- **Panagra:** 2 Douglas DC-6Bs.
- **Slick:** 3 Douglas DC-6As.



FIRST AND LATEST: Donald Douglas, left, and WAL's president Terrell Drinkwater compare models of DC-6B, WAL's latest purchase, and M-2, its first Douglas plane.

- **Trans World:** 5 Lockheed 749s, 10 Lockheed 1049s, 41 Martin 4-O-4s.
- **United:** 20 Douglas DC-6Bs, 30 Convair-

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Liner 340s.
• Western: 5 Douglas DC-6Bs.
• Total U. S. Air Lines: 292 large multi-engine transports.
• Air France: 4 Lockheed 749s.
• Air India: 1 Lockheed 749.
• Avianca: 1 Lockheed 749.
• Finland: 3 Convair-Liner 340s.
• KLM: 7 Douglas DC-6Bs, 9 Lockheed 1049Cs.
• Philippine: 2 Douglas DC-6Bs.
• Scandinavian: 2 Douglas DC-6Bs.
• Swissair: 2 Douglas DC-6Bs.
• Total foreign airlines: 31 U. S.-made transports.
• Aramco: 2 Douglas DC-6Bs, 2 Convair-Liners 340s.
• Pratt & Whitney: 1 Convair-Liner 340.
• Texas Co.: 1 Convair-Liner 340.
• Total executive: 6 large multi-engined transports.
• Navy: 52 Lockheed 1049Cs, 65 Douglas DC-6As.
• Air Force: 18 Douglas DC-6As, and undisclosed number of Boeing Stratofreighters.
• Coast Guard: 2 Martin 4-0-4s.
• Total military (other than Boeing Stratofreighter and other strictly military types) 137.

This total of 466 big new standard-type transports should more than double the present commercial-type airlift potential.

CAA Certificates Douglas DC-6B

Civil Aeronautics Administration has cleared the Douglas DC-6B for commercial operation and issued the maker type certificate number 6A-4—thus clearing the way for early deliveries. The license covers a gross takeoff weight of 100,000 lb. and landing gross weight of 85,000. The certificate was granted after Douglas agreed to add spoilers to the wings so the plane would meet CAA stall regulations.

Following close on the heels of the certification was notice that Western Air Lines—which 25 years ago purchased the first five M-2 airliners from Douglas—had ordered five of the big new DC-6Bs at a cost of more than \$5 million. WAL will begin taking deliveries in September, 1952.

This latest order boosts Douglas DC-6B orders to 96 planes: American, 17; UAL, 20; PAA, 18; NAL, 8; Pan American Grace, 2; Scandinavian Airlines, 8; Philippine Air Lines, 2; KLM, 7; Swissair 2; Arabian American Oil Co. 2; and WAL 5.

United and American are taking the initial deliveries, two for each carrier.

CAA had refused to certificate the DC-6B because the agency claimed the plane's power-on stall characteristics were not up to requirements. CAA test crews said that without the spoilers, and with flaps all the way down, the plane tended to roll as it stalled. Then it would pick up speed in nose-down attitude and lose considerable altitude before recovery. Douglas claimed that this was a post-stall antic, not the initial stall effect.

First-stall warning on the DC-6B is

when the nose ducks about five degrees, then recovers with virtually no altitude loss. Douglas considered this characteristic to be the stall, and claims that CAA based its objections on what Douglas says was secondary stall.

Senate Unit to Study Foreign Air Subsidy

Senate's Interstate and Foreign Commerce Committee is opening an investigation into subsidization by foreign governments of the operation of their international airlines.

The committee has awarded a contract, with a maximum ceiling of \$6500, to Aviation Advisory Service of New York, of which Selig Altschul is the principal, to gather factual data on the subject. A former member of the economic staff of Civil Aeronautics Board, Altschul served as financial consultant to the Congressional Aviation Policy Board in 1948. Dr. Oliver J. Lissitzyn, associate professor of Law at Columbia University and author of "International Air Transport and National Policy", will collaborate on the undertaking. Deadline for the study is July 15.

In awarding the contract, Chairman Edwin Johnson said Commerce Committee wants "a thorough exposition of the various means, direct and indirect, by which foreign governments underwrite the operations of their national airlines" in considering separation of subsidy from mail pay for U.S. overseas and foreign carriers.

"We want to know how subsidies to foreign carriers affect the competitive position of our lines," he commented on the question.

Johnson has long been skeptical of the advisability of separation for U.S. international carriers. Once subsidization is on a direct basis, he told AVIATION WEEK, it may open the way for foreign carriers, themselves receiving hidden government support, to be critical of our lines on this score.

The committee will consider the advisability of establishing the Universal Postal Union rate of \$2.86 as the compensatory mail pay, with additional support by direct grants.

For comparison, CAB reports that in the third quarter of last year, U.S. carriers received the following mail pay per ton-mile: Braniff, \$21.45; Chicago and Southern \$49.16; Northwest \$2.83; Panagra \$10.69; Pan American \$2.49; Trans World \$3.16.

New Airport Opens At Guadalajara

Mexico City—The finest airport in Mexico has been placed in service at Guadalajara, near the Pacific coast. The

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A-726A



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new airport includes an ultra-modern terminal building with 1500 square meters of floor space, two main landing strips equipped with high-intensity lighting and the latest type meteorological, radar control and radio communications equipment. Its cost was \$1.4 million.

The runways at the new airport are capable of handling DC-6 aircraft. The field serves at a stopover on the run from Mexico City to Tijuana and Los Angeles. It is used by Cia. Mexicana de Aviacion, a Pan-American affiliate; Aerovias Reforma, an independent airline; and several smaller airlines.

SHORTLINES

► **Air France**—French national airline has added a second luxury nonstop New York-Paris flight per week. In its first year, the special service averaged better than 90 percent occupancy. Luxury-fitted Constellation can carry 32 passengers.

► **American Airlines**—AAL has added two new New York-Washington flights using 70-passenger DC-6s.

► **Colonial Airlines**—Colonial and Trans-Canada Air Lines are dropping their competitive family plans (half-fare for accompanying family member) May 1.

► **Flying Tiger Line**—Air freight volume on the Flying Tiger all-cargo airline ranked third among U. S. domestic lines in February—2,994,000 ton miles—more than double a year ago. United Air Lines ranked third in the U. S. air cargo traffic volume until Flying Tiger passed it in February. . . . Tiger has made a joint tariff agreement with Northwest Airlines in regard to overseas traffic.

► **International Air Transport Assn.**—Israeli and Yugoslav airlines have become members of IATA. Both El Al Israel National Airlines and Jugoslovenski Aerotransport JAT are scheduled international operators. IATA members now number 65 airlines representing 45 countries.

► **Mid-Continent Airlines**—CAB Examiner Curtis C. Henderson recommends that Mid-Continent serve Lincoln, Neb., as an intermediate point on the run between Omaha and St. Joseph, Mo.

► **National Airlines**—Final settlement of outstanding pilot grievances against NAL is announced jointly by President G. T. Baker and ALPA regional vice president W. T. Babbitt. Both credit

Moral Re-Armament for ending the "terrific fight" that has characterized NAL-pilot relations for three years.

► **Northwest Airlines**—Final mail pay set for NWA Dec. 8 1947-Dec. 31, 1950, in a CAB show cause order, comes to \$14,091,574. "In view of Northwest's critical financial condition and the danger of further impairment of its position. . . ." CAB has set temporary mail pay as follows: 50 cents a mile, Jan. 1-June 30, 1951; 25 cents from July, 1950 on.

► **Pan American World Airways**—Pan Am has stepped up cargo service between Miami, Caribbean and northern South America from four flights weekly to one a day.

► **Philippine Air Lines**—PAL has notified the Philippine post office the company is ready to take mail pay on a ton-mile basis instead of the present plane-mile basis. Despite "considerable financial sacrifice," the airline says this puts the line on a more businesslike compensation basis and saves the public money.

► **Piedmont Airlines**—Piedmont's 7,688,851 passenger miles the first quarter of 1951 are 85 percent over last year. Passenger load factor averaged 47 percent of capacity.

► **Post Office Department**—February air mail was 45 percent over 1950, about 5.8 million lbs. Air mail the first two months this year showed a contra-seasonal gain over late 1950.

► **Scandinavian Airlines System**—SAS starts a summer schedule of seven flights a week out of New York this week, nine May 26-June 2, and 11 from June 2 to Oct. 20. . . . SAS starts Tokyo service next week—the flight originates in Copenhagen, but the daily New York-Copenhagen flight meets it.

► **Slick Airways**—All-cargo operator says first-quarter profits before taxes come to \$287,000—first first-quarter profit in the line's history. The 16.3 million ton miles of air freight are more than double January-March, 1950.

► **San Francisco**—Bids for San Francisco's new airport terminal will be opened next month, and construction should start in June. Cost is estimated at \$5 million to \$7 million.

► **Trans World Airlines**—TWA is moving its international operations from LaGuardia to Idlewild Airport at New York Apr. 29. . . . TWA flew a record 6,308,908 passenger miles on the day of Apr. 1—international, 1,496,680, domestic, 4,812,228.

AVIATION CALENDAR

Apr. 23-24—Semi-annual meeting of the Air Industries & Transport Assn. of Canada, Harrison Hot Springs Hotel, Harrison, British Columbia.

Apr. 23-26—Meeting of American Assn. of Airport Executives, Radisson Hotel, Minneapolis.

Apr. 24—Fourth session on communications by International Civil Aviation Organization, Montreal, P. Q.

Apr. 24-26—ATA annual engineering and maintenance conference, Hotel Drake, Chicago.

Apr. 26-29—1951 annual forum of the American Helicopter Society, including flight demonstrations of representative service copters, Washington, D. C. Chairman is Bartram Kelley, Bell Aircraft Corp., P. O. Box 1, Buffalo 5, N. Y.

May 4-6—Fourth annual national intercollegiate air meet, Max Westheimer Field, Norman, Okla.

May 7-11—National Fire Protection Assn.'s annual meeting of committee on aviation and airport fire protection, Hotel Statler, Detroit, Mich.

May 12-13—Airlines Medical Directors Assn., eighth annual meeting, Hotel Shirley Savoy, Denver, Colo.

May 16-18—1951 spring meeting of Society for Experimental Stress Analysis at National Bureau of Standards and Wardman Park Hotel, Washington, D. C. Send inquiries to Dr. Edward Wenk, Jr., David Taylor Model Basin, Washington 7, D. C.

May 17-19—Annual convention of the Women's Aeronautical Assn., of the U. S., Little Rock, Ark.

May 21-24—Tenth annual conference of the Society of Aeronautical Weight Engineers, Hotel Jefferson, St. Louis, Mo.

May 22—Aircraft Technical Committee national meeting, Aircraft Industries Assn., Statler Hotel, Washington, D. C.

May 27-30—Third annual Wright memorial glider meet, South Dayton Airport, Dayton, Ohio.

June 13-16—Aviation Writers Assn., convention, Hotel Commodore, N. Y.

June 15-July 1—International aviation display, Grand Palais and Le Bourget Airport, Paris.

June 18-July 6—Three-week Air Age Institute course, Parks College of Aeronautical Technology of St. Louis University, East St. Louis, Ill.

June 23—1951 British National Air Races, Hatfield Aerodrome, Hertfordshire, for light, heavy craft, and jets. Entry blanks available from National Aeronautic Assn., 1025 Connecticut Ave., N.W., Washington 6. Closing date for receipt of entries is May 1.

June 27-29—Mid-year meeting of officers and directors of Aviation Distributors and Manufacturers Assn., The Homestead, Hot Springs, Va.

PICTURE CREDITS

9—(P2V-5) Lockheed; (XC-99) Air Force Times; (Aviator Escalator) USN; 14—Piasecki Helicopter Corp.; 17—(Hell-Jeep) Rotor-Craft Corp.; 21, 22, 26, 28, 29—Consolidated Vultee Aircraft Corp.; 32—NACA; 34—International Telephone and Telegraph Corp.

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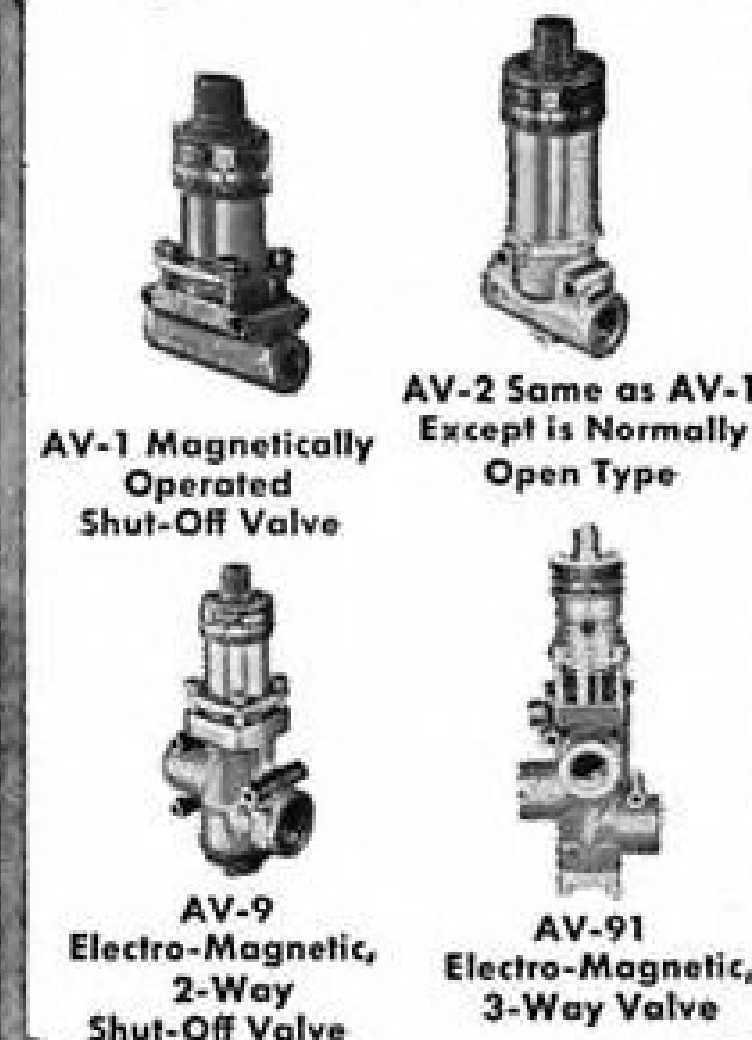
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PW-9519, Aviation Week
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Engine hours since overhaul—
Left 335:05—Right 335:05
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Model 22D30-23
Overhauled July 26, 1949
Time on props—179:55
Instruments—Full gyro instrument panel
Radio equipment—VHF: 1LS: 3105 Transmitter:
Marker Beacon: 190 to 1500 KC, 3000—6000 KC
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29	5903A	Bearing
130	8288	Follower Assy.
27953	8427	Screw
30	9030	Bolt
1276	10759	Bolt
1600	11210	Cover
100	11762	Guide
7	26456-2	Bearing
1157	35787-5	Bushing
2174	35787-10	Bushing
39	35807-8	Stud
814	35814	Blower Assy.
3967	35817	Spring
280	35855	Cap
2446	35924	Washers
4200	35932	Gasket
6	37751	Cover
15	37993	Housing Stud
28	38314	Rod Assy. Comp
20	45213	Cover
182	46400E	Liner
30	48346	Cylinder
1	48347	Cylinder
1475	48360	Bearing
53	48362	Shaft
175	48363	Shaft
3	48388	Sump
100	48389	Fitting
209	48390	Retainer
56	48392	Sump
533	48447	Bushing
107	48457	Adapter
76	48458	Bushing
390	48461	Gear
149	48468	Bearing
90	48468B	Bearing
389	48469	Bearing
470	48470	Bearing
75000	51506	Plug
395	54847	Clamp
71	56721	Cover
71	57006	Cover
10	68375	Gear
16	68837	Clamp
78	76236	Gear
5	77453	Housing (Reduction)
565	81397	Tube
10736	84185	Cover Assy.
261	84235	Pipe
155	84281	Spacers
1351	84282	Adapter
12	84284	Adapter
1178	84289	Bearing
113	84487	Housing
87	84567-8	Stud
77	84591C	Nose Housing
178	84602	Bracket
251	84687	Pinnon
30	84702	Shroud
397	84752	Bearing

ELECTRONIC COMPONENTS

Quantity	Part No.	Description
35	RA-10-DB	Receiver
20	TA128	Transmitter
150	DA-1F	Dynamotor
162	3611-B	Amplifier
35	MR-98	Control Box
7	AS27A/ARN-5	Antenna
9000	45	Bulb
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1000	987	Bulb
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80	BX42-7	Dynamotor

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Quantity	Part No.	Description
22	AN 5531-1	Tachometer Generator G. E. 2CMSABW
1000	AN 5780-2	Wheel and flap position Indicator G. E.—indi- vidual cans
400	AN 5780-2	Weston model 882-P/N111602 Description as above
1500	AW 2-65B	U. S. Gauge Air Pres- sure Gauge (0-2000 lb.)
160	2E-492E	Pesco fuel pumps
700	TFD 8600	Thompson fuel booster pump
125	D-7818	Adel anti-icer pumps
170	2P-771-A	Pesco fuel pump
250	AN4014	AN4102-1 Erie Meter Systems D-3 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	37D6810 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
75	EE 709-M2	Air associates Motor
115	P4CA2A	Parker Primers
80	AN 3213-1	Scintilla Ignition switch
568	A-9 (94-32226)	Ignition Switch
687	RS-2	Mallory Selector boxes
490	AN 6203-1	Vickers Hydraulic Ac- cumulator
88	572-3A	Eclipse Distributor
90	JH-950R	Valve
492	S841 (94-32253)	Jack & Helms Starter Motor for JH5 starters
17	FA122	Electric box Flasher Exterior lights Wallace & Tieman

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STRICTLY PERSONAL

TO WHAT END?—Doktor Von Flugen reports CAA's Harold Hockstra's stock reply to inquiries as to advisability of changing our national administration: "It is ALWAYS poor policy to change horses—or any part thereof—in mid-stream."

* * *

ON RYE OR ALCLAD?—Dr. Von Flugen says Stan Yagiela, Chairman of the ANC-23 Panel, plans to send several copies of the new ANC-23 bulletin, "Sandwich Construction," to GSI. For those who haven't been eating their alphabet soup lately, GSI means Government Services, Inc., the outfit operating the government cafeterias.

* * *

ANNA KNOWS HER PENTAGON—Discussing "security" in Washington, as we always are, we enjoyed Assistant Defense Secretary Anna M. Rosenberg's plaint the other day that the Pentagon is secret-happy. She told a House committee she couldn't give them military reserve figures because they were "classified." When Chairman Carl Vinson said they'd been printed "a hundred times," Mrs. R sighed and said, "Sometimes I think we classify last week's newspapers." Mrs. R wasn't so far wrong. Sometimes the Pentagon asks the press and its contractors to withhold even material that has already been published generally.

* * *

TELEVISION IS CHEAPER—Jerry McBrearty, Lockheed chief structures engineer, told Von Flugen recently while discussing pressurized cabins and cabin window requirements: "We could build 'em cheaper, lighter, and stronger if we could leave the windows out entirely and install television sets instead."

* * *

FROM THE SOLID SOUTH—A certain aeronautical engineer in Atlanta, according to Von Flugen, has a favorite saying: "Things wouldn't be like this if Truman were only alive."

* * *

BEHIND THE HEADLINES—Sometimes we like to give you readers a glimpse behind the AVIATION WEEK headlines so you'll be glad you aren't editors. A strange sounding news story reached us from our correspondent in Colombia. We held up the story and asked for a further check before printing it. The McGraw-Hill World News Bureau did check and reported back to us:

"Our correspondent writes that he got it from an official on the Colombian equivalent of the CAB, who got it from Lansa's president. He also says, 'When I checked at Lansa's offices yesterday they told me something was cooking but they doubted very much that Braniff would invest money in Lansa, having the opportunity now to establish their own lines to Colombia. But when we discussed the matter longer he did not actually deny my information though it sounded rather fantastic to him'." (Definite answers! That's what we like.)

* * *

A NEW DEPARTMENT?—AVIATION WEEK's Equipment Editor, George Christian, says on his return from Florida that PanAm is going about efficiently labeling all its departments with succinct three-letter initials. The Miami Overhaul Base becomes MOB; Component Overhaul Base becomes COB. One straight-faced PAA official is urging immediate establishment of a Supply Overhaul Base.

* * *

NO PLANE SHOULD BE WITHOUT ONE—O. K. Stamply, the hydraulics specialist, tells this one about a fellow he knows. It seems the chap had been flying an airplane in which the airspeed and altitude indicator behaved quite erratically in certain maneuvers. The unsatisfactory condition had been eliminated by installing static vents and the gentleman was duly impressed with the value of these accessories. Some time later, the same fellow was discussing an autopilot installation with personnel at the experimental station in Indianapolis and, upon being informed that the altitude control was causing difficulties, he suggested that static vents be installed. When he returned to his office he received a call from the experimental station. Seems they wanted to know just what the heck static vents are. Being a resourceful fellow, the chap asked them to hold the line, went to another phone and called O.K. to find out!

* * *

ELECTION REPORT—Connie Hoffman, in Atlanta, noting that we still haven't commented officially on last November's elections, says he regarded the results with mixed emotions. Says he, "It's like seeing your mother-in-law drive over a cliff in your new Cadillac."

—R. H. W.

WHAT'S NEW

New Publications

Recent Developments in Visual Low-Approach and Landing Aids for Aircraft is a 19-page digest by author Dr. Maurice A. Garbell covering observations and activities at the Air Force-Navy-Civil Landing Aids Station, Arcata, Calif., and of European and British experiments. Briefly covered are the methods employed in the flight tests at Arcata of various landing systems, Garbell's conclusions, and some new methods of meteorological measurement suggested by PAA Captain Howard Cone for low ceilings at night.

Write the Garbell Research Foundation, San Francisco, for copies. Price is 60 cents.

A compilation of traffic, operating and financial coverage on all U.S. certificated airlines is presented in the current edition of *World Airline Record*. In addition, for the first time, data on foreign airlines is also included but is not as extensive as that for U.S. carriers. This is a handy reference manual for airline investors and others desiring background information on the industry. Published by Roy R. Roadcap, 208 S. LaSalle St., Chicago 4. Price \$9.75.

Telling the Market

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Agency—The McCarty Company	Agency—Needham, Lous & Brorby, Inc.
AEROQUIP CORPORATION..... 85	MARMAN PRODUCTS CO., INC..... 61
Agency—Hopcraft-Keller, Inc.	Agency—West-Marquis, Inc.
AIRBORNE ACCESSORIES CORP..... 7	NORTH AMERICAN AVIATION, INC..... 62, 85
Agency—Gray & Rogers Adv.	Agency—Batten, Barton, Durstine & Osborn, Inc.
AMERICAN PHENOLIC CORP..... 49	PACIFIC AIRMOTIVE CORP..... 20
Agency—Burton Browne Adv.	Agency—Easig Company, The
ARO EQUIPMENT CORP..... 35	PIASECKI HELICOPTER CORP..... 77
Agency—Beeson-Faller-Reichert, Inc.	Agency—B. K. Davis & Bro.
AUBURN SPARK PLUG CO., INC..... 4	ROBINSON AVIATION, INC..... 69
Agency—Spitz & Webb Adv.	Agency—J. Branch Briggs Adv.
AUSTENAL LABORATORIES, INC..... 52	SAFE FLIGHT INSTRUMENT CORP..... 69
Agency—Frank C. Nahser, Inc.	Agency—Davis & Parsons, Inc.
AVICA CORPORATION..... 62	SCINTILLA MAGNETO DIV. OF BENDIX
Agency—Knight & Gilbert, Inc.	AVIATION CORP..... 69
BARBER COLMAN COMPANY..... 60	Agency—MacManus, John & Adams, Inc.
Agency—Cummings, Brand & McPherson Adv.	SEARCHLIGHT SECTION..... 78, 79, 80, 81, 82, 83
BOEING AIRPLANE COMPANY..... 68	SERVOMECHANISMS, INC..... 76
Agency—N. W. Ayer & Son, Inc.	Agency—Sanger-Punnell, Inc.
BROOKS & PERKINS, INC..... 69	SIMMONDS AEROACCESSORIES, INC..... 52
Agency—Holden-Clifford-Flint, Inc.	Agency—Jones & Brakeley, Inc.
CANNON ELECTRIC DEVELOPMENT CO..... 72	STALWART RUBBER CO., THE..... 66
Agency—Hixson & Jorgensen, Inc.	Agency—Penn & Hamaker, Inc.
CESSNA AIRCRAFT CO..... 70	STANDARD PRESSED STEEL CO..... 28
Agency—Gardner Advertising Co.	Agency—R. E. Lorekin Corp.
CHASE AIRCRAFT CO., INC..... 8	STANDARD PRODUCTS, INC..... 85
CHEVROLET MOTOR DIV., G.M.C..... 47	Agency—The McCormick-Armstrong Co.
Agency—Campbell-Bwald Co.	STEWART WARNER CORP..... 30, 31
CITIES SERVICE OIL CO..... 43	Agency—MacFarland-Areyard & Co.
Agency—Ellington & Co., Inc.	SUNDSTRAND MACHINE TOOL CO..... Second Cover
COUSE-HINDS COMPANY..... 44, 45	Agency—Howard H. Monk & Assoc.
Agency—Barlow Advertising Agency, Inc.	SWEDLOW PLASTICS CO..... 56
DARNELL CORPORATION, Ltd..... 26	Agency—Francis D. Gonda Adv.
Agency—Rhea Advertising Service	TELEX..... 64
DOW CORNING CORP..... 46	Agency—McLamed Hobbs, Inc.
Agency—Don Wagnitz Adv.	TEXAS ENGINEERING & MANUFACTURING CO., 48
DUMONT AVIATION ASSOCIATES..... 23	Agency—J. B. Taylor, Inc.
Agency—Edward S. Kellogg Co.	TINNERMAN PRODUCTS, INC..... 54
EATON MANUFACTURING CO..... 19	Agency—Meldrum & Fewsmith, Inc.
Agency—Clark & Rickerd, Inc.	TORRINGTON CO., THE..... 36
EDISON, INC., THOMAS A..... 66	Agency—Hazard Adv. Co.
Agency—Gotham Adv. Co., Inc.	TUBE METHODS, INC..... 60
ECLIPSE-PIONEER DIV. OF BENDIX AVIATION	Agency—John Miller Adv. Agency
CORP..... 24	UNITED STATES STEEL SUPPLY CO..... 77
Agency—MacManus, John & Adams, Inc.	Agency—Batten, Barton, Durstine & Osborn, Inc.
EX-CELL-O CORPORATION..... 57	VAPOR HEATING CORP..... 58
Agency—Holden, Clifford, Flint, Inc.	Agency—William Hart Adler, Inc.
FAFNIR BEARING CO., THE..... 5	WESTERN GEAR WORKS..... 23
Agency—Horton-Noyes Co.	Agency—West-Marquis, Inc.
FAIRCHILD ENGINE & AIRPLANE CORP..... 3rd Cover	WITTEK MANUFACTURING COMPANY..... 42
Agency—Buchanan & Co., Inc.	Agency—The Advertising Corp.
FINE ORGANICS, INC..... 73	WYMAN GORDON CO..... 6
Agency—Sid N. Cottin Adv.	Agency—John W. Odlin Co., Inc.
FLYING TIGER LINES, INC., THE..... 64	
Agency—Helitz & Co., Inc.	SEARCHLIGHT SECTION
GENERAL CONTROLS CO..... 77	(Classified Advertising)
Agency—Hixson & Jorgensen, Inc.	EMPLOYMENT
GENERAL ELECTRIC COMPANY..... Fourth Cover	Positions Vacant..... 78, 79, 80, 81
Agency—G. M. Basford Co.	Positions Wanted..... 78
GENERAL LABORATORY ASSOCIATES, INC..... 63	SPECIAL SERVICES
Agency—J. Branch Briggs Adv.	Contract Work..... 78
GLIDDEN CO., THE..... 74	PLANES—EQUIPMENT
Agency—Meldrum & Fewsmith, Inc.	(Used or Surplus New)
GOODRICH CO., THE B. F..... 3	For Sale..... 80, 81, 82, 83
Agency—Batten, Barton, Durstine & Osborn, Inc.	
GRUMMAN AIRCRAFT ENGINEERING CORP..... Front Cover	
Agency—Charles W. Hoyt Co., Inc.	
GULF OIL CORPORATION..... 59	
Agency—Young & Rubicam, Inc.	
HARTMAN ELECTRICAL MFG. CO..... 75	
Agency—Palm & Patterson, Inc.	
INTERNATIONAL NICKEL CO., INC., THE..... 53	
Agency—Marshall & Pratt Co.	
JOHNS-MANVILLE CORP..... 65	
Agency—J. Walter Thompson Co.	
JOY MANUFACTURING CO..... 51	
Agency—Walker & Downing Adv.	
LEBANON STEEL FOUNDRY..... 25	
Agency—Foltz-Weasinger, Inc.	
LEWIS ENGINEERING CO., THE..... 32	
LORD MANUFACTURING CO..... 61	
Agency—W. S. Hill Co.	

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EDITORIAL

Due Notice or Smear?

The Civil Aeronautics Board, in accord with the Civil Aeronautics Act, has given Colonial Airlines due legal notice that it will investigate the airline beginning Apr. 30 in New York to determine whether there have been violations of the act.

If the Board had restricted its notice to the airline affected, it would have fulfilled its legal duty. But it also went to the trouble of releasing an incomplete public announcement as well. The announcement made oblique references to various regulations in the act covering free or reduced-rate transportation, disclosure of holdings by airline officials in other aviation businesses, and to the need for airlines' keeping uniform accounts and records as prescribed by the law. It named Colonial President Sigmund Janas and Vice President A. M. Hudson as possible violators. It referred to various criminal penalties applicable to certain violations.

But it refused to release the full bill of particulars until it is served on the airline. Why? Because, it said nobly, full publication before the inquiry is not required in the public interest and might unnecessarily affect the interests of the parties.

In this country we usually consider an individual innocent until proven guilty.

The Board in publicizing the incomplete text of an accusation it plans to make later has gone to unnecessary lengths to affect adversely the interests of one of the parties.

It has smeared the airline with the stigma of guilt before the opening of the official inquiry. The smear came one day before Colonial announced completion of 21 years without a fatal accident.

With this kind of trial by press release, it is surprising the Board is willing to go to the trouble of a cut and dried hearing at all.

Eventually—Why Not Now?

Collisions of planes with terrain and other aircraft is a subject commercial and military aviation should be restudying closely. Government authorities ought to be alerted anew.

How many aircraft are flying at illegal altitudes or at unreported altitudes? What is being done in the way of a nation-wide campaign by all aviation interests to answer this question?

Signs are increasing that something more should be done about preventing collisions of plane and plane than is being done. It seems needless to wait for crashes to prove it.

Then there are the collisions with mountains. These—by commercial airlines, at least—have diminished in recent years. But without prejudicing the cause in any way, the recent Southwest Airways DC-3 crash brought back to the public the old-time newspaper headlines, "Airliner Rams Mountain." It is the kind of accident the public seldom can understand, so it looks for an answer to aviation people—who can seldom explain it satisfactorily either. Why in this day and age do airliners fly with insufficient clearance over the highest known point in the area, the public asks. How much longer will they do so? The public has a right to know, and there should be some industrious soul-searching, fact-gathering and regulation-enforcing to prevent the necessity of telling them that aviation isn't as safe as we could make it if we really tried.

Reports of illegal flying and close squeaks will not get any fewer, with increasing air traffic, unless something is done

about the subject. Action on the part of the airlines alone, the civil government agencies alone, the military services alone is not enough. It must be a national, coordinated campaign with some disciplinary sting in it.

Eventually. Why not now, and save lives?

Embarrassing, Eh What?

The New York Herald Tribune's Gill Robb Wilson cables back from Hatfield, England, that if jet-powered civil air transportation has not arrived yet, somebody had better tell the de Havilland Aircraft Co.

De Havilland has nine 36-passenger jet Comets sitting on the tarmac ready for final upholstery and flight testing. Nine other Comets are on the production line pushing toward completion. BOAC, of course, has bought the whole lot and may begin operating them as early as September, Gill Wilson says. First schedules will be to Rome, Athens and Cairo and the African empire. "Darkest Africa will have 500-mile-an-hour transportation before blase New York," the Herald Tribune told its readers.

It was only ten years ago next month that the Gloster-Whittle flew for the first time. Several flights had been made earlier with other jet planes but the Whittle unit was the first successful machine.

Britain was far ahead of us in jet aviation ten years ago. She is still ahead of us in commercial jets. Even Canada has one prototype flying. We have one turboprop prototype flying. No jets.

We salute the British over there across the pond. A bit embarrassing for us Americans over here, eh what?

The Newest CAB Member

With a second ex-member of Congress, the Civil Aeronautics Board hopes its reception on Capitol Hill will be a little warmer. The newest Board member, ex-Senator Chan Gurney, will supplement the congressional experience of Josh Lee, who for years was a congressman from Oklahoma before he was named to CAB.

The air transport industry is asking about Mr. Gurney's background. The man who replaces recalcitrant Harold Jones undoubtedly knows Capitol Hill and the national defense picture, as he was chairman of the Senate Armed Services Committee during the 81st Congress. But he has had little—if any—experience in aviation or transportation.

He was born John Chandler Gurney in Yankton, S. D., May 21, 1896, and was graduated from Yankton High School. He served as a sergeant in the Army Engineers in the first World War, with several months' service overseas. He was secretary & treasurer of a seed and nursery business, House of Gurney, Inc., in Yankton from 1914 to 1926—except for his military stint. He operated a Yankton radio station from 1926 to 1932. Then he moved to Sioux Falls, S. D., and engaged in the wholesale gasoline and oil business as president of Chan Gurney Oil Co., till 1936.

He failed to win the senatorial election in 1936 but was elected as a Republican in 1938, and was re-elected in 1944 for the term ending Jan. 31, 1951. He was defeated for renomination in 1950.

Mr. Gurney is a Protestant, a Mason, and is a member of the Odd Fellows and Elks. He and Mrs. Gurney have three children.

According to the New York Times of Sept. 26, 1950, the ex-senator had visited President Truman the day before and said the President had promised him a position in the "defense effort" after Jan. 1. —Robert H. Wood

MAKING NEWS... MAKING HISTORY!



C-119's SUPPLY TRAPPED FORCES WITH 113 TONS

Drop Accomplished On Half "Football Field" at 800 Feet

HQS, FEAF COMBAT CARGO COMMAND, AIRLIFT BASE, JAPAN—(A.T.)—Again exercising the flexibility of airlift operations, eighteen C-119 Flying Boxcars of the 314th Combat Cargo Wing roared out from this base yesterday with 113 tons of critically needed war materials for embattled United Nations forces in the Chosin Reservoir area.

Immediately after the emergency request for these supplies was received, loading crews began lashing the mixed cargo of gasoline, rations, ammunition and other materials to pallets and loading them aboard the huge cargo carriers. Each aircraft departed for the drop zone as soon as it was loaded.

Seven of the Flying Boxcars reached the drop zone before noon called a halt to

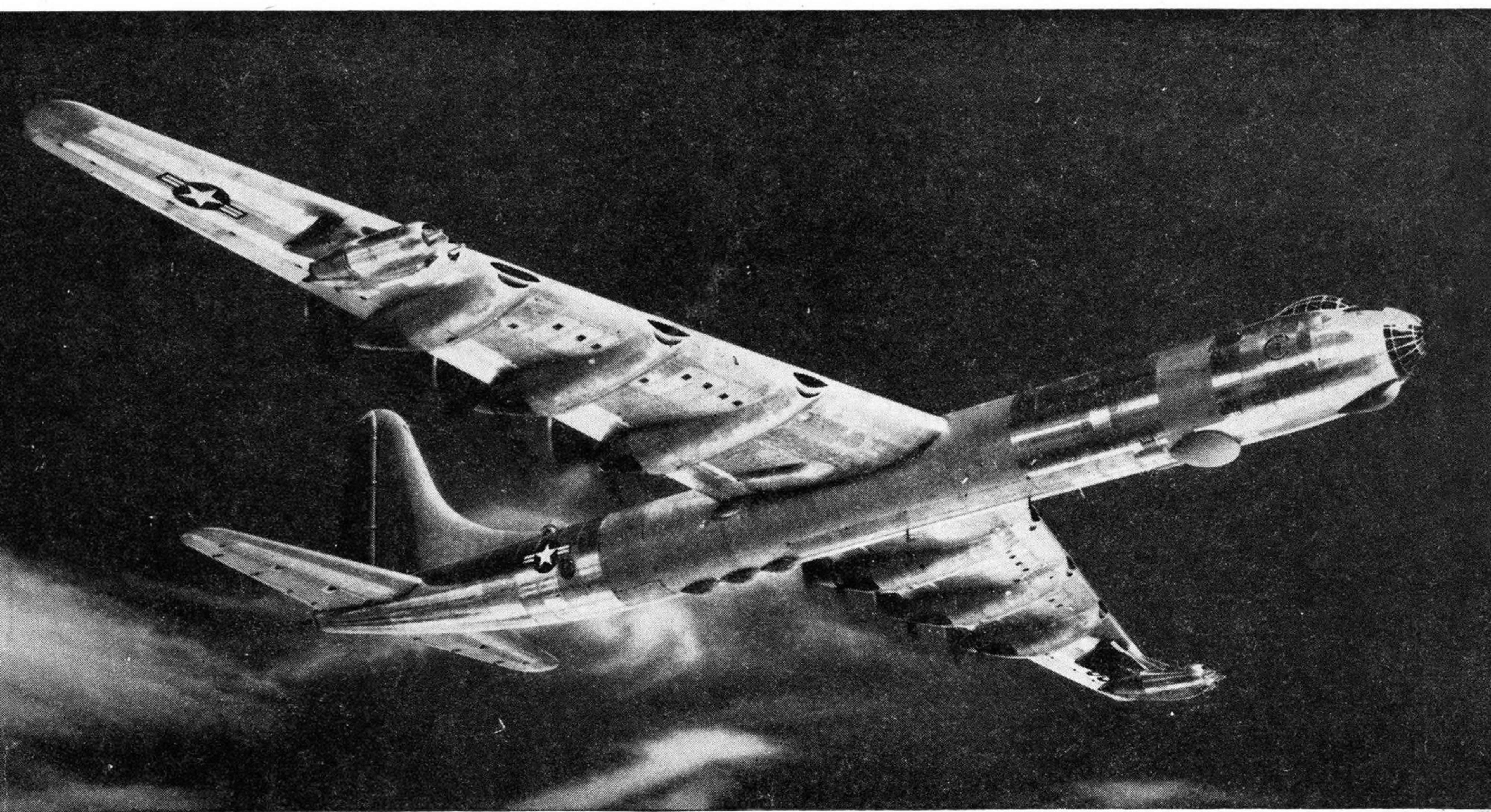
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puters make the defensive counterpunching faster and more accurate.

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