

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

APR. 9, 1951

\$6.00  
A YEAR



## Why Helicopter Pilots May Soon Have Four "Hands"

The unique construction of the helicopter not only makes it mighty useful in peace and war, it also creates a unique set of stability factors. Pilots need special training and ability which is different from their fixed-wing experience.

But helicopters may soon acquire a new reputation for ease of control — thanks to Honeywell's continuing research on aeronautical control problems. At the request of the Air Materiel Command, and working with Goodyear Aircraft Corp., Honeywell engineers have successfully adapted the

Honeywell Autopilot to the helicopter's special needs.

Experienced pilots say the result is "amazing" — that it's *as good as having four hands*.

That's just one of many aircraft control problems now being researched and solved by Honeywell engineers. We expect to solve many other control problems in the years to come — because *automatic control* is such an important part of aviation progress. And *automatic control* is Honeywell's business.

**Aeronautical Division**

MINNEAPOLIS-HONEYWELL, MINNEAPOLIS 8, MINN.

**MINNEAPOLIS Honeywell** *Aeronautical Controls*





According to Irish and Scottish folklore, banshee was a wailing female spirit. In modern usage, it refers to the F2H-2 Banshee—a sleek, spirited twin-jet carrier-based fighter manufactured by McDonnell Aircraft Corporation, St. Louis.

Today's high-performance jet aircraft, like this F2H-2 ramming into the stratosphere, rely on structural materials which provide maximum strength with minimum weight.

That is one of the reasons for OSTUCO's success. For OSTUCO Aircraft Tubing—while meeting the most exacting Army, Navy and AMS specifications—provides inherent strength-without-weight advantages. In addition, OSTUCO Tubing has specialized forming and machining qualities which make it the best material available for fuel lines, engine mounts, landing gears, and other applications.

The first "Chrome-Moly" manufactured was an OSTUCO product and today OSTUCO Tubing, produced by one of the nation's largest suppliers of aircraft tubing, is used by 26 leading U. S. plane builders.

#### SEND FOR FREE HANDBOOK

Write today for free copy of Handbook A-2—packed with facts for ready reference on OSTUCO Aircraft Tubing. Airframe Stock List (revised bi-monthly) also available. No obligation.



# SPRITE

...WITH A  
NAVY SPIRIT



#### THE OHIO SEAMLESS TUBE COMPANY

Manufacturers and Fabricators of Seamless and Electric Welded Steel Tubing  
Plant and General Offices: SHELBY, OHIO

SALES OFFICES: BIRMINGHAM, P. O. Box 2021 • CHICAGO, Civic Opera Bldg., 20 N. Wacker Dr. • CLEVELAND, 1328 Citizens Bldg. • DAYTON, 511 Salem Ave. • DETROIT, 520 W. Eight Mile Road, Ferndale • HOUSTON, 6833 Avenue W, Central Park • LOS ANGELES, Suite 300-170 So. Beverly Drive, Beverly Hills • MOBILE, 617 15th St. • NEW YORK, 70 East 45th St. • PHILADELPHIA, 1613 Packard Bldg., 15th & Chestnut • PITTSBURGH, 1206 Pinewood Drive • ST. LOUIS, 1230 North Main St. • SEATTLE, 3104 Smith Tower • SYRACUSE, 501 Roberts Ave. • TULSA, 733 Kennedy Bldg. • WICHITA, 622 E. Third St. • CANADIAN REPRESENTATIVE: RAILWAY & POWER CORP., LTD.

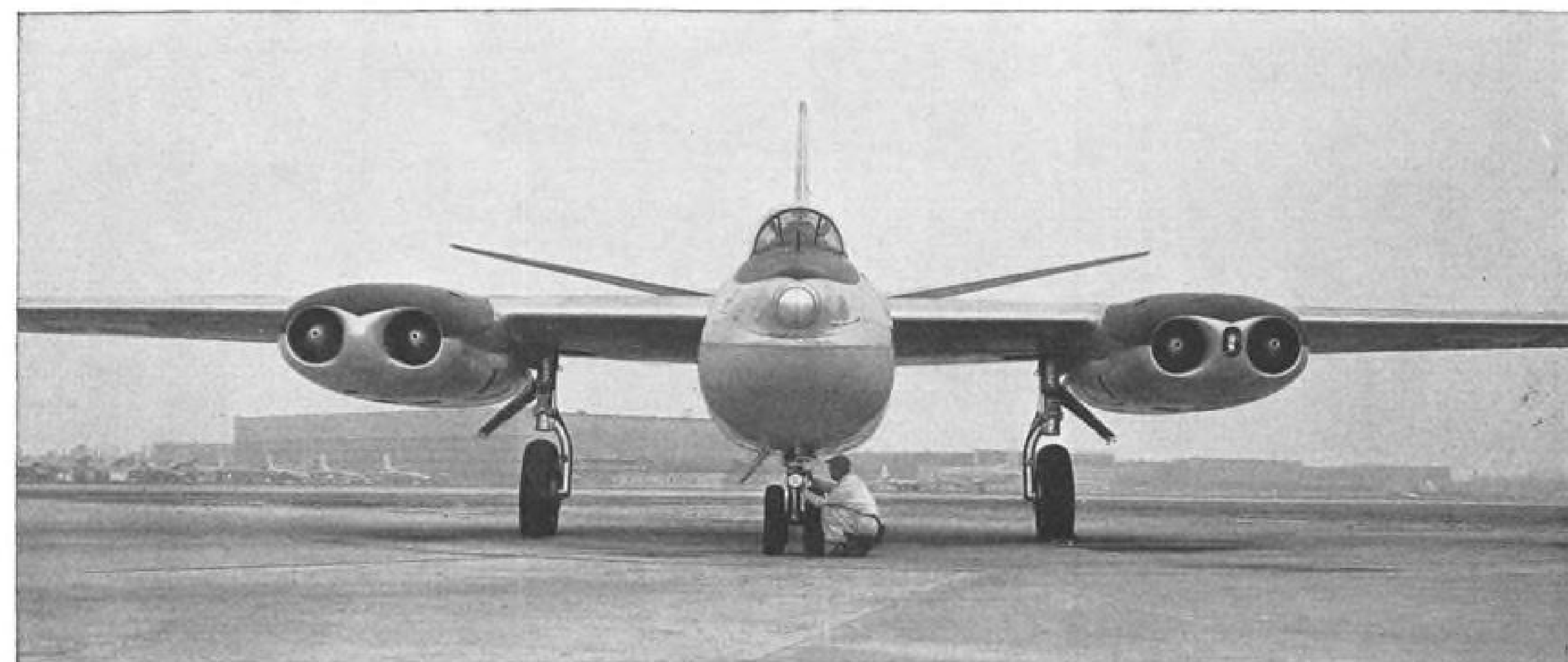
From Your Blueprint . . . to Your Product

## OSTUCO TUBING



Tapering • Swaging • Flanging • Bending  
Upsetting • Expanding • Reducing • Beading  
End closing • Spinning • Drilling • Slotting  
Notching • Flattening • Shaping • Trimming  
Threading • Angle Cutting • And Many Others

# B.F. Goodrich



## Revolutionary 60,000 lb. wheel proved by year of actual use

THE AIR FORCE needed a new wheel for its fastest bombers—a 56 x 16 wheel with the unheard-of load rating of 60,000 pounds! That's about 15,000 pounds more than the strongest wheel made could carry.

B. F. Goodrich engineers went to work on the problem. They made dozens of design improvements, always with the goal of greater strength *without* major increases in weight.

The wheel they came up with, complete with brakes, weighs less than 1%

of the weight of the airplanes. And it not only made the 60,000 lb. rating—it stood up under test loads of 300,000 lbs!

This new B. F. Goodrich wheel—with the greatest load rating of any airplane wheel in current production—has been giving maintenance-free performance now for over a year as standard equipment on Boeing's B-47 (top photo above) and North American's B-45 "Tornado" (bottom photo above). In both cases, the wheels are equipped

with the new BFG spider-type brakes and BFG Type VII tires.

The revolutionary 60,000 pound wheel is another example of how research and engineering make B. F. Goodrich first with the answers to aviation's tough problems. *The B.F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

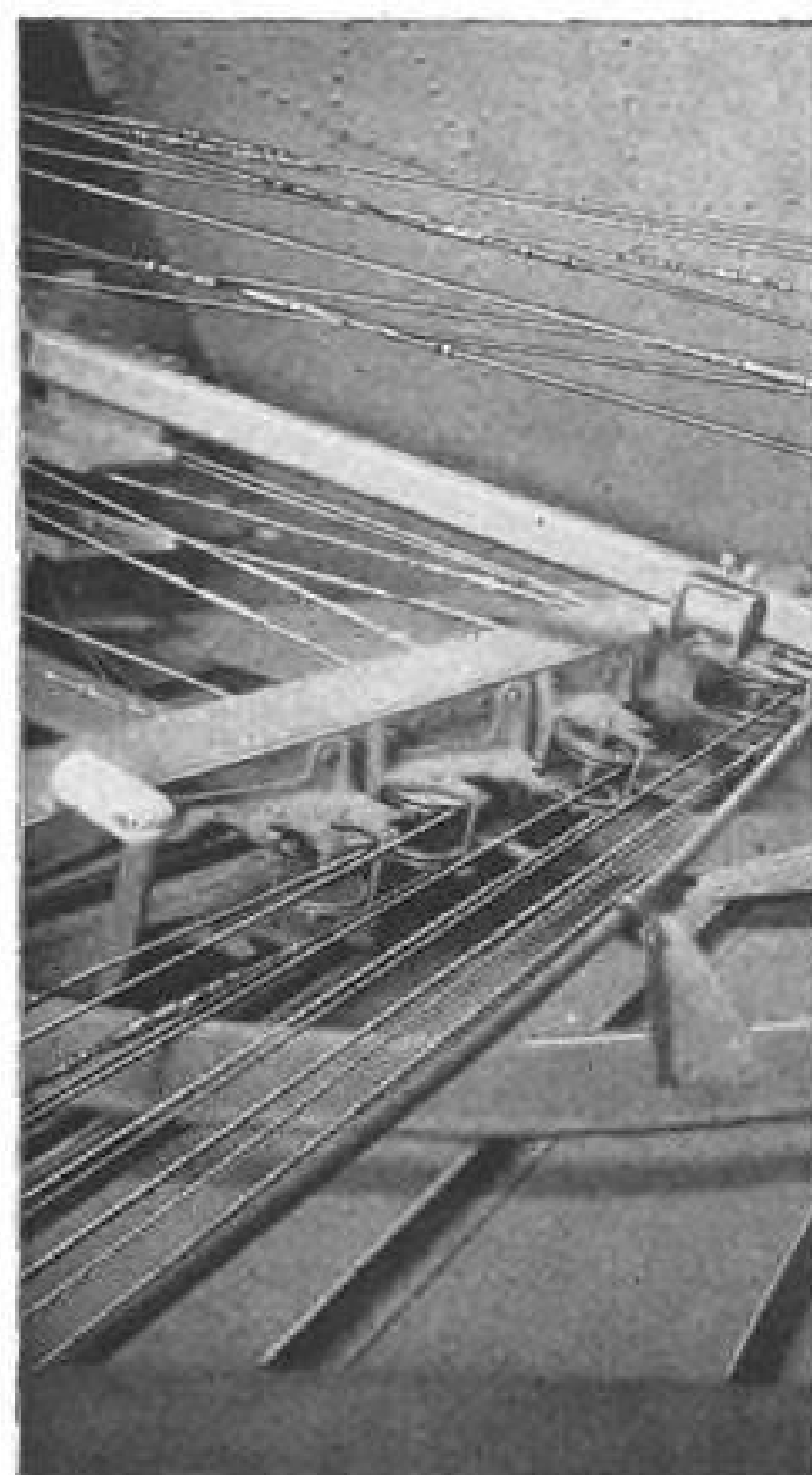
## B.F. Goodrich

FIRST IN RUBBER



# AIRCRAFT CONTROLS

There's almost no  
"constructional  
stretch" in  
Roebling Aircord



BEYOND MEETING today's most stringent specifications, Roebling Preformed Aircord for controls contains practically no troublesome and unpredictable "constructional stretch." For this reason, Roebling Aircord always affords maximum uniformity of control and minimizes the need for periodic take-ups.

Roebling Preformed Aircord, made of steel or of stainless steel, comes in a full range of sizes and can be furnished in complete assemblies with swaged terminals that possess the full strength of the cord itself.

Write for complete information about Aircord and other test- and time-proven Roebling aircraft products. And call on Roebling's engineering staff for any desired suggestions and assistance. John A. Roebling's Sons Company, Trenton 2, New Jersey.

Branches and warehouses in  
principal cities.

# ROEBLING

# Aviation Week



Volume 54 April 9, 1951 Number 15

Headline News	Production
Avionics Gets Own AIA Group..... 13	How to Up Tool Productivity..... 43
CE-100 to Try Atlantic Run..... 14	
UAC to Build Two New Plants..... 15	Financial
CAB Issues New Code..... 15	How the Funds View Air Stocks..... 51
Airline Profits..... 16	
Aeronautical Engineering	Air Transport
Tomorrow's Passenger Copters..... 21	U. S.-French Pact Clears the Air..... 52
NACA Reports..... 27	World's Air Traffic (chart)..... 52
	Capital-National Interchange..... 53
	Transcontinental Pacts..... 54
	Airline Designs—Service Needs..... 54
Avionics	Special Report
Electron Hammer: Research Tool.... 32	
Equipment	Sec'y. Finletter's Semi-Annual Report 66
Hangar Comes Apart in Middle..... 37	
Departments	
News Digest..... 7	Washington Roundup..... 12
Sidelights..... 8	New Aviation Products..... 40
Picture Page..... 9	Also on the Market..... 40
Who's Where..... 11	AF Invitations..... 48
Industry Observer..... 11	Aviation Calendar..... 57
What's New..... 64	

Robert H. Wood  
EDITOR

Merlin H. Mickel.....MANAGING EDITOR

William Kroger.....Assistant Managing Editor	Katherine Johnsen.....Congress
Alexander McSurely.....Assistant Managing Editor	Henry Lefer.....News Desk
Irving Stone.....Technical Editor	Scott H. Reiniger.....Editorial Assistant
Ben Lee.....Military Editor	Victoria Giaculli.....Editorial Assistant
G. L. Christian, III.....Equipment & Maintenance	Erwin J. Bulban.....Special Assignments
David A. Anderton.....Engineering	Thomas M. Self.....Los Angeles
F. Lee Moore.....Transport	Leo T. Tarpey.....Editorial Makeup

Editorial Offices: 330 West 42nd St., New York 18, N. Y., Phone Longacre 4-3035  
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.

Foreign News Bureaus: London, Paris, Frankfurt, Tokyo, Bombay, Melbourne, Rio de Janeiro, Mexico City. Correspondents in more than 50 major cities.

Robert F. Boger  
PUBLISHER

R. W. Martin, Jr., Sales Manager; J. G. Johnson, Business Manager; Anita Scaffo, Research and Marketing; Sales Representatives: J. C. Anthony, New York; M. J. Storz, Philadelphia; H. B. Johnson, Cleveland; L. J. Biehl, Chicago; W. E. Donnell, St. Louis; J. H. Allen, Dallas; R. C. Maulsby, Atlanta; J. W. Otterson, San Francisco; C. F. McReynolds, Los Angeles. Other sales offices in Pittsburgh, Detroit, Boston, London.

April 9, 1951 AVIATION WEEK Vol. 54—No. 15  
Member ABC and ARP

Published weekly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. Publication Office: 99-129 North Broadway, Albany 1, N. Y.  
Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 18, N. Y.  
Curtis W. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.

Subscriptions: Address correspondence to AVIATION WEEK—Subscription Service, 99-129 N. Broadway, Albany 1, N. Y., or 330 W. 42nd St., New York 18, N. Y. Allow ten days for change of address.

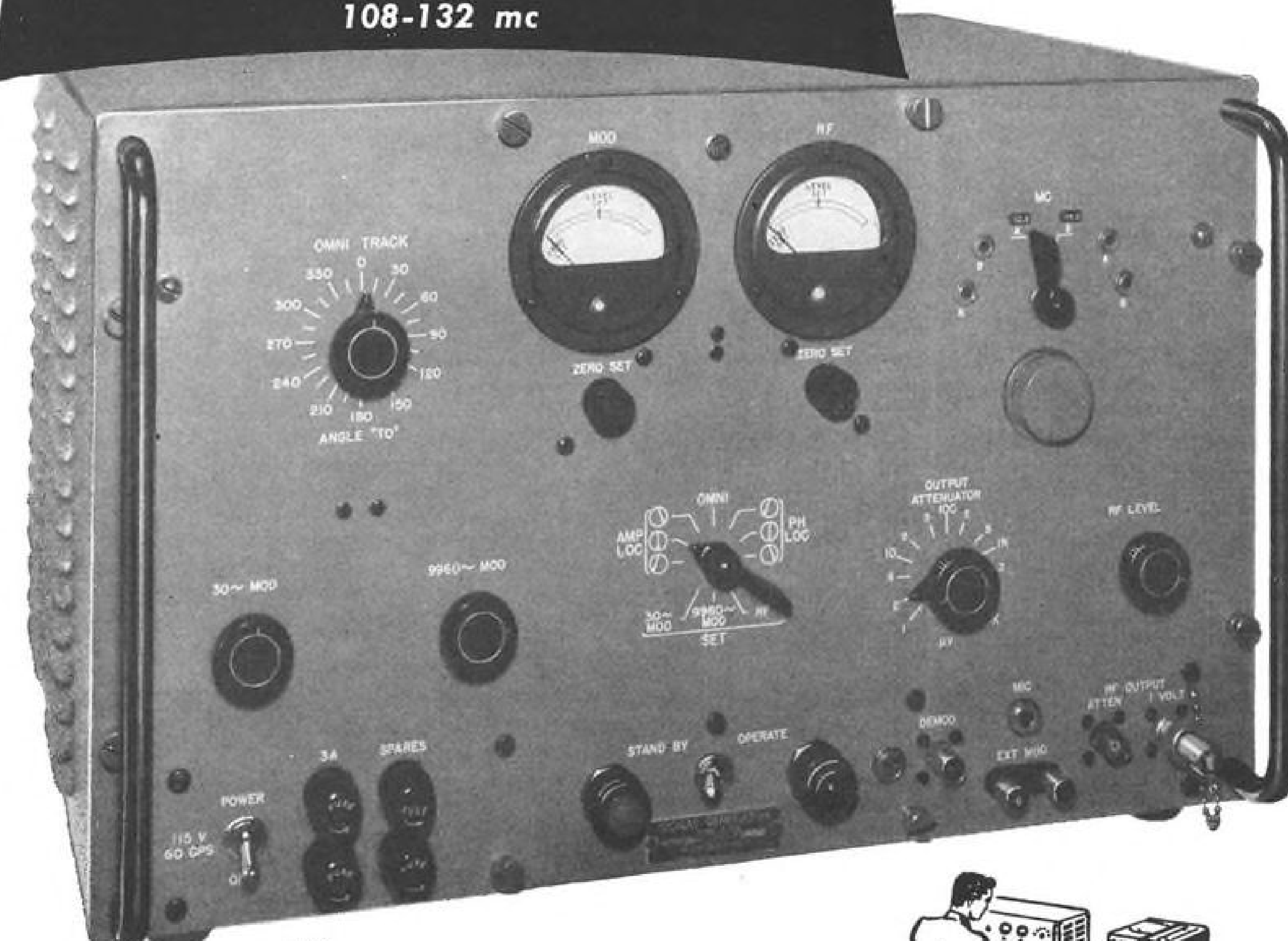
Please indicate position and company connection on all subscription orders.  
Single copies 50¢. Subscription rates—United States and possessions, \$5 a year; \$9 for two years; \$12 for three years. Canada, \$8 a year; \$12 for two years; \$16 for three years, payable in Canadian currency at par. Pan American countries, \$10 a year; \$16 for two years; \$20 for three years. All other countries, \$20 a year; \$30 for two years; \$40 for three years. Entered as second-class matter, July 16, 1947, at the Post Office at Albany, N. Y., under Act of Mar. 3, 1879. Printed in U. S. A. Copyright, 1951 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Cable address "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.

AIRCRAFT RADIO CORPORATION

## Type H-14 Signal Generator

108-132 mc

A TEST SET FOR  
AIRBORNE VHF NAVIGATIONAL  
RECEIVING EQUIPMENTS

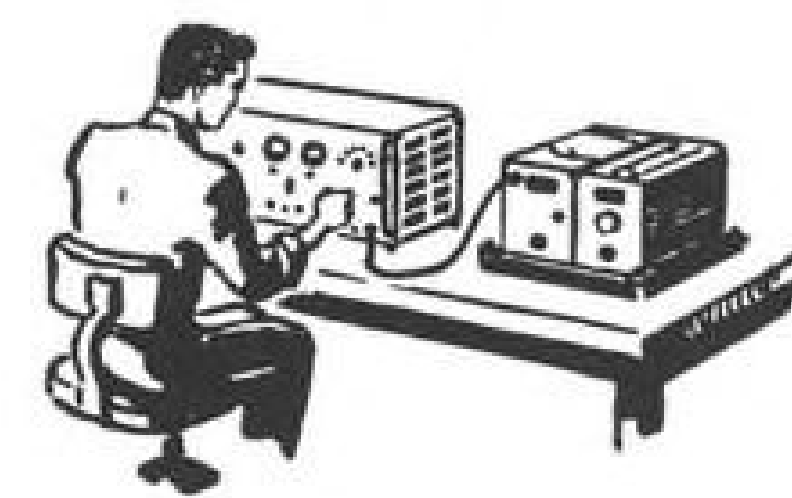


for Testing of Equipment in Aircraft

The H-14 Signal Generator provides simulated omni, phase localizer, and tone localizer signals for testing of VHF navigational equipment in one aircraft, or in a squadron of aircraft simultaneously. The instrument will check:

- 24 omni courses
- Left-center-right on 90/150 cps localizer
- Left-center-right on phase localizer
- Omni course sensitivity
- Operation of TO-FROM meter
- Operation of flag-alarms

Simultaneous voice instructions to pilots may be transmitted with the test signals. A limited "go-no go" check requires less than one minute for one aircraft or for a squadron of aircraft.



for Testing of Equipment on the Bench

The H-14 Signal Generator provides signals of accurately known frequency, amplitude, and modulation for quantitative tests of VHF navigational receiving equipments on the bench.

Dependable Electronic Equipment  
since 1928

# ARC RADIO CORPORATION

BOONTON • NEW JERSEY





**UNITED AIR LINES, 1926-1951:** From single-engined Swallow biplanes to the double-decked Mainliner Stratocruisers now in over-water service to Hawaii, United Air Lines has spanned a quarter-century of air transport growth. To date, United has flown close to 9¼ billion revenue passenger miles and more than 145 million cargo ton miles. Its great Mainliner fleet—engines of which are lubricated with Texaco Aircraft Engine Oil exclusively—serves 83 cities and 22 states, as well as the District of Columbia, British Columbia and Hawaii.

**TEXACO  
TOASTS**

## UNITED AIR LINES' 25<sup>TH</sup> BIRTHDAY

A cake with 25 candles, and a record of growth outstanding in transportation history, mark United Air Lines' birthday this year.

In the quarter-century between 1926 and 1951, United—the first transcontinental commercial air line—has expanded its system from 460 to 13,250 route miles, upped its personnel from 10 to 10,000, and increased its fleet from six single-engined, open cockpit planes to 135 giant Mainliners.

Texaco is proud to have played a part in this growth... proud that the engines of every United Mainliner are lubricated exclusively

with *Texaco Aircraft Engine Oil*. In fact—

**For more than 15 years, more revenue airline miles in the U. S. have been flown with Texaco Aircraft Engine Oil than with any other brand.**

Dependable performance and operating economies—both are assured with Texaco Aviation Products and Texaco Lubrication Engineering Service. To get them, just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, *Aviation Division*, 135 East 42nd Street, New York 17, N. Y.



**TEXACO Lubricants and Fuels**  
FOR THE AVIATION INDUSTRY

TUNE IN... TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

## NEWS DIGEST

### DOMESTIC

American Airlines has ordered three Douglas DC-6A cargo planes, which will up the carrier's air freighter fleet to 16 and will boost AA's cargo air-lift capacity by about 1,716,000 ton miles monthly. The line also has 17 DC-6Bs on order to be delivered this year.

The sweptwing MF9F-6 Panther will be the next new Grumman design to fly. Powered by a P&W J-48, the plane will be capable of supersonic speeds in level flight, and will probably be used as an interim type pending service use of the big, new variable-sweptwing 800-mph. F10F-1, prototype of which is now under construction.

First 100 Convair 340s will be fitted with AiResearch air conditioning and pressurization systems. The contract calls for installation of 23 different AiResearch items which form the equipment. The company has already been given contracts to do similar work on the Martin 4-0-4 and Lockheed 1049 Super Conquies.

Alexander R. Krapish, known for his racing plane designs, and who also worked with Sikorsky on various helicopter projects, died in Bridgeport, Conn. at the age of 61.

Fairchild C-119 Packet has successfully completed series of Arctic suitability tests at Ladd AFB, Alaska.

Convair XP5Y-1 has made its second longest flight, 4 hr. 5 min. It was the big turboprop-powered boat's tenth test hop. Last August the plane established a world's endurance record for turbine-powered craft when it was airborne for 8 hr. 6 min.

T. Preston Lockwood, president of Brewster Aeronautical Corp. (in liquidation since 1946), died in New York City at the age of 59. He became president of the firm in 1944.

Fred W. Herman, general manager of Douglas Aircraft Co.'s Long Beach division, died at the age of 58. He joined Douglas in 1930 and was a project engineer on the DC-1, forerunner of the company's commercial transport planes.

Research and Development command of USAF will be based at Friendship Airport, near Baltimore, under present plans. RDC has been temporarily

headquartered at Wright-Patterson AFB.

Request to cut CAA 1952 fiscal year budget for the Air Navigation and Development Program from \$8 million to \$1.833 million was sent to Congress by President Truman last week. The reduction is substantially the cut AVIATION WEEK reported would be made, Apr. 2.

### FINANCIAL

Sperry Corp. reports profit, after taxes, of \$9,588,718 on sales of \$162,454,591 for the year ending Dec. 31, 1950. Backlog as of February 1951, totaled \$350 million. Separate results of Sperry Gyroscope and Vickers, Inc. divisions—which are responsible for most of the corporation's aviation production—were not disclosed.

Continental Motors Corp. is completing negotiations for a \$30 million V-loan, which is being set up with a group of 30 banks whose credits to the firm will be largely guaranteed by U. S. fiscal agencies. The huge loan marks the return of the financing scheme set up by the government during World War II.

Texas Engr. & Mfg. Co. reports profit, after taxes, of \$500,708 on sales of \$12,793,866 for the year ending Dec. 31, 1950. For the preceding year, profit was \$945,175, after taxes, on sales of \$12,893,582. Temco's Luscombe Airplane subsidiary had sales for nine months ending Dec. 31 (it was in bankruptcy the first three months of 1950) for \$207,424, resulting in a loss of \$112,139. Temco backlog is about \$61 million.

### INTERNATIONAL

British Overseas Airways Corp. will cut back its order for 25 Bristol 175 turboprop transports, according to Minister of Supply Strauss as quoted in London newspapers.

Gloster Meteor 8 jet fighters are being delivered to the Royal Australian Air Force for use in Korea.

Paris' Orly Field is being expanded more than 100 percent, from 2000 to 4500 acres. Expansion will be financed with 500 million francs in Marshall Aid counterpart funds.

Trevor (Wimpey) Wade, ace British test pilot, was killed when prototype Hawker P.1081 jet fighter exploded in flight and crashed.

PACKAGED Functional Components  
... Electronic-Mechanical

**electronic components  
packaged for aircraft  
spatial  
requirements**

mecha\* products



Servomechanisms, Inc. pioneers in standardized, packaged, plug-in electronic and mechanical units for aircraft control systems. Easily adaptable to all airframe spatial requirements and fulfilling the urgent need for

- Spatial Adaptability
- Instant Maintainability
- Training Simplicity
- Ease of Manufacture



SPATIAL  
ADAPTABILITY

**MECHATRONICS\*** The functional packaging of a functional unit so that it has an interchangeable use in one or more electronic syntheses.

\*Trademark

**SERVOMECHANISMS**  
\*Inc.

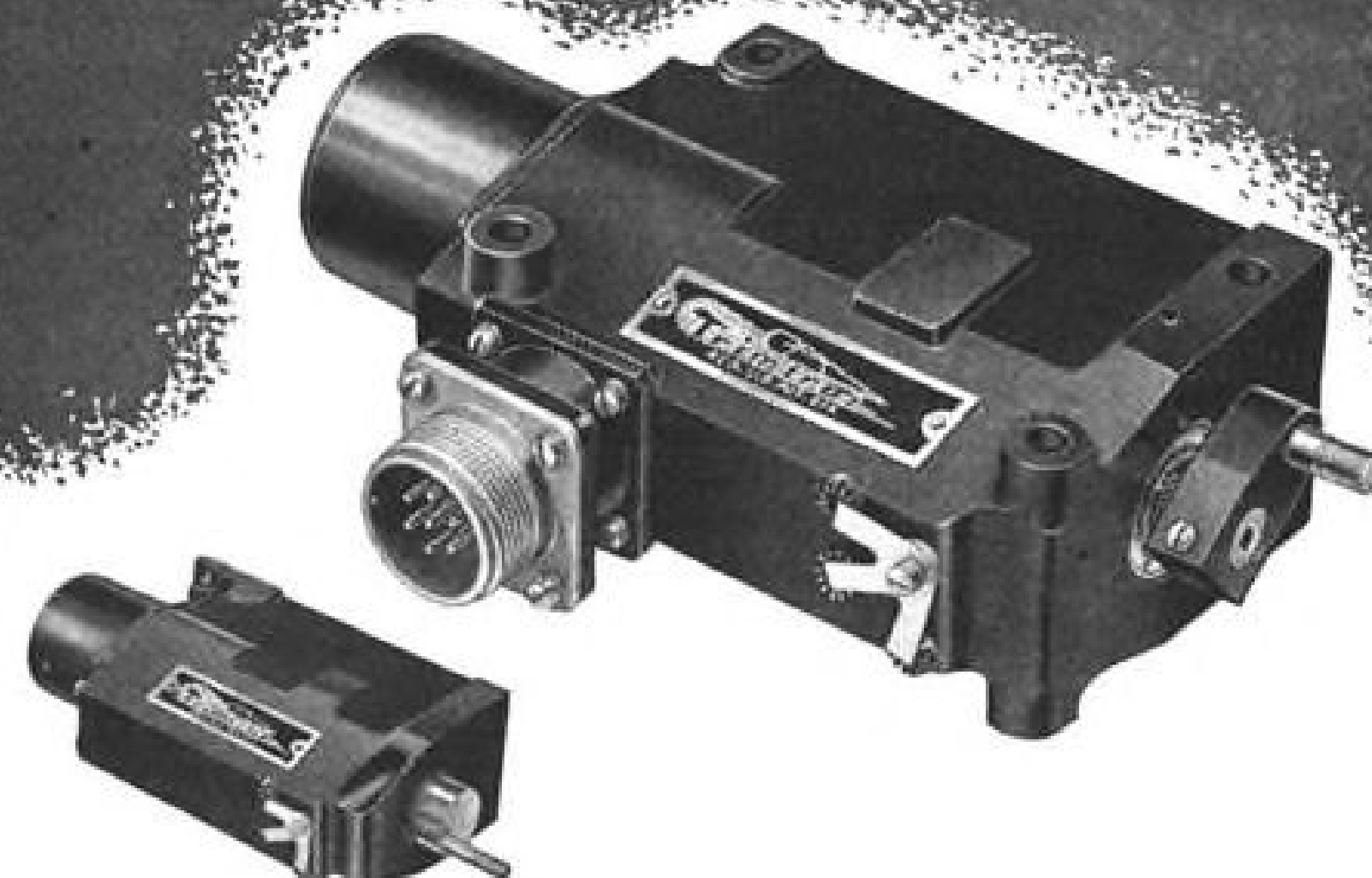
Old Country & Glen Cove Roads, Mineola, N. Y.

Imperial Hwy. & Sepulveda Blvd., Los Angeles Calif.



**THE STRONGEST,  
SIMPLEST,  
LIGHTEST  
SYSTEM OF  
TRIM TAB  
CONTROL**

**TrimTrol**

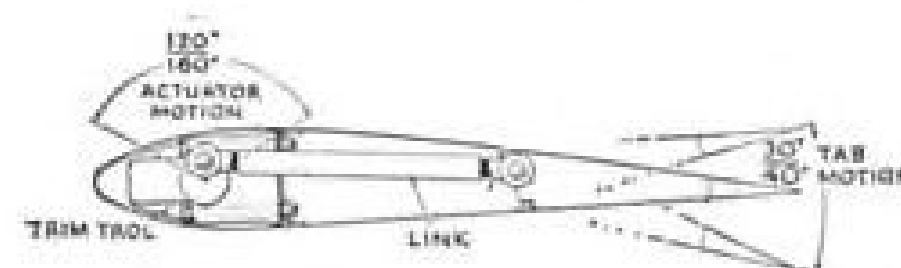


Although TrimTrol weighs only 2¼ pounds, it has an ultimate static capacity exceeding 1,500 inch-pounds, and produces 350 inch-pounds operating torque through 180° rotation.

TrimTrol incorporates zero backlash output, 26 volt dc explosion-proof reversible motor, magnetic brake, built-in externally adjustable limit switches, externally adjustable position transmitter, built-in radio noise filter. Airborne's Servosyn units can be used to synchronize two or more TrimTrols. Servosyn permits "dialing" the setting

without overshoot, thus eliminating a position indicator.

Offered in two models, differing in mounting arrangements, but identical in performance. Both meet the requirements of Specifications AN-M-40, AAF 41251, TN TSESE-1.



See our condensed literature in the I.A.S. Aeronautical Engineering Catalog or write for Bulletin 111.

**AIRBORNE**  
**ACCESSORIES CORPORATION**

Note our new address: 1414 Chestnut Avenue, Hillside 5, New Jersey  
LOS ANGELES, CALIFORNIA • DALLAS, TEXAS • OTTAWA, CANADA

## SIDELIGHTS

### Pilot ID Cards

CAA says pilot identification cards will be mandatory by Sept. 1, with applications available in CAA field offices by Apr. 15. Forms must be completed in presence of a CAA official and will be forwarded to Washington by him.

### Airlines

American's president, C. R. Smith, has returned to the airline after two months' duty as Air Force general advising Undersecretary John McCone on procurement.

### Maneuvers Delayed

Exercise Southern Pine, three-week modified version of last year's Exercise Swarmer, has been postponed from June to mid-August. Simulated battle problems in logistics and tactical support problems are scheduled in these joint Army-Navy-Air Force maneuvers. Delay will enable more civilian components to join.

### Civil Aviation

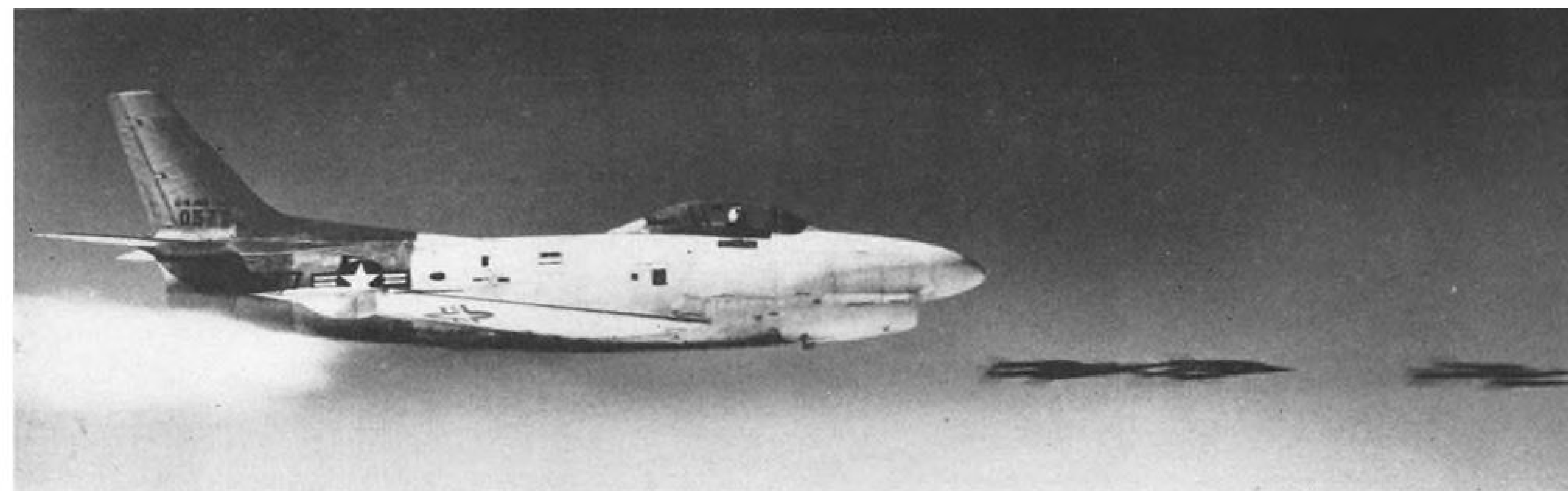
Sky Pilots Flying Service, Columbus, O., de-iced an Ohio highway recently, laying down salt spread from the hopper of an agricultural crop duster plane. Harry Jordan, pilot, flying at 50-75 ft. altitude, laid the salt on the icy highway a mile each two minutes, using 200 lb. of salt per mile. The test area was cleared of ice. The Ohio Aviation Board and State Highway Dept. will continue research . . . Aircraft Owners & Pilots Assn. has arranged with Minnesota Mutual Life Insurance Co., St. Paul, for a group plan under which any AOPA member may obtain a \$5000 life insurance policy, as a civilian pilot, at a flat rate of \$60 a year. Plan will go into effect as soon as 1000 members apply . . . AOPA general offices are moving to Bethesda, Md. (P. O. Box 5960, Washington, 14, D. C.) but executive office remains in Room 410 Washington Bldg., in downtown Washington.

### CAB

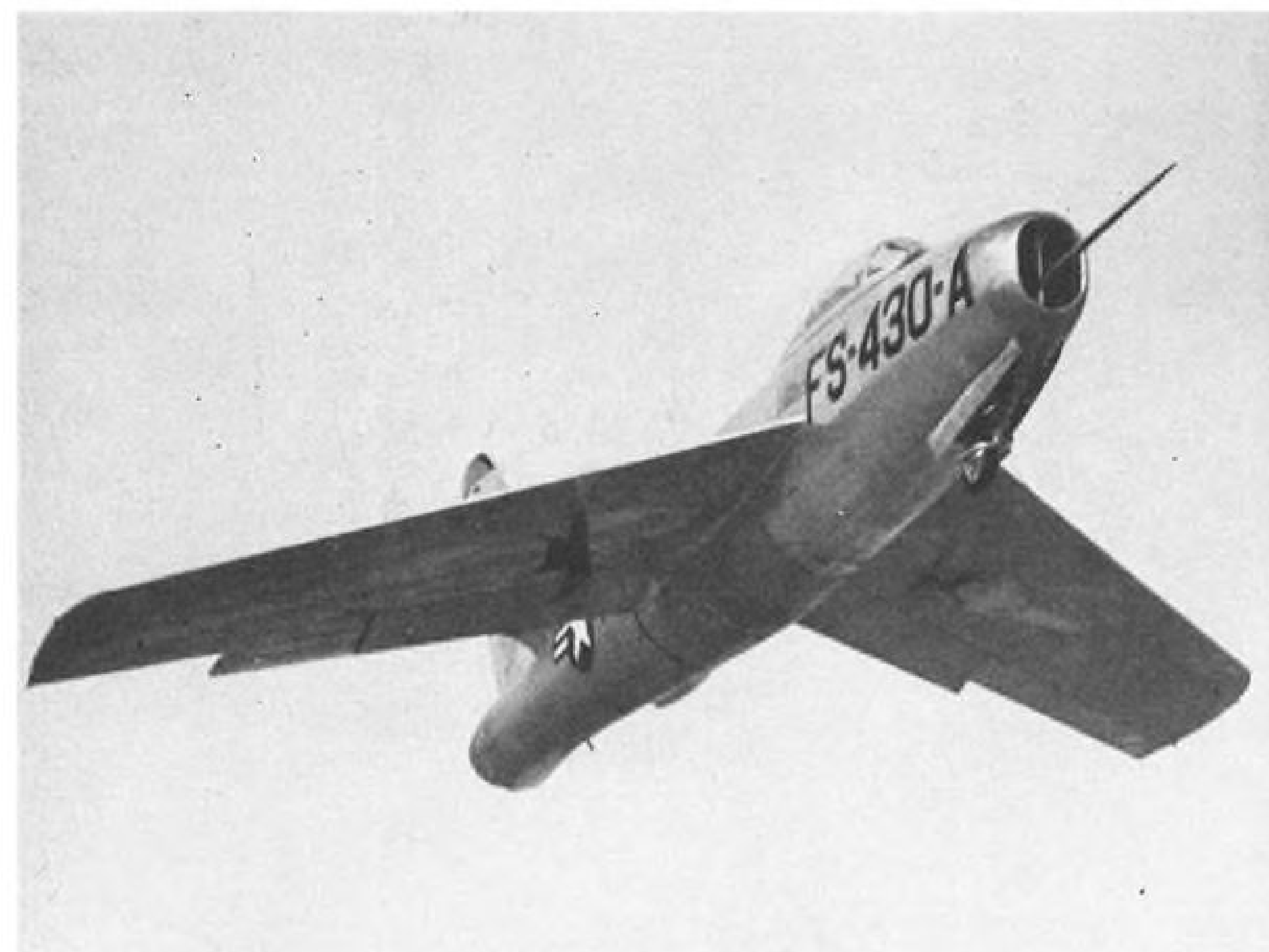
Former director of the now-reorganized Economic Bureau, Robert J. G. McClurkin, last week moved to a State Dept. job: Deputy Director of the Office of Northeast Asian Affairs. McClurkin found his CAB job virtually liquidated when Chairman Rentzel called in Gordon M. Bain to head the new Bureau of Air Operations in January.

### The Press

Congressional Record reprinted Ben Lee's USAF Troop Support story from AVIATION WEEK of Feb. 12 . . . N. Y. Herald Tribune columnist Hy Gardner said "Watch for CAB to furnish front-page fodder any edition . . ." Stewart Alsop's syndicated column Apr. 1 said "Another agency on the list of likely (Continued on page 64)



**SABRE DE-MOUSED**—A salvo of deadly Mighty Mouse air-to-air rocket projectiles are fired from a North American F-86D Sabre all-weather fighter, which packs 24 of the 2.75-in. Navy-developed missiles. Plane is in large-scale production for USAF and Navy (FJ-2).



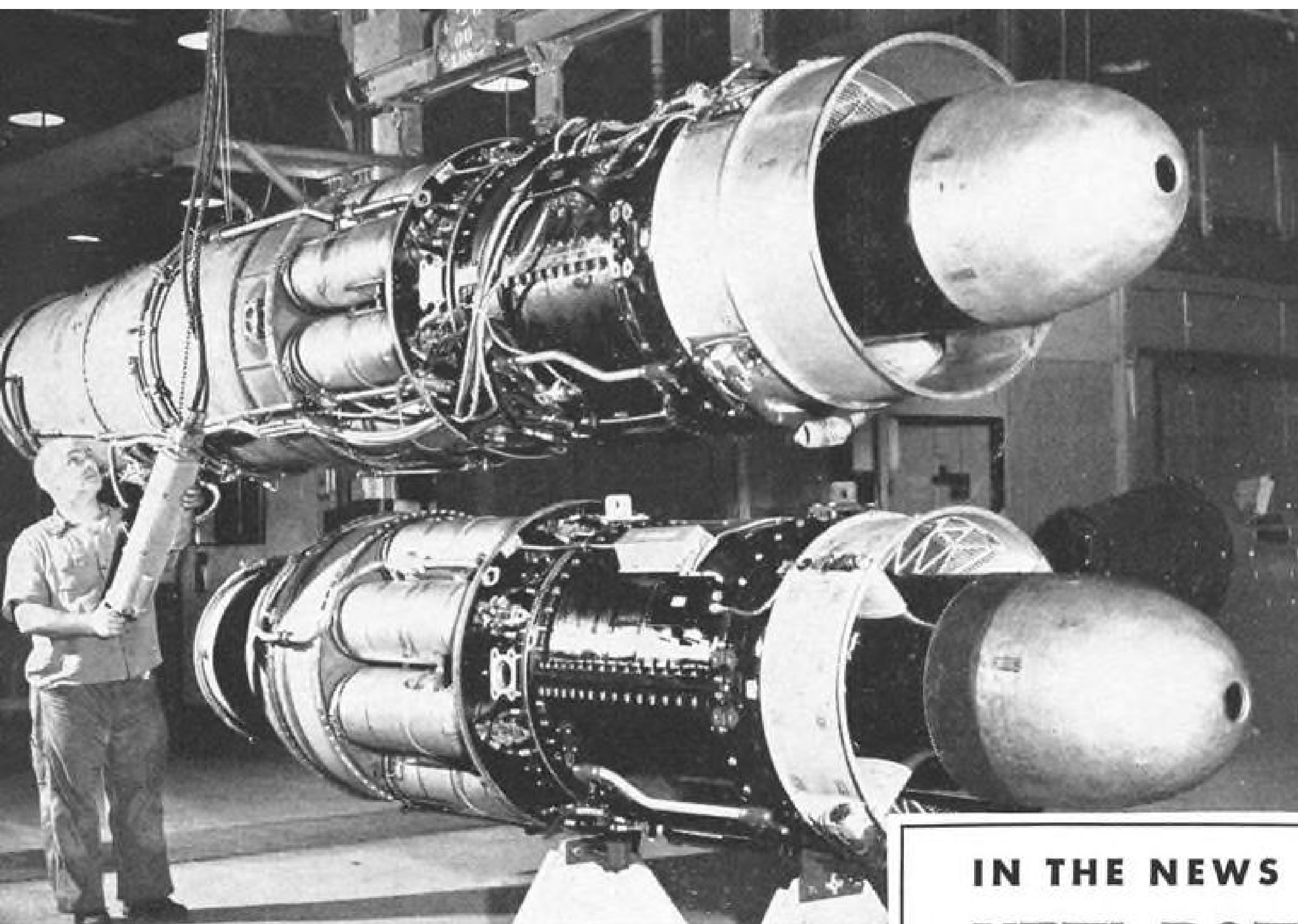
## Aviation Picture Highlights

**BEJEWELLED THUNDERJET**—First view of the Armstrong Siddeley Sapphire-powered F-84F shows the plane tucking up its wheels after takeoff. The air inlet scoop appears to have been modified to give increased area, probably to handle the reportedly greater air handling capacity of the big British-designed axial-flow jet engine. The new engine is conservatively rated at 7200-lb. static thrust, considerably more than the Allison J-35 previously fitted to the F-84F. The Sapphire-Thunderjet will be mass-produced by Republic and General Motors, using engines built by Curtiss-Wright.

**HILLER ARMY AMBULANCES**—Two Hiller H-23A copters (below left) display their capacious externally mounted litters. The cockpit closeup details new placement of the control sticks (they were mounted overhead). The horizontal lever is for collective pitch control.







J47-17 reheat engine (upper), one of new engines now in production at G-E's Lynn, Mass. plant, features integrated electronic fuel and jet nozzle system for completely automatic control of engine and afterburner. New fuel system is designed for operation at 50,000 feet; opposite polarity ignition allows starts at that altitude.

Designed to suit your specific needs, turbojets, turboprops and turbosuperchargers are available at General Electric. This complete line of aircraft gas turbines is backed by forty-five years of experience. Specialists in every phase of aircraft gas turbine work assure you



Water-cooled periscope lets G-E engineers look directly into hot exhaust gases in jet tail pipes. Study of these burning gases is invaluable in the improvement of aircraft gas turbines. Research tools such as this are constantly being developed at G-E to give you better power.

of quality and dependability. For aircraft powerplants that are constantly being improved, call your General Electric aviation specialist or write Apparatus Department, General Electric Company, Schenectady 5, New York.



World endurance record was set at Selfridge AFB by this North American F-86 powered by G-E J47. Plane landed every two hours for refueling but was operated continuously for 23½ hours. Civilian on wing is representative from widespread G-E service organization.

## IN THE NEWS

# NEW POWER NEW RESEARCH NEW RECORD

## WHO'S WHERE

### In the Front Office

Lee Douglas, chief engineer for Piasecki Helicopter Corp., has been promoted to the newly created position of vice president-engineering. Douglas has been with the copter manufacturer since 1949 as chief engineer, and prior to this was with Kellett from 1944. There he supervised the XH-17 design, since acquired by Hughes Aircraft.

M. Cullen Wilkin has been named vice president-sales and Henry P. Huff, Jr., has been made vice president-operations of Slick Airways. Wilkin had been general sales manager and Huff, operations manager. Both men have been with the air freight carrier since its early days.

Charles W. France has been appointed first vice president-general manager of Ozark Air Lines. One of the developers of Western Air Lines, France during World War II was vice president-general manager of the St. Louis Curtiss-Wright plant, and for a time also headed that firm's Buffalo, N. Y., facility. He has been acting in an advisory capacity for Ozark since 1950.

Stanley O. Halberg has been made vice president of traffic and sales for Continental Air Lines, and Lynn H. Dennis has been appointed vice president of CAL's flight service department.

### What They're Doing

Robert P. (Duke) Hedman, vice president of the Flying Tiger Line, has left the carrier to sell securities for the Pacific Co. of California, where he will work out of the investment firm's Santa Monica offices. A charter member of the American Volunteer Group (Flying Tigers), he later joined Robert W. Prescott at the founding of the West Coast-based carrier. He retains his airline title.

K. Robert Hahn has resigned as secretary and assistant vice president of Lake Central Airlines, Ind., to join Lear, Inc. in the office of contract administration. Hahn joined the airline in 1949 when it inaugurated scheduled operations.

### Changes

George S. Cooke, Jr., has been appointed manager of the Glenn L. Martin B-57 Canberra project and W. E. Groff has been named manager of overseas operations on the same project to work with English Electric, the plane's parent firm. . . . W. E. Douglas, son of the president of Douglas Aircraft, has been appointed project coordinator of missile production at the company's Santa Monica plant.

Douglas M. Dunn has been named purchasing agent at Chevrolet's Aviation Engine Plant 1 in Buffalo, which will produce jet engines. William B. Nicol has been appointed plant engineer. . . . Martin V. Kiebert, Jr., has been made business manager of Bendix Aviation Corp.'s research laboratories.

## INDUSTRY OBSERVER

► Boeing's 175-hp. gas turbine is getting a service test at Annapolis in a Navy personnel boat.

► Texas A & M College's experimental agricultural plane developed by Fred Weick is starting CAA type certification tests. New wingtips, designed to add a greater dihedral effect, have been added and are now ready for test.

► Texas Engineering & Manufacturing Co. has leased Majors Field, at Greenville, Tex., and will transfer its overhaul and maintenance operations to this new facility as rapidly as is required by expansion of its production of defense aircraft and major assemblies at its main plant at Grand Prairie, Tex.

► Watch the new McCulloch Motors Corp. tandem helicopter as a very strong potential big league competitor with the other tandem copters, made by Piasecki and Bell. Designer of the new McCulloch machine is D. K. Jovanovich, who was in charge of engineering for Piasecki on the XHRP Navy Rescuer prototype tandem helicopter, and who developed the JOV-3 intermeshing rotor tandem helicopter. The two-place MC-4 McCulloch machine which the Navy is buying is a trainer for the larger tandems which Navy is buying from Piasecki and Bell. But if it works out as expected, McCulloch will probably prove a serious competitor in larger tandem copter production as well.

► Interesting indication of the increased amount of aircraft engineering work expended on modern aircraft is the Lockheed report that in 1945 the company spent about one engineering hour for each ten in the factory while to date the proportion is about one to four.

► Bell's move of its helicopter operations to Ft. Worth, following a previous Bell move of its jet engine nacelle program for the B-47 and B-36 to Ft. Worth, doesn't mean the company is pulling out of Buffalo. In fact a breakdown between the two areas indicates that Bell now employs over 8000 in the Buffalo area, compared to about 2000 now programmed for Texas, and factory space amounts to around 1.7 million sq. ft. in the Buffalo area, compared to 400,000 sq. ft. programmed for Texas.

► Latest gimmick in landing mats is a proposal by Army Corps of Engineers for glass laminate plastic landing mats, built in layers so that a fighter strip can be converted to a bomber strip, if necessary, by adding more layers to strengthen it. Deterioration effects of jet fuels on bituminous landing strips are so serious that the plastic alternative is being seriously considered, along with new type metal mats. However, it is understood that current supplies of glass laminates would have to be greatly expanded in order to meet requirements for the mats, if they were ordered in quantities.

► Convair is buying components and accessory systems for the Convair 340 44-passenger airliner in blocks of 100 on the basis of current orders which tally 88 planes including some options for additional planes.

► Advanced version of the Allison T-40 turboprop is rated about one-third more powerful than the 5500-equivalent shaft hp. attributed to the first T-40s now flying in the Douglas A2D and Convair XP5Y-1 flying boat.

► Four Pratt and Whitney T-34 turboprop engines rated at 5700-equivalent shaft hp. are expected to go into the first Convair XP5Y-1 after completion of its tests with the Allison T-40s which now power it. Meanwhile, the second XP5Y-1 scheduled to fly later this spring, also powered with Allison, is to be tested as a mine layer and for other long-range uses.

► Navy lack of interest in the Hughes flying boat is traced to the opinion of its flying boat specialists that hull design of the big eight-engined boat was good in its day, but that it has been outmoded. Incorporation of more advanced hydrodynamic and aerodynamic principles is found in later seaplanes such as the Convair XP5Y-1 and the Martin P5M, and still newer designs which may be well on the way to completion before an all-metal version of the big Hughes craft could be built, if it were started today.

AIRCRAFT GAS TURBINES

GENERAL  ELECTRIC

210-21



## Washington Roundup

### Strategy: A Political Issue

Military strategy is likely to be the big national issue of the 1952 election. Republican National Committee is intent on making it so.

Defense costs, even if they're kept under \$50-to-\$60-billion-a-year ceiling by the Administration, will account for three-fourths of the national budget.

Democrats will have to face up to a Republican campaign based on a military program which will be presented to the voters like this: "For \$40 billion a year, you can have an impregnable America. For \$60 billion a year, the Administration isn't even giving you adequate defense. The Administration program, to be properly implemented, would cost \$100 billion a year. The Joint Chiefs of Staff estimate that."

Here is how the Republican program would divide military funds:

- **Air Force.** Most of the eggs would go into this basket. To build up a gigantic strategic air arm, as much as 75 percent of the defense budget would be channelled into USAF. Under the Administration program, USAF gets a 33-percent slice. Army and Navy would be reduced to USAF "appendages" to support the primary long-range bombing role.

- **Navy.** Although Republican politicians are now stumping for a "big" Navy, their concept of this is a Navy substantially smaller than the fleet now in being—which is greater than the combined fleets of the rest of the world. Navy's primary mission would be support of Air Force bases. The carrier mission would be greatly reduced. The super-carrier for long-range atomic jet bombing would be out. Navy's anti-sub force would stay at about its present level. Reasoning is that an air war would require dominance of the skies, not of the seas.

- **Army.** Its strength would be slashed to "a small mobile force," plus forces to support Air Force bases—a fraction of the 27 divisions programmed by the Administration.

This GOP program is formulated for a direct war with Russia. Behind it are these political convictions: the U. S. cannot afford to dissipate its strength in an endless series of Koreas. It must lay down the line on what Russian aggressions it will consider threats to U. S. security. If and when Russia crosses the line, the course of the U. S. should be to launch its air might against the main enemy.

Army's Brig. Gen. Bonner Fellers (ret.), now military adviser to Republicans, says:

"This tiffing over whether the Air Force ought to get a few more dollars each year is arguing on the periphery. What's required is a thorough fundamental change in the defense concept. The time has arrived for the Air Force to fill the primary role of America's 'first line of defense'—the role the Navy filled up to 1941. The other two services should be adjusted as supporting arms of the strategic air arm.

"The Administration program of 'dividing the defense dollar' is directed at mollifying the services, not at achieving defense for the U. S. This must go out.

"The Administration program highlights the Army. Its defense leaders, all ground officers, can't conceive an air war. The State Department is 'big army,' too. Its diplomatic efforts are strengthened by stationing U. S. doughboys here, there, and everywhere in the world. At best, the Army-State Department coalition that's sold

itself to the President, implements diplomacy—not the defense of this nation."

Republican National Committee hopes to win two outstanding voices to outspoken support of its program: • **Gen. Hoyt Vandenberg.** One Republican senator put it: "Vandenberg a few weeks back supported the Administration's plan for ground support to Europe. When he did, he thought the Administration was going to give him funds for his 95-group Air Force. But he isn't going to get funds for implementation of that program. When he comes up to Congress in a month or so, we don't think he's going to endorse expending funds for land forces to dispatch to Europe for a hopeless ground war against Russia at the expense of . . . his air program.

Vandenberg realizes that if he strays too far from the Administration line he'll be replaced as Chief of Staff for the Air Force by a down-the-line 'yes man' to ground officers Marshall and Bradley. Despite this, we think he's about ready to break from his support of the Administration plan."

- **Gen. Douglas MacArthur.** High Republicans report MacArthur is 100 percent behind their plan for building up an all-mighty strategic air arm, keyed to a direct war with Russia. And, one adds: "We expect him to talk out on the matter after the situation in Korea is settled—whether he's retired by then or not."

### Vandenberg's Play

Sen. Kenneth Wherry wants to know what size Air Force the U. S. ought to have—and at what cost—to assure victory in a direct air war with Russia.

He asked USAF's Chief of Staff Vandenberg to supply the information at a session of the Senate's Foreign Relations Committee.

Vandenberg is going to submit the information requested. He is drawing it up personally, will submit it directly to Wherry. It won't go to Secretary of Defense George Marshall for clearance.

The Vandenberg estimate on air power to defeat Russia will be based on "several dozen" suppositions.

But the estimates will serve air power two ways:

- They will highlight how much less an air conquest of Russia would cost than the Administration's strategy of a holding action in Europe with ground forces.
- They will give Republican and Democratic airpower advocates a lever to push funds proposed for the ground forces this year into the Air Force.

### What Size Defense?

Sen. Lyndon Johnson's War Preparedness Committee will soon disclose, either in a report or public hearings, the startling rise in costs of defense equipment.

A quick go-around by the three services in December indicated they could reach partial-mobilization strength by mid-1952 with a \$70-billion appropriation. But when they firmed up their figures in late January, it added up to over \$100 billion.

The Administration means to squeeze the \$100-billion program under the \$70-billion ceiling.

But a \$70-billion program now will purchase only what a \$45-to-\$60-billion program would have purchased in January, the Johnson committee investigations will show.

—Katherine Johnsen

# AVIATION WEEK

VOL. 54, NO. 15

APRIL 9, 1951

## Avionics Gets Own AIA Technical Group

### Electrical and electronics subcommittee set up to handle standards and specs.

By Alexander McSurely

An important new avionics intra-industry technical organization to tackle the tremendously complicated problems of standardization and specifications of electronic equipment used in airplanes, air navigation and control, and missiles, is taking shape under leadership of Aircraft Industries Assn.'s technical staff.

Participation in the new technical group by such aircraft companies as Convair, North American, Northrop, Hughes, Ryan, Fairchild, Bell, Martin, AiResearch, and probably some others, is another tipoff to the sizable amount of engineering investment which major U. S. aircraft companies are now making in this new, richly promising field.

Under plans tentatively agreed upon, they will join with such companies as Sperry Corp., Bendix Products div., Bendix Eclipse-Pioneer div., Bendix Scintilla div., Minneapolis-Honeywell Aeronautical div., General Electric Co., (coordinating for seven divisions), Sperry Gyroscope Co., Westinghouse Electric Corp., and Jack & Heintz, for an overall program of interchange of information on common avionics technical problems.

- **Membership Limit**—Membership in the organization which is due to be established in the next 10 days, will be limited to manufacturers who are producing electronics aircraft equipment for industry availability. It will not include manufacturers who are producing electronics materials only for incorporation in their own aircraft. Boeing, Douglas and Lockheed are the most prominent aircraft manufacturers in this latter classification. Presumably they may come into the committee later if they make their avionics production more generally available to other manufacturers. Other likely members are such aircraft manufacturers as Chance Vought, Republic and Grumman, and Goodyear Aircraft, although neither Grumman nor Goodyear are at present members of AIA.

Major problem in setting up the new organization has been the reconciliation of conflicting interests of the accessories companies, and the airframe

manufacturers who are moving into the avionics field. Consideration was given to setting up two separate technical committees to accommodate the special interests of each group. But the more logical method of including all avionics producers in a single unit has apparently prevailed.

- **Stoltenberg Elected**—It will be known as the Electrical and Electronics Subcommittee of the Accessories and Equipment Technical Committee of AIA. G. R. Stoltenberg, specifications engineer for Minneapolis-Honeywell, was elected first chairman of the committee at an organization meeting in Dayton recently attended by representatives of AiResearch, Eclipse-Pioneer, General Electric, Westinghouse, Hughes Aircraft, Jack & Heintz, Sperry and Thompson Products (which is another likely member prospect).

As a result of discussions at this and later sessions, it was agreed to invite the aircraft companies to participate.

At the first session, it was agreed that the joint Army-Navy specification 1-A for aircraft electronics tubes (JAN 1-A) was too loosely drawn to obtain the rugged and reliable tubes needed for aircraft use. There followed the establishment of the new sub-committee's first working panel, the AETC electron tube panel headed by C. A. Wolf, Eclipse-Pioneer, chairman.

The tube panel has already selected a tentative list of 11 of the most used electron-tube types, and is circulating a letter survey for comments as to whether these are the types to concentrate its work on, how the tubes are used relative to environment and circuit, what troubles have been encountered, and what should be specifications to make the tube reliable. The tentative list includes the following types: 6JY, 6AK5, 6AL5, 12AU7, 12AX7, 2C51, 6X4, 5687, and 5Y3.

Panel members have pointed out that about 10 percent of all tubes received will not pass the JAN acceptance tests, and that there is considerable variation in quality between different manufacturers' products.

- **Problem for Avionics**—One problem in improving the quality of the tubes to the high standards required for avi-

onics use is in convincing the tube manufacturers that such high standards are required, informed observers say. The tube manufacturers have been producing to standards for home equipment use, which are inadequate under the extreme temperature variations and vibration and other rough treatment to which aircraft equipment is subjected.

It has been proposed that the JAN-1A specification be supplemented with a "ruggedized tube" section which would apply to aircraft electron tubes.

And it has been further agreed in industry to propose that any manufacturer who will guarantee that his tube will meet JAN requirements will be allowed to put the JAN brand on his product whether it is used for military end items or other requirements.

- **Manufacturer Viewpoint**—Bell Laboratories (Western Electric affiliate), RCA, Westinghouse, and Radio Tube Manufacturers Assn. will sit in with the panel on tube problems to represent the tube manufacturers.

Three panels have been set up out of a total of ten planned. Each will handle a specific problem until solved, then will be dissolved in favor of new panels attacking new problems.

A military service panel will do short-range electronic trouble-shooting relating to Convair B-36 and Boeing B-47 bombers. Maintenance problems for bomber electronics equipment are, reportedly, fantastically involved. Many tubes are sealed in, seriously inaccessible for replacement in event of failures. And there are as many as a thousand tubes in some plane installations.

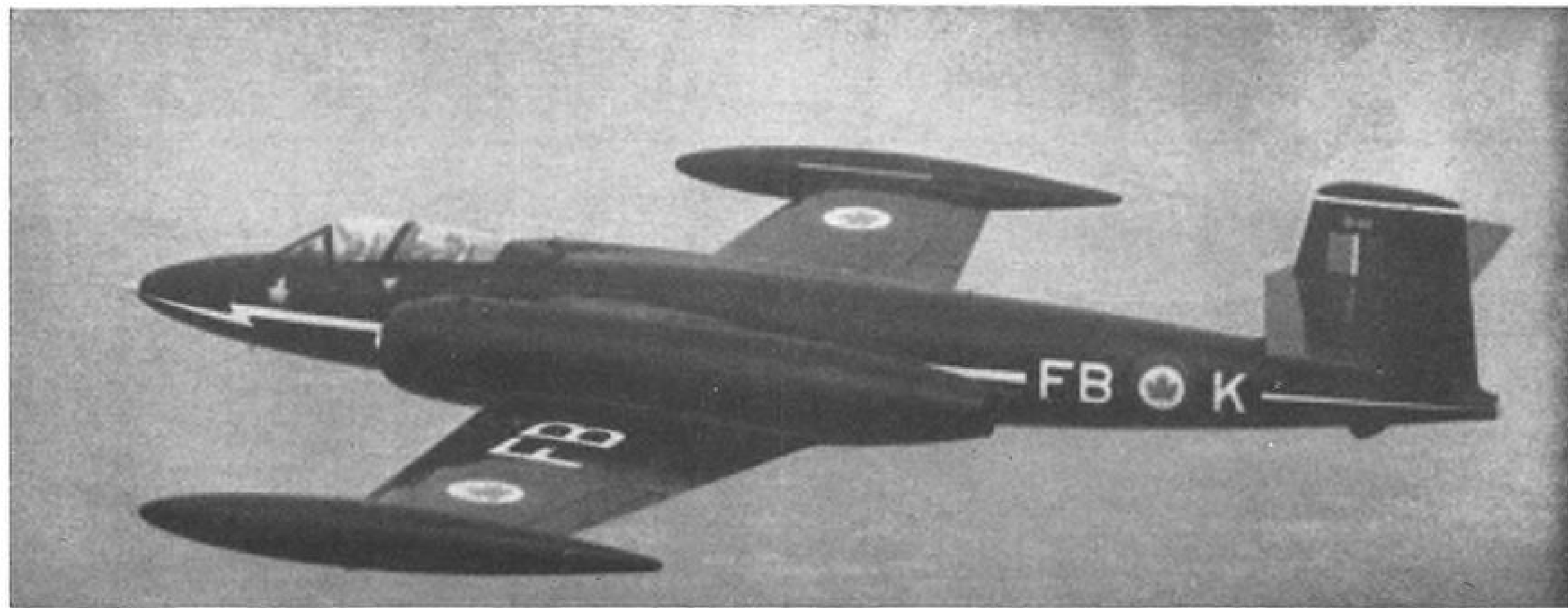
Third panel is a group inquiring into radio noise measures and limits.

- **"Ruggedizing"**—Problem of "ruggedizing" tubes is of prime concern to other research groups as well. Aeronautical Radio Inc., has set up a nine-tube reliability program confined to communications tubes alone.

Defense Department's Research and Development Board also is hiring 15 scientists for a research program to develop tubes better able to stand shock.

Some engineers visualize that a virtual replacement of many present-day electronic plants will be necessary in order to get the precise temperature and atmospheric conditions and other ideal working conditions necessary to achieve the high degree of perfection which is the goal.





AVRO CF-100 equipped with wingtip tanks for projected first nonstop non-refueled trans-Atlantic flight by a jet fighter.

## CF-100 Readied for Trans-Atlantic Test

Following flight trials with large-sized wingtip tanks, one of the two Avro CF-100 prototype jet night fighters is being groomed at Malton Airport, near Toronto, Canada, for the first nonstop non-refueled jet fighter trans-Atlantic flight.

The plane is scheduled to fly from Gander Airport, Newfoundland, sometime this month or next depending on suitable weather.

Preliminary flight trials included a series of long-range fuel consumption test flights to provide data on consumption at various cruising speeds and altitudes under varied operating conditions.

At the controls for the trans-Atlantic crossing will be Squadron Leader E. L. (Shan) Baudoux, RCAF test pilot, accompanied by Flight Officer J. W. Whelan, RCAF, as navigator and radio operator.

►**RAF Evaluation**—The flight was originally scheduled last summer, in time for the Farnborough SBAC show in

September, but was postponed for additional tests in Canada. The prototype will remain in England for some time, at Boscombe Down, an RAF flight test evaluation center, and will be given a thorough testing and evaluation in comparison to current British and American jet types.

The trans-Atlantic flight is described as not being an attempt to set a new speed record. But at the CF-100's normal cruising speed in the 600-mph. range it will obviously set one at any rate.

Meanwhile in one of the three large production bays in the Avro Canada plant at Malton, several of the first ten pre-production CF-100 fighters have already begun to take shape, and finished components are reported ready for the first ten planes. These models, or at least some of them, are expected to be powered by two Avro Orenda turbojet engines rated at about 7000-lb. thrust each. The two prototype CF-100s

are powered by Rolls-Royce Avon engines, not quite as powerful as the Orendas, but rated at more than 6000 lb.

►**NATO Choice?**—Besides the first ten fighters now under construction, Avro has a substantial production order for an additional number of the long-range night fighters. There have been hints that the CF-100 may be picked as a standard night fighter for the Atlantic Pact nations, if the Boscombe Down evaluations show up as well as the Avro engineers anticipate.

Last fall, when one of the prototypes was flown to Andrews AFB and later to Wright-Patterson AFB for evaluation by USAF test pilots, it was indicated that USAF expected to buy a small service test quantity of the planes, about ten. There has been no indication since that additional planes will be ordered by USAF, and it is probable that any additional orders will await the service testing program.

## Four More Airlines Report '50 Salaries

Salaries and stock bonuses of airline executives of American, Capital, Chicago & Southern and Colonial 1950 and 1949 are:

• **American Airlines**—Reports as follows: President and director, C. R. Smith, salary, \$50,000, and 4000 common shares (1949: \$50,000, and 2000 common shares); vice-president and director, O. M. Mosier, \$30,000, and 4500 common (\$27,500 and 4500 common); vice-president, R. E. S. Deichler, \$30,000 and 10 preferred (\$27,500, 10 preferred and 100 common); vice-president, L. G. Fritz, \$30,000 and 400 common (\$27,500 and 400 common); vice-president and treasurer, Wm. J. Hogan, \$30,000

(\$27,500); vice-president, Wm. Littlewood, \$30,000 and 5000 common (\$27,500 and 5000 common); vice-president and secretary, C. W. Jacob, \$27,500 and 20 preferred (\$22,500 and 20 preferred); vice-president, Rex W. D. Smith, \$22,500 (\$21,250); vice-president, Amos Culbert, \$10,833.33 (\$20,000 and 1000 common); vice-president, C. J. Brandewiede, \$22,500; vice-president, G. K. Griffin, \$15,395.63 and 500 common; assistant vice-president, J. G. Flynn, \$4,222.25; assistant vice-president, Marvin Whitlock, \$14,273.05; assistant vice-president, Glenn Markt, \$10,300 and 200 common shares (\$9,429 and 200 common shares); assistant vice-president, W. H. Miller, \$18,000 and 670 common shares (\$18,000 and 670 common shares); assistant vice-president, Carlene Roberts, \$25,000 and 100 common shares (\$14,250 and 100 common shares); assistant vice president, C. R. Speers, Jr., \$18,000 (\$16,500 and 400 common shares); assistant-treasurer and comptroller, P. G. Larie, \$16,000 and 200 common (\$16,000 and 200 common); assistant treasurer and

assistant secretary, V. J. Long, \$13,500, 10 preferred and 50 common (\$13,500, 10 preferred and 50 common); assistant treasurer and assistant secretary, W. L. McMillen, \$13,500, 30 preferred and 220 common (\$13,100, 30 preferred and 220 common); assistant treasurer, T. O. English, \$10,200 (\$10,220), assistant comptroller and assistant treasurer, L. E. Glasgow, \$13,500 (\$10,578.51); assistant secretary, A. A. Paradis, \$8,250 (\$7500).

Also the following regional vice-presidents:

A. R. Bone, \$12,375, 55 preferred and 1100 common (\$11,869.29, 55 preferred, and 1000 common); W. N. Bump, \$12,375 (\$11,500); Walter Johnson, \$12,375 (\$11,000); S. G. King, \$12,375, 25 preferred and 250 common, (\$12,000, 25 preferred and 250 common); M. D. Miller, \$13,500, 30 preferred and 500 common (\$12,750, 30 preferred and 500 common).

Also the following directors:

Harold T. Ames, \$1100, and 3000 common (\$900 and 3000 common); H. E. Bene-

dict, \$1200 and 2100 common (\$1000 and 2100 common); James Bruce, \$600 and 1100 common (\$200); E. H. Butler, \$600 and 1250 common (\$600 and 1250 common); Amon G. Carter (Ret.), \$500 and 50,000 common (\$800 and 66,800 common); C. S. Cheston, \$1400 and 400 common (\$1100 and 2400 common); T. M. Conroy, \$1400 and 200 common (\$1100 and 200 common); Silliman Evans, \$600 and 500 common (\$500 and 500 common); John W. Farley, \$600 and 200 common (\$500); Charles T. Fisher, \$900 and 1000 common (\$800 and 1000 common); Thomas S. Hammond, \$100 (\$900, 100 preferred and 50 common); A. N. Kemp, \$600 and 2500 common (\$400 and 2500 common); Robert W. Miller, \$500 and 1000 common (\$400 and 100 common); and Edgar Queenley, \$500, 15,050 common and 1000 preferred (\$700, 15,000 common and 800 preferred).

• **Capital Airlines**—Reports the following: President and director, J. H. Carmichael, salary \$40,000 (1949 salary, \$35,000); vice-president and treasurer, R. G. Lochiel, \$26,000 and 2000 shares B. debenture stock, (\$23,500 and 2000 B debenture); vice-president, J. W. Austin, Jr., \$24,000 (\$18,000); vice-president, J. B. Franklin, \$22,500 (\$18,000); vice-president, R. J. Wilson, \$19,800 (\$17,760); secretary, Hayes Dever, \$15,500 (\$14,000); Chairman, executive committee and director, C. H. Murchison, no salary (\$15,000); director, G. R. Hann, 273,000 shares B debenture stock (175,500 B debenture); director, T. D. Neelands, Jr., 100 shares B debenture stock (25,000 B debenture); director, H. J. Reeves, 500 shares B debenture stock (40,000 B debenture); director, J. R. Stockton, 100 shares B debenture stock.

• **Chicago and Southern Airlines**—The following figures are reported:

President and director, Sidney Stewart, salary, \$32,000, bonus of \$200, and 900 shares of common stock (1949: \$30,000, bonus of \$150, and 900 common shares); chairman of the board and director, Carleton Putnam, \$23,999.98, bonus of \$200 and 54,800 common (\$26,000, \$150, and 54,800 common); vice-president—finance, and director, Junius Cooper, \$18,000, bonus of \$200 and 100 common (\$18,000, \$150 and 100 common.); vice-president—operations, William T. Arthur, \$17,500 and 500 common (\$11,278.98 and 500 common); vice-president—secretary, Richard S. Maurer, \$13,666.67 and 40 common (\$12,666.67 and 40 common); treasurer, Thomas Hambleton, \$7,483.33 and 100 common (\$7000 and 100 common); assistant treasurer, R. S. Scrivener, \$5160 and 20 common (\$5160 and 20 common); assistant secretary, Erma Murray, \$4680 and 50 common (\$4589 and 50 common); director, L. Raymond Billett, bonus of \$100 (bonus of \$150); director, John R. Longmire, bonus of \$100 and 9499 common (bonus of \$150 and 9534 common).

• **Colonial Airlines**—Reports the following: President and director, Sigmund Janas, Sr., salary of \$18,000, bonus of \$6500 and 36,922 common shares of record, (1949: salary of \$24,500 and 36,922 common shares of record); vice-president, Edward S. Ridley, \$11,999.88 (\$10,999.92); treasurer, James F. Gormley, \$11,999.88 (\$11,416.59); secretary, Warren S. Cooper, \$8625 and 139 common shares of record (\$7950 and 139 common shares of record); vice president and director, B. T. Dykes, \$15,000 and 500 common shares of record (\$15,000 and 500 common shares of record); vice-president—operations and traffic, Sigmund Janas, Jr., \$11,999.88 (\$10,999.92); vice-president, A. M. Hudson, \$11,999.98 and 800 common shares of record (\$10,999.92 and 900 common shares of record); and the following directors: Karl H. Bissell, bonus of \$550 and 3000 common shares of record (\$550 and 2200 common shares of record); Eugene P. Barry, \$50.00 (500 and 100 common shares of record); Francis Hartley, Jr. bonus of \$550 and 12,404 common shares of record (\$550 and 13,804 common shares of record); Stanley Meyer \$7500 salary, \$500 bonus and 100 common shares of record.

## Our Expanding Industry

## UAC to Build Two New Plants

By William Kroger

Repeated signs that aviation is expanding toward a new and higher "normal" productive base were strengthened last week with United Aircraft Corp.'s announcement of its plans to construct two new plants at a total cost of about \$20 million.

More and more, industry observers and analysts are coming to the conclusion that a substantial part of the present "emergency" expansion is in reality a catching-up on what should have been the industry's normal growth but for the severely curtailed defense expenditures after the war.

►**High Peacetime Level Seen**—Under this interpretation, the increased productive capacity of the industry at the end of the present emergency build-up can be kept fully utilized by normal peacetime business.

A strong factor in this favorable forecast is United's decision to go ahead now on new plant construction with its own funds. UAC is notably conservative, and since its founding has developed a widespread subcontracting network principally to enable the home plant to remain relatively small and stable in a business that once fluctuated greatly between high and low levels of production.

Now, the feeling at UAC and at other large aircraft manufacturers is that the future needs of both military and commercial aviation will be much greater than at present—even without a war. In other words, aviation manufacturing will never go back to the pre-Korean level.

►**Accelerated Depreciation**—There are two strong spurs to the present overdue expansion. One, of course, is the emergency defense program. The second hinges on the first—the accelerated depreciation permitted under a "certificate of necessity." Manufacturers are allowed to depreciate new defense construction in five years rather than ten. Effect is to reduce their taxes and, accordingly, pay for a good part of the new construction with money that otherwise would go to the government in taxes.

It is for this reason that plant expansion is taking place in a variety of industries under certificates of necessity (AVIATION WEEK Mar. 12, p. 15).

A survey just completed by the McGraw-Hill Economics Department shows that this year all manufacturers plan new plant and equipment expenditures totaling \$13.3 billion, 66 percent more than was spent in 1950. According to

the survey, transportation equipment manufacturers (principally aircraft) this year plan to spend \$490 million on plants alone. This contrasts with \$130 million spent last year.

New capital expenditures in the transportation equipment field will show a greater increase percentagewise over 1950 than in any other manufacturing group. Including both plants and equipment, the increase will be 277 percent. If 1951 plans are fulfilled, transportation equipment manufacturers will end this year with nearly 300 percent more capacity than in 1939. The aircraft industry, according to the survey, this year will increase its capacity more than 40 percent over 1950.

United Aircraft's expansion, on which a certificate of necessity has been approved, provides for a new 500,000-sq. ft. plant for Hamilton Standard division at Bradley Field, Windsor Locks, Conn. (14 miles from the present Ham Standard facility at East Hartford) and another 500,000 sq. ft. plant for Pratt & Whitney Aircraft at North Haven, near Wallingford, Conn.

P&WA will take over the present 330,000-sq. ft. Ham Standard plant, and add to it so that the engine builder will wind up with better than 1 million more square feet of production space, plus offices.

According to UAC's annual report (AVIATION WEEK Mar. 26, p. 17), the government will furnish tooling valued at \$95 million for the expanded production capacity.

Other signs of our expanding industry:

Bell Aircraft Corp. will spend \$3 million on a new plant in Ft. Worth, Tex., for its helicopter division engineering and assembly operations. Bell has bought 55 acres, and first unit of the facility will have 200,000 sq. ft. Bell recently acquired more space for its helicopter division in the Buffalo area, but within a year expects to transfer all its rotocraft activities to Texas. Harvey Gaylord, vice president in charge of helicopters, will head the Texas operation, which will employ about 2000 . . .

Northrop Aircraft, Inc. has received new USAF orders for its F-89 Scorpion all-weather interceptor. This pushes company's backlog to an all-time high of about \$300 million . . .

Nash-Kelvinator Corp., Detroit, is negotiating a license with Pratt & Whitney Aircraft division of United Aircraft Corp. to build the 2500-hp. R-2800 Double Wasp piston engine. Engines will be produced at Nash's factories at Kenosha and Milwaukee, Wis.



Top Profits

EAL reports its highest earnings; American leads the airlines.

Peak earnings for 1950 continue to be revealed in the separate annual reports now being released by the major air carriers. Eastern and American are the latest to show the impact of boom travel conditions prevailing last year.

Eastern reported net earnings of \$5,257,874, after federal income taxes, equivalent to \$2.19 per share. This was the best in the company's history and far better than was previously expected. It compared with net earnings of \$1,967,905 or 82 cents per share for 1949. The company's previous best showing was in 1946 when net earnings aggregated \$3,504,643 or \$1.46 per share.

►Unbroken Skein—Eastern also has the distinction of operating at a net profit for 16 consecutive years, the longest unbroken profitable period in the domestic airline group.

The company's 1950 passenger revenues totaled more than \$71.3 million, a new peak and 13 percent above 1949. Revenue from this source accounted for about 91 percent of total operating revenues in 1950, revealing the company's independence of mail payments. In fact, Eastern would have been able to show a profit without any revenue or income whatsoever from mail.

Eastern makes the claim of having carried the largest volume of air coach traffic of any air carrier in the world during 1950. The company asserts that its air coach service earns a small profit and supplies a necessary rapid means of transportation to many who could not otherwise afford to fly. But EAL recognizes this service creates some diversion of traffic from standard fare flights to coach flights.

Eastern also reveals that its new aircraft acquisition program comes to about \$69 million. Of this, \$8.9 million has been advanced to the aircraft builders covering orders for 60 Martin 4-0-4s and 14 Super-Constellations. To facilitate financing these purchases, the company has a \$30 million bank credit. Accumulated cash, anticipated earnings and depreciation provisions are expected to supply the balance of funds needed.

Eastern's current financial position was also improved. Net working capital at the 1950 year-end aggregated \$15,738,085. This excluded the \$8.9 million advanced to aircraft builders covering equipment on order.

The company resumed dividend payments with a 25-cent disbursement per share last December. A semi-annual pay-

1950 Airline Operations

DOMESTIC TRUNK LINES	TOTAL OPERATING REVENUE	TOTAL OPERATING EXPENSE PER REVENUE TON MILE	NET OPERATING PROFIT	NET PROFIT
American	\$114,653,557	.41	\$22,918,827	\$10,128,896
Eastern	77,416,193	.47	9,835,640	5,214,276
TWA	73,180,399	.49	6,586,053	*
United	95,711,415	.43	14,218,019	*
Braniff	15,702,258	.54	2,104,404	1,336,396
Capital	29,816,460	.52	2,236,754	1,160,031
C & S	9,146,331	.62	704,070	672,586
Colonial	4,176,594	.88	(385,664)	(422,877)
Continental	6,221,793	.74	383,907	191,247
Delta	18,869,917	.51	2,151,833	1,146,550
Mid-Cont.	8,238,390	.67	681,383	355,446
National	16,948,673	.49	2,469,638	2,185,494
Northeast	6,361,154	.88	108,534	333,756
Northwest	NA	NA	NA	NA
Western	14,246,493	NA	1,635,761	787,904
ALL-CARGO OPERATORS				
Slick	\$7,796,000	.14	\$784,987	\$506,608
Fly. Tiger	4,809,572	.15	1,466,517	1,171,971
U. S. Airlines	NA	NA	NA	(NA)
INTERNATIONAL & TERRITORIAL (LARGER CARRIERS)				
American	\$4,031,143	.42	\$328,694	\$272,908
Braniff	5,663,610	1.06	86,481	(108,311)
C & S	3,738,713	.98	289,991	183,449
Colonial	1,458,675	.65	115,034	112,357
Eastern	1,089,474	.36	82,233	43,597
Hawaiian	3,492,055	.81	(5,660)	(54,720)
National	1,598,450	.67	(86,298)	(86,298)
Northwest	NA	NA	NA	NA
Panagra	NA	NA	NA	NA
Pan American*	NA	NA	NA	NA
TWA	43,811,833	.79	4,986,499	*
United	5,682,601	.86	(1,588,594)	*

\* Reports Consolidated Int'l. and Domestic Net Profit: C & S, \$856,035; TWA, \$6,494,713, United, \$6,429,722.  
\*\* Pan American, all divisions: no announcement until Apr. 30.  
NA—Not available. Figures in parenthesis indicate losses.  
SOURCE: CAB and airline reports.

1949 Airline Operations

DOMESTIC TRUNK LINES	TOTAL OPERATING REVENUE	TOTAL OPERATING EXPENSE PER REVENUE TON MILE	NET OPERATING PROFIT	NET PROFIT
American	\$99,494,070	\$.47	\$9,442,154	\$6,488,085
Eastern	68,853,652	.54	3,944,869	2,008,340
TWA	63,710,914	.53	2,595,641	722,543
United	87,010,702	.50	4,975,176	1,786,817
Braniff	14,527,520	.63	476,806	446,010
Capital	26,905,835	.57	1,319,437	1,681,670
C&S	8,582,730	.65	300,172	470,851
Colonial	4,445,132	.80	216,441	48,665
Continental	5,247,449	.79	(313,259)	(229,397)
Delta	15,897,974	.64	706,866	450,967
Mid-Cont.	7,515,155	.67	539,789	340,024
National	12,983,817	.66	52,654	23,618
Northeast	5,293,502	.94	65,234	24,364
Northwest	27,360,509	.57	(1,181,078)	(1,325,181)
Western	11,542,530	.64	984,462	440,833
TOTAL	\$459,782,544	.54	\$24,625,337	\$13,378,209
ALL-CARGO OPERATORS				
Slick	4,075,261	.18	(397,431)	(343,352)
Fly. Tiger	1,482,796	.19	240,691	275,323
U. S. Airlines	266,074	.43	(351,702)	(351,702)
INTERNATIONAL & TERRITORIAL (LARGER CARRIERS)				
American	3,801,803	.45	50,964	23,151
Braniff	3,925,611	1.27	4,900	(224,416)
C&S	3,784,754	1.06	364,887	159,236
Colonial	1,176,254	1.34	(352,405)	(307,380)
Eastern	892,146	40.93	(40,435)	(40,435)
Hawaiian	3,518,404	.79	126,672	54,428
National	1,398,195	.69	(44,349)	(44,349)
Northwest	13,140,508	.70	2,662,060	2,682,859
Panagra	16,825,639	1.03	2,205,647	870,965
Pan American	NA	NA	NA	NA
All Divs	158,854,581	.84	11,414,353	1,322,091
Atlantic	53,477,386	1.02	4,487,205	2,491,652
Alaska	5,170,002	.57	310,606	163,064
Pacific	34,663,532	.86	2,940,214	1,475,449
Latin Am.	65,513,469	.75	3,689,277	2,308,757
TWA	42,274,321	.89	4,711,988	2,986,302
United	4,543,137	.49	743,230	462,589

SOURCE: CAB.

ment of the same amount is being paid Apr. 13.

Record-breaking traffic and earnings are known to continue well into 1951. Results for the current first quarter are expected to attain an all-time record high.

►American Leads Domestic—American Airlines showed the largest gross revenues and net earnings among the domestic airlines last year. Its gross came to about \$118.7 million with net income exceeding \$10.4 million. After provision for preferred dividends of \$1.4 million, these earnings were equivalent to \$1.39 per common share. This compared with common share earnings of \$9 cents in 1949.

Earnings last year would have been even higher were it not for the \$923,000 loss absorbed in the liquidation of the American Overseas Airlines investment.

American, too, is engaged in an equipment expansion program. It increased its orders for DC-6Bs from 11 to 17. Deliveries are scheduled to start early this year. Total cost for this equipment with spare parts, is expected to be about \$20 million.

At present, American operates 49 DC-6s, 79 Convairs and 13 DC-4 air freighters. The entire Convair fleet is being structurally modified so as to increase its weight-carrying capacity.

Reference is made to the low cost of American's existing flight equipment. The entire fleet originally cost about \$72 million, is depreciated on the books to \$45.7 million, but is considered by the management to have a replacement value of around \$135 million.

Substantial progress was made by the company last year in its financial position. Further reductions in its outstanding debentures were made, with retirements bringing the issue down to \$30 million as compared with \$40 million originally in the hands of the public. Net working capital stood at \$13 million on Dec. 31, 1950. This is misleading as it excludes \$29 million set aside to pay for equipment and replacements. With the DC-6B purchases entailing a cost of only \$20 million, further capital expenditures of an unspecified nature are indicated.

Both Eastern and American comment on the same Civil Aeronautics Board decision, but in a different vein. Eastern indicates its determination to seek CAB reconsideration for application for a southern transcontinental route. American, on the other hand, appears pleased that the Board denied this application following a favorable examiner's report. It also expresses its satisfaction with the equipment interchange arrangements imposed by the CAB in place of granting a new route which would have posed a serious competitive threat to its operations.

Army Copters

Ground forces hope new order pried out of USAF is only starter.

By Ben S. Lee

Army got its foot in USAF's jealously guarded door to aircraft procurement last week when it managed to force through an Air Force order for a limited number of helicopters in excess of the 4000-lb. weight limitation presently imposed by USAF.

Army regards these initial helicopter orders as "only the beginning" of its planned procurement of this type plane. Informed quarters state that Army plans envision an air fleet of 'copters virtually replacing surface combat carriers in forward areas.

One high-ranking Army official declared that it was inevitable that Army must get into the aircraft business not only from point of economy but from sheer combat supply needs. "I envision," this official declared, "in a few short years, that numbers of Army aircraft will exceed those of Air Force."

►Air Force View—Air Force, however, still takes a dim view of Army encroachment into the air transport field. said one top-ranking air officer, "four air services (USAF, MATS, Navy and Marine Corps) are enough—one more (Army) would clutter it up. . . . The Joint Chiefs aren't about to give Army authorization for an air force, logistical, tactical, or otherwise."

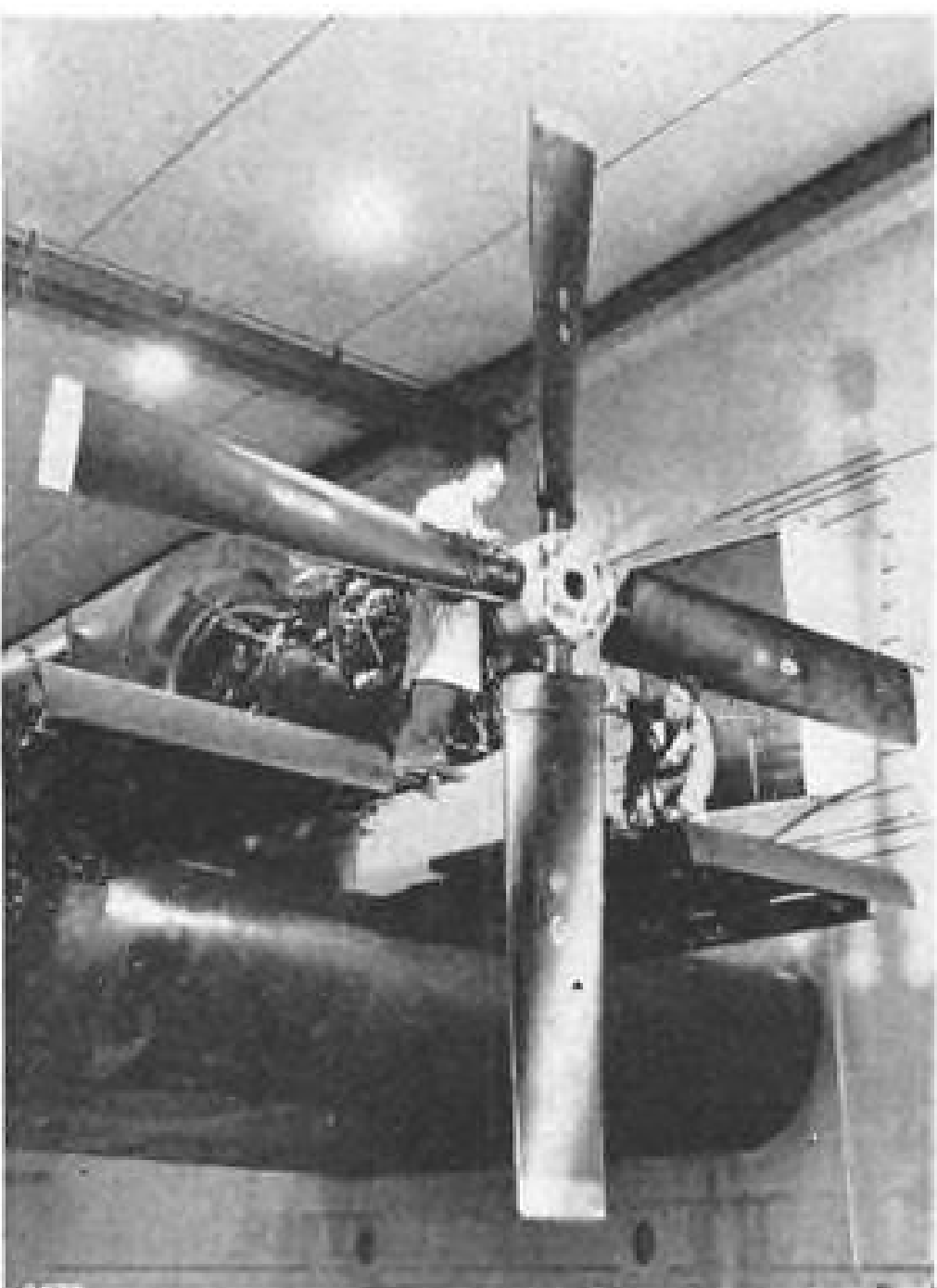
Officially Air Force said only "the joint Army-Air Force regulations concerning weight limitations are still in effect. The Air Force will purchase for the Army a limited number of helicopters in excess of the 4000-lb. weight limit set forth in joint regulations for certain experiments by Army."

Despite high-level conflict over control, problems and technique for air-ground tactical problems, Army is moving heavily into the aircraft procurement field. In 1949 Army spent \$10,081,127. In 1951 budgets (regular, 1st and 2nd supplemental) Army has already committed \$67.3 million for liaison rotary and fixed-wing aircraft and another \$4.7 million for parts and equipment. The Third Supplemental is expected to up Army's plane procurement budget for 1951 to \$90.4 million.

Presently programmed regular 1952 budget, still to be presented to Congress, is expected to top \$150 million for Army organic aircraft.

Equipment ordered by Army for experimental purposes includes:

•Piasecki H-21. Fuselage is 54 ft. in length with a cabin capacity of 615 cu. ft.; room for 12 litter patients or



Turbo-Hydromatic 19-ft. Prop to AF

Latest and largest of the Turbo-Hydromatic series propellers to go to the Air Force after initial proving by United Aircraft Corp.'s Hamilton Standard division is this 19-ft. four-blader.

Now undergoing further testing at the Air Materiel Command's Wright-Patterson AFB, this prop was developed under AF sponsorship for engines delivering over 5000 hp. While this power requirement would make the prop applicable to "medium" horsepower turbines, the unit would be too big for Pratt & Whitney's R-4360 piston plant. But there have been reports that a 5000-hp. reciprocating engine has been seriously considered.

Development of this 19-ft. unit, and two others of the Turbo-Hydromatic series—a smaller four-blade prop and a dual rotation eight-blader—now under test by the Navy, incorporates experience gained in more than 2600 hr. of flight and ground test with Hamilton Standard installations on turbine engines. These have included General Electric's TG-100 in both the Convair F-81 and Ryan's XF2R-1 Dark Shark and P&W's T-34 as an additional nose engine in a B-17G flying test bed.

Hydraulic pitch changing mechanism for the new 19-ft. prop is mastered by an electronic control, but on the ground, direct control of the blade angle is taken over by the pilot. The pitch-change system utilizes two small 3-lb. pumps, each capable of delivering 30 quarts of oil per minute from the prop system's own reservoir.

Requiring a total of 15 hp. from the engine shaft to drive them, the pumps are used together only for rapid pitch adjustment in sudden power changes and for feathering and reversing.



## Marine Copters

While Army is still pushing to get its first assault transport helicopters, the Marine Corps has commissioned its first three east coast helicopter squadrons at Cherry Point, N. C.

The squadrons will be organized to supplement existing fighter and transport units of the Second Marine Air Wing. Initial equipment will be single-rotor Sikorsky HO4S (H-19) helicopters. Delivery of the ten-place 110-mph. copters to the squadrons will begin in May.

22 troops. A single Wright R-1820-76A engine developing 1090 hp. turns twin three-bladed 44 ft. diam. rotors. Weight empty is 7324 lb.; gross weight is 10,133; useful load is 2809 lb. including 816 lb. fuel and oil.

Maximum speed at normal gross weight is 135 mph.; cruising speed 104 mph.; vertical climb rate at sea level, 1480 fpm.; hovering ceiling 13,000 ft.; service ceiling 16,600 ft.; range at 5000 ft., with normal fuel 610 mi. ferry range 1435 mi.; endurance 21 hours.

• **Sikorsky H-19.** fuselage is 41 ft., 8.5 in.; cabin seating capacity 12. A single Pratt and Whitney R-1340 S1H2 engine turns a single 53 ft. rotor. Weight empty is 4395 lb.; gross weight, 6800 lb.; fuel capacity 180 gals.

Maximum speed 110 mph.; cruising speed 86 mph.; vertical climb rate at sea level, 1000 fpm.; hovering ceiling 9000 ft.; absolute ceiling 16,500 ft. normal range is 462 mi.

• **Piasecki HUP-2.** Details of the copter have not been disclosed but Army sources state it a slightly larger version of the Piasecki Navy HUP-1. The latter has a fuselage length of 32 ft., and seating capacity of 7. Weight empty, 3924 lb.; gross weight, 5450 lb. A single Continental R-975-34 engine turns twin three-bladed 35 ft. rotors. Navy is buying these copters for Army.

Maximum speed at sea level, 125 mph.; cruising speed 100 mph.; vertical rate of climb 1200 fpm.; absolute ceiling 12,000 ft.; normal range 400 mi.

Army sources state the HUP-2 can accommodate a slightly higher number of troops than can the HUP-1 and that its range and speed are somewhat higher.

While point and counter-point efforts are made in top USAF-Army echelons to work out disagreements between the two services in reference to air transportation needs, Army is nevertheless moving steadily ahead with plans for an expanded air arm.

• **Army helicopter company.** To meet the needs of a highly flexible combat ground arm, Army has ordered establishment of three helicopter companies to form the nucleus of similar organizations which would be organized for corps, division and smaller tactical units. The H-19 and H-21 helicopters just ordered will provide transport equipment for these companies, it is reported.

• **Pilot training.** Long concerned with AF's World War II policy of diverting wash-out fighter and bomber trainees to liaison pilots, Army is agitating for assignment of cadets directly to Army pilot schools. While the program is still embryonic, a step in that direction has been made with recent Army publication of a directive asking its reserve components to "volunteer" for pilot training.

• **Airborne center.** Two years ago Army proposed establishment of a joint airborne (test) center at Ft. Bragg, N. C. to aid development of a modern airborne fighting force. Original proposal to ease tactical air-ground support problems lagged when USAF declined to go along with the idea.

Last year Army went ahead and established the center, placing Maj. Gen. Robert M. Miley in command. He has pressed mission of the center to foster advanced airborne techniques, doctrines, tactics, weapons and equipment, so relentlessly that the military aircraft industry has had to take heed. Air Force and Navy both now have set up "coordinating" offices at the Ft. Bragg center.

In the helicopter field, Army plans are much broader. It considers the Piasecki YH-16 with its probable 6000 to 8000-lb. payload as base for practically all future Army air transport. To give its newly organized helicopter companies training, Army is using the H-19 and H-21.

## CAB Sets Up New Code of Ethics

Civil Aeronautics Board has established a new code of ethics defining principles of conduct for itself, its staff and those who do business with it. Many of the code's general principles are similar to those recently proposed by Senator Paul Douglas in an interview with AVIATION WEEK (Mar. 26 issue.)

The Board makes a special point of asking parties to CAB procedure to stop using "cumulative and repetitious evidence."

Chief written rules are:  
• **No public pressure** by such airline maneuvers as giving "statements to the press or radio... designed to influence the Board's judgment in the

case." How this will affect press releases such as one recent one telling how "shocked" Eastern's Captain Rickenbacker is "by today's action of a minority of the board" is uncertain.

• **No shop talk** with staffers or members on the merits of a case by those with a business interest in the case. "Merits" of a case mean personal judgment of it, not inquiry as to facts of record, it is understood.

• **No evidence padding** by piling up repetitious evidence. Parties must keep their briefs concise.

• **No wining and dining** to influence the Board on a case. The new regulation forbids "unusual hospitality."

• **Attorney's honor** is relied on by the regulation to prevent introduction of a case or piece of evidence not bearing directly on a case. Thus, the attorney-client relationship clause of the regulation (300.5) makes the attorney responsible for any case delaying tactics or other subterfuge. If the client behaves improperly, the attorney "should terminate their relationship."

Punishment for breaking these rules shall be disqualification from the privilege to appear or practice at CAB.

The new "principles of practice of the CAB" were drawn by the specially appointed committee on practices and procedures, made up of well-known civilians, mostly airline attorneys.

## Senate to Query CAB on Non-Skeds Role

Senate Small Business Committee's investigation into the role of non-skeds in air transportation is going to draw the curtains wide open on Civil Aeronautics Board.

Hearings are scheduled to open Apr. 19. Committee's counsel, Laurance Henderson is giving full time to preparation for them.

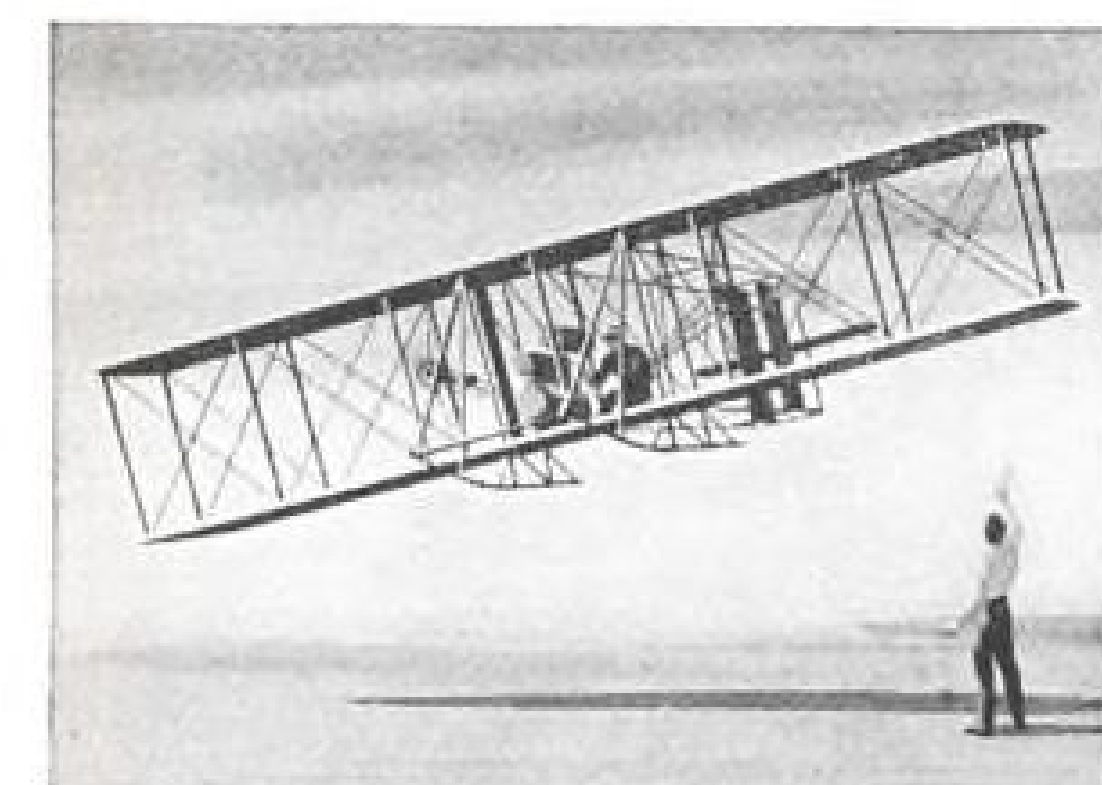
Meanwhile, at the request of the committee's chairman, Alabama's Sen. John Sparkman, CAB has postponed, from Apr. 6 to May 6, the effective date for its order limiting non-skeds to three trips monthly between any two points.

Non-skeds are charging that the order, and other Board actions, are the result of a "conspiracy" of the scheduled airlines, in which "fraud and corruption" figure, aimed to drive non-skeds out of business.

Sparkman has assured a thorough investigation and airing of the non-sked charges. "We don't know whether they will stand or fall," committee counsel Henderson told AVIATION WEEK, "but we are going fully into them."

Henderson anticipated that present members of CAB, its past members, CAB staff personnel, attorneys who have handled cases before the Board, and industry officials will probably be called in to testify.

# FIRST



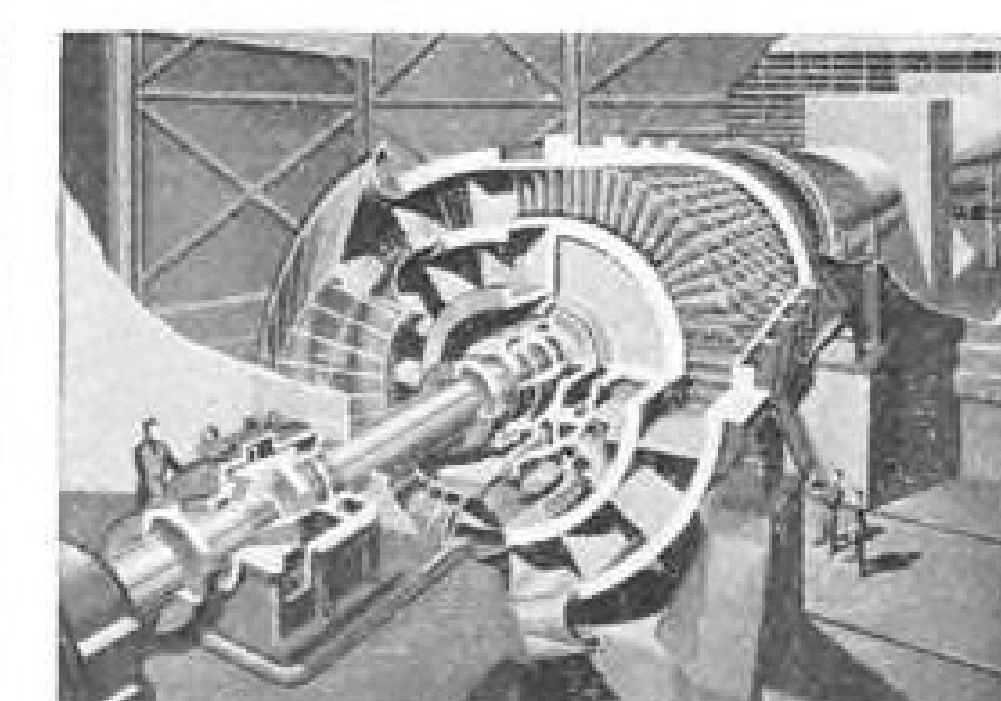
WRIGHT BROTHERS — making history's first successful flight — relied on Mobiloil!



PAN-AMERICAN assures top performance on long overseas flights with Mobiloil Aero!



MOBILLOIL AERO helped Joe de Bona set record-breaking pace to capture highly prized Bendix Trophy!



WORLD'S LARGEST wind tunnel turbine is protected with lubricants by the makers of Mobiloil!



NEW AVIATION lubricants and fuels are being constantly developed by Socony-Vacuum engineers!

# IN AVIATION

## The Flying Red Horse Paces Air Progress!

• Mobiloil first flew with the Wright Brothers back in 1903 — has since flown with leading air pioneers... Lindbergh, Wiley Post, Amelia Earhart, Joe de Bona and others.

The makers of Mobiloil have been "out front" in developing products to meet progressively

tougher operating conditions — higher engine heat, longer range, greater speed and altitude.

Small wonder leading aircraft engine builders approve Mobiloil Aero... why it is found at hundreds of U. S. airfields.

Get Mobiloil Aero for top flight protection!



## Why Accept Anything Less?

SOCONY-VACUUM OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.,





In  
Aircraft Fan Design

Only **JOY**  
**AXIVANE**<sup>®</sup>  
**FANS**

Offer All These  
Advantages



### CAST-IN STRENGTH

The outer casing, stationary vanes, and the inner casing are a single casting to provide maximum resistance to shock, and to prevent strain under working conditions.

### LIGHT WEIGHT

These fans are not only compact in design, but are available in either aluminum or magnesium to reduce overall weight to a minimum.

### VANEAXIAL DESIGN

Stationary vanes provide an equal pressure and velocity distribution at all points across the fan outlet, thus producing an air flow pattern substantially free from turbulence.

### AERODYNAMIC ENGINEERING

Both the blades and stationary vanes of Joy blowers employ aerodynamically-efficient airfoil shapes, to insure the most favorable electric-to-air power ratio.

### PRECISION CONSTRUCTION

The squared-off blade-tips clear the casing by only a few thousandths of an inch to minimize tip loss, a common cause of fan inefficiency, and to reduce noise.

### COMPLETE LINE

Joy offers a wide selection of standard single or two-stage aircraft fans, as well as custom-designed types, for all ventilating, heating or cooling problems on military and commercial planes. Optional features include straight or flared inlets, beaded or flanged connections, radio noise-filters, anodization, and cooled motors where required.

### UNMATCHED EXPERIENCE

Joy is the world's largest manufacturer of vaneaxial fans and blowers. Fans for all purposes, ranging from 1/25 H.P. to 3000 H.P. and up, with fixed, adjustable, or controllable blade pitch, constitute the unequalled background of JOY engineering experience.

Write for Bulletin, or

*Consult a Joy Engineer*

100 Years of Engineering Leadership



# JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

## AERONAUTICAL ENGINEERING



COPTER of 1954, carrying 10-12 passengers, could be like this Bristol 173, says report of British helicopter committee.

## A Look at Tomorrow's Passenger Copters

British study group tells how rotary craft could dominate travel over routes in 50-300-mi. range.

By David A. Anderton

The United States helicopter industry has built on the foundation of user experience. In England, with few helicopters and fewer users, there has to be a different basis for expansion.

And so the British have been pursuing their traditional approach—a detailed study of all related factors, carried out by a special working group.

This is what the British did with jet propulsion and postwar air transportation. The results of those planned programs have put England far ahead of the rest of the world in jet transports.

In the helicopter studies, they have found some of the same answers that were learned here by cut-and-try methods and costly experimenting. But they have also proposed a number of interesting solutions which have not as yet found wide circulation in this country.

► **Two Year Gestation**—The Minister of Civil Aviation appointed the Interdepartmental Helicopter Committee in August 1948; the first report of the committee is dated about two years later, but has just been released.

It summarizes the committee's views on the prospects of the helicopter's future commercial use on internal air serv-

ices in the United Kingdom, its effects on air service and airport requirements and the related programs of development and experimental work for the helicopter.

To aid in forming its opinions, the committee heard many witnesses representing helicopter manufacturers, users and civil and military aviation. Membership of the committee itself was chosen from the Ministries of Civil Aviation and Supply, the General Post Office, British European Airways and the British Air Charter Assn. No manufacturers were represented.

By the committee's own admission, it was not constituted as a technical group. And although the report shows a keen appreciation of the technical problems involved, the main emphasis is the consideration of the feasibility of the helicopter as a transportation medium.

► **Current Status**—The committee survey of current helicopter status in the United Kingdom named four major companies:

• **Bristol Aeroplane Co.** Two prototypes of the single-engined, 3-4-passenger Bristol 171 have flown, and the Ministry of Supply has ordered three prototypes of the Mk. 3 version which may become the production model. Trans-

mission difficulties have delayed this project.

• **Cierva Autogiro Co.** Ministry of Supply has ordered three W.14 single-engined, one-passenger helicopters; two have been built. Two W.11 (Air Horse) prototypes have been built, and one of these was lost in an accident. This craft is a twin-engined, three-rotor copter carrying 24 passengers.

• **Fairey Aviation Co.** At its own expense, this company built two prototypes of a single-engined copter, the Gyrodyne, capable of carrying three passengers. One of these crashed, and the project has been abandoned.

• **Westland Aircraft Ltd.** This company produces the Sikorsky S.51 under license agreements. Since issuance of the report, Westland has obtained rights also to the S.55.

With the exception of the Air Horse, all of these are too small for use as public transport craft, and only one has been granted a Certificate of Airworthiness which permits the carrying of fare-paying passengers.

The committee also went on record as feeling "... some concern at the defects which have come to light in the rotor systems of all British helicopters, other than the Westland-Sikorsky S.51, which have so far flown."

Future plans were also heard, among them these proposed designs:

• **Bristol 173**, a twin-engined, tandem-



rotor helicopter with a designed cruising speed of 113 mph., and a payload of 10-12 passengers. This craft is under construction and should fly shortly.

• **Cierva W.11T**, a twin-engined, three rotor helicopter with a prospective payload of 30-36 passengers or five tons of freight, and a cruising speed of 116 mph. Ministry of Supply has placed only a design contract for this variation of the basic Air Horse design.

• **Fairey Rotodyne**, a twin-turboprop, 23-passenger craft of novel configuration. This craft has been proposed to the Ministry of Supply which has authorized preliminary development.

As an adjunct to the committee's survey of current rotary-wing status, there was an examination made of British European Airways' helicopter experimental unit, now completing its fourth year of operations. This unit is equipped with five American helicopters—three Sikorsky S-51s and two Bell 47Bs. The work of this unit has been valuable in assessing the operational and handling characteristics of helicopters and in the development of blind and night flying techniques.

► **First Conclusions**—After surveying current helicopter status, the committee came to some conclusions which served to direct its further thinking. These were in general that the helicopter was best

fitted for a short-range (50-300 mi.) job; that for economic reasons, the service should be of high frequency; that they should operate from town center to town center; that at least two engines will be necessary for safety reasons; and that (and this point was reiterated several more times during hearings and in the report) the helicopter should not have the standards of passenger service now used on fixed-wing trunk service. The committee stated that it was convinced that "... there is no other single factor which could so effectively stifle the development of the helicopter as an acceptance of the high costs inherent in a luxury service."

As a result of preliminary thinking and considering also the current level of technical development, it appeared that a 20-passenger helicopter would be an economic answer to the question of rotary-winged public transportation.

Since no such copter is being constructed in Great Britain, the committee set up its own design specifications, and British European Airways staff drew up a plan for a helicopter powered by four Alvis Leonides engines. (This engine is currently rated at 550 hp. for takeoff, and shows possibilities of development to 600 hp.)

► **"Ideal"**—This proposed craft would have an estimated gross weight of 22,-

000 lb., would carry 20 passengers over stage distances of about 300 mi., and up to 28 people over shorter distances.

Estimated maximum continuous cruising speed is 142 mph.

Mechanically, such a helicopter should have folding blades, capable of being stowed rapidly and easily. Vibration and noise levels should be minimized. And a fresh approach must be made to landing gear design to obtain lower density of load distribution.

Operationally, the helicopter should be capable of being flown by one man; it should require a minimum of landing area and navigational aids; and it should be able to land vertically, power off, when necessary.

► **Traffic Control**—Consideration of future helicopter transportation must go beyond merely planning a rotary-wing design, and so the committee also considered the problem of traffic control, landing area design and costs.

Control facilities, stated the committee after hearing from a number of witnesses, should be related to traffic density and any necessary integration with fixed-wing aircraft movements. The system recommended is based on route control, rather than on area control.

The sky boxes one statute mile on either side of helicopter routes, and from 500 to 2000 ft. altitude are to be-

come control areas. Terminal or junction points are to have control areas of 3-mi. radius and 2000 ft. altitude.

Communications for such a control facility were carefully studied, and boiled down to three basic types: private telephone wires for terminal-junction station communication; telephone exchange lines; and VHF radio-telephone for ground-air messages.

Final committee recommendation was that full reliance be placed on the VHF/RT, and that wire communication be used only where safety considerations make it desirable.

► **Landing Area Design**—Landing area sizes were considered by the committee as being a design criterion for the helicopter designer, and not for the area designer. The committee statement that "... we should from the outset require manufacturers to produce helicopters to fit landing areas, and not to rely on landing areas being provided to fit helicopter" is a fresh approach to the subject of aircraft landing areas.

The procedure was to determine minimum area sufficient for realistic operational requirements, and to set that area as a target for manufacturers of rotary-winged craft. Landing area size would be determined primarily by helicopter dimensions, obstruction clearance required, angle of approach, rate of movement, and operational conditions of landing, whether visual or instrument.

For size, the committee considered a helicopter with a maximum dimension of 125 ft., and which could be circumscribed by a 125-ft. diameter circle. (This would allow for helicopters somewhat larger than the Cierva W.11T which has a maximum span of 112 ft.)

For approach, the committee chose an angle of 35 deg. with the ground as representing a conservative approach path. It noted that present helicopters in normal operations followed a 20-deg. path, but that the Civil Aeronautics Board in the United States does not require "... wide approaches, on the straightforward reasoning that the helicopter is specifically designed for vertical landing and takeoff." And it added the observation (which should be obvious but which seems to need emphasizing) that a design requirement for future helicopters should be that they must be able to land vertically, power off.

For rate of movement, one helicopter was assumed to be in the landing area at any one time.

For operational conditions of landing, the committee believed that all landings would be made in visual conditions, in daylight or with lights.

► **Minimum Sizes**—With the above data, the committee considered the most demanding condition for operat-



THEY'RE ALL  
"ON TIME"  
ARRIVALS

WITH  
**BENDIX  
GCA**

Recently, Bendix Airport Surveillance Radar and Precision Approach Radar equipment (the two major components of Bendix G.C.A.) was selected by the C.A.A. for installation at 34 major U. S. airports. Thus, another milestone was added to a record of leadership in this field begun years ago when Bendix pioneered radar. Later, Bendix engineers collaborated with the Radiation Laboratory at the Massachusetts Institute of Technology in the development of the first G.C.A. equipment. Since that time, Bendix G.C.A. has been guiding planes in to safe landings at military and civil air fields all over the world. If you are interested in the many airline and airport operational advantages inherent in Bendix G.C.A., write today to Bendix Radio for more information on Bendix G.C.A.



Whatever the  
Plane or Purpose...

**Bendix Radio  
is the Choice**

**BENDIX RADIO** BENDIX RADIO DIVISION of **Bendix**  
REG. U.S. PAT. OFF. BALTIMORE, MARYLAND  
Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, New York

VHF Transmitters • H. F. Transmitters • Radio Control Panels • Antennas • Indicators • Automatic Radio Compasses • Marker Beacon Receivers • Announcing Systems • VHF Communication and Navigation Receivers • Inter-Communication Systems • H. F. Receivers • Radio-Magnetic Indicators • Ground Controlled Approach Landing Systems • Flightweight Personal Plane Radios • VHF Omni-Directional Range Systems

# NUTT-SHEL ALL METAL Self-Locking



## AN APPROVED

... The NEW "EXTRA HIGH DOME" Floating Self-Locking Nut has the same width dimensions as AN366F and AN362F Stationary Plate Nut.

Has a 1/32" float from center in ANY direction.

Light in weight and capable of high axial loads.

Manufactured to comply with requirements of specifications AN-N-5 and AN-N-10 and is approved up to 550 degrees F.

Write for Descriptive Engineering Data.

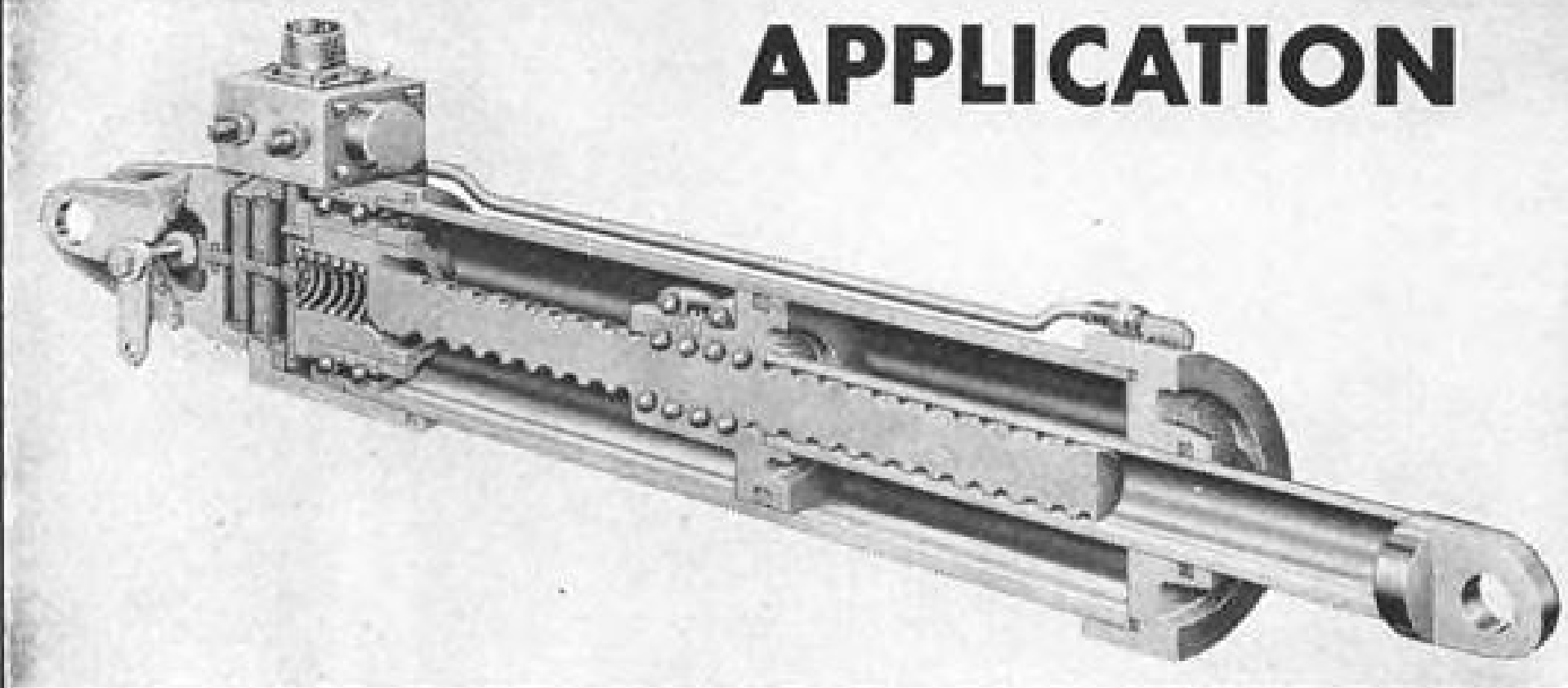
**NUTT-SHEL COMPANY**

317 EAST SECOND ST.

LOS ANGELES 12, CALIF.



## NEW BALL BEARING SCREW APPLICATION



### New Aircraft Actuator Uses Saginaw Ball Nut Screw

This advanced, hydraulic aircraft actuator owes its efficiency and lightweight to its quick-acting Saginaw ball bearing screw and nut. It operates satisfactorily under extremely high loads . . . features emergency power drives and synchronization for two or more units. In the event of system failure, a mechanical brake locks the actuator. Stroke and thrust are limited only by available flow and pressures.



Numbers show electro-mechanical actuator installations on Banshee jet fighter for (1) main landing gear door, (2) main landing gear, (3) wing fold, and (4) nose landing gear. Operating loads run from 1800 lbs. to 14,000 lbs. Strokes range from 8.4 in. to 19.53 in. All installations use Saginaw's friction-free ball bearing screw and nut.

#### FRICION-FREE PRINCIPLE NOW AVAILABLE FOR UNLIMITED USES

The friction-free operation of the Saginaw ball bearing screw and nut brings new efficiency to numberless industrial operations. In many cases actuating efficiency is increased more than 90 per cent, while operating costs are reduced as much as two-thirds.

The Saginaw ball bearing screw and nut makes possible the use of smaller motor drives with less horsepower. It permits faster operation with less heat generated, and allows rapid forward or reverse action with minimum wear and friction. Compact design for simple lubrication; remarkably low maintenance.

#### SAGINAW DESIGNS EACH APPLICATION TO SPECIAL ORDER

Each application is treated as an individual design; Saginaw makes no off-

the-shelf sales. Manufacturing facilities are geared to meet any desired production rate — large or small — and deliveries are scheduled to meet customer requirements.

Saginaw puts 38 years of gear building experience behind every product it makes; has one of the largest and most highly trained staffs of engineering, designing and manufacturing gear specialists in the country.

#### INSTALLATIONS FOR BALL BEARING SCREWS COVER EVERY FIELD OF INDUSTRY

Present industries using the product include aircraft, machine tool, automotive, farm machinery, boat building. It is widely employed in truck trailers, adjustable beds, lifting jacks and countless other actuating devices. Complete engineering facilities are available to give prompt attention to customer problems.

**Saginaw**  
STEERING GEAR  
DIVISION  
General Motors Corporation, Saginaw, Michigan

**SGI PRODUCTS**  
STEERING GEARS AND LINKAGES • PROPELLER  
SHAFTS • TRANSMISSION CONTROLS • TURN  
SIGNALS • DIESEL ENGINE PARTS • BALL BEARING  
SCREW AND NUT ASSEMBLIES • AUTOMOBILE JACKS

ing space. This condition occurs when one engine fails on takeoff and the helicopter has to land again in the same area it has just left. On this basis the following appear to be minimum dimensions necessary for any landing area:

- A square, 300 ft. by 300 ft., or
- An L or T, giving two areas each 150 ft. by 300 ft. intersecting at right angles, and
- An obstruction clearance at an angle of 26 deg. (slope 1:2) from the edge of the landing area.

With folded blades, one more helicopter could be parked in the areas above.

On ground sites, the committee recommended that an additional area 300 ft. by 400 ft. will meet all requirements at transit sites; if there are to be a number of terminal or international services, total area should be increased to 400 ft. by 500 ft. The exception would be roof top sites where any such expansion of space would be prohibitively expensive.

The committee also considered the subject of roof top landing areas, and found that there were four major attractions of such sites. These were economy of land usage, partial cost absorption in space rentals, minimized obstacle quantity during approach and easier landing on roof tops than between tall buildings onto ground sites.

Balancing advantage and disadvantage, the committee felt that it would be impracticable to adapt and strengthen the roofs of existing buildings, and therefore it would be necessary to construct special buildings for the purpose. This would mean large capital expenditure and perhaps would raise problems of town planning.

► **Comparative Findings**—As a single criterion, the committee presented the result of an independent investigation which compared costs of roof top and ground landing sites in Glasgow, Scotland. Capital expenditure for a roof top site would be about 40 times that of a ground site, and annual cost would be about 50 percent greater.

Further to the roof top problem, the effects of noise and vibration on buildings have yet to be determined. There would be an anticipated fire risk, although no worse than for indoor garages; artificial lighting and ventilation would have to be provided on a large scale.

Final recommendation on this score was that initial stages of helicopter service should be planned so as not to call for building construction. "If helicopters are to operate into large cities, they should at first use either such ground sites as can be developed at little cost or floating platforms on rivers or lakes. . . . We think it wise that the first development of helicopter services

# SAVED!

## ... dozens of man-hours — by a few minutes of Radiography

THERE'S a lot of skilled machinist time invested between a cast bronze blank and a finished precision gear. And it's time all lost when you wait until the cutting tool exposes a gas hole or other irregularity in the casting causing rejection.

Nowadays that time can be saved—saved by first proving the casting sound—by Radiography. Foundries that do this can be certain that only high-quality castings are released. And this is the basis for an enviable reputation. What's

more, radiography often suggests changes in casting methods which increase the yield in production runs.

Get in touch with an x-ray dealer. Ask him to give you more details on how Radiography can better your foundry operations and increase production. Send for a free copy of "Radiography as a Foundry Tool."

**EASTMAN KODAK COMPANY**  
X-ray Division • Rochester 4, N. Y.

## Radiography . . .

another important function of photography

**Kodak**  
TRADE-MARK



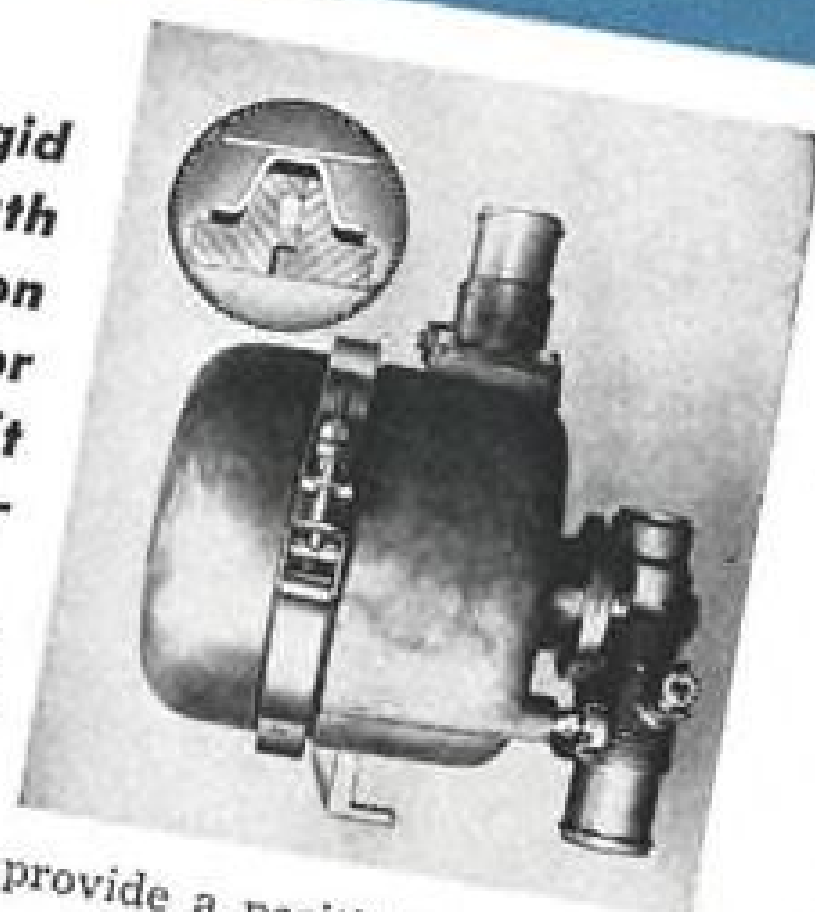
# ENGINEERS' NOTEBOOK



**V-Band  
Couplings  
simplify  
Hot Air Valve  
Installation on  
Lockheed F-94**

Electrically operated hot air valves used on Jet engines demand a joint seal that will withstand high temperatures and pressures. Ideal solution employed on Lockheed F-94 Hydro Air Valve illustrated, is a Marman V-Band Coupling. This lightweight, compact joint easily withstands pressures as high as 400 p.s.i. and temperatures of 450° F. At the same time it is quickly detachable for fast assembly and disassembly—saves weight, space and cost.

**Rigid  
High Strength  
Connection  
for  
Jet Aircraft  
Fuel Filter**



Marman V-Band Couplings are also utilized to connect fuel filters on Lockheed F-80, F-94 and T-33 series. Tested at 150 p.s.i., these connections provide a positive seal under vibration and stress.

Marman V-Band Couplings are usable for all types of flanged joints. Standard types available for wide range of temperature, pressure and strength requirements.

**Save Cost and Design Time with Marman**  
Standard Clamps for Special Applications

FOR INFORMATION WRITE: DEPT. W-4  
**MARMAN**  
PRODUCTS CO. INC.  
940 WEST FLORENCE AVENUE  
INGLEWOOD, CALIFORNIA

should be away from such large cities as do not offer alternatives to roof-top sites, to be specifically constructed for the purpose."

► **Pounds and Pence**—Cost analysis of helicopter service was carried out in great detail. Quoting or translating figures from pounds to dollars does not mean much because of the lack of a comparable cost-of-living index. But some of the qualifying assumptions and bases for cost estimates are of particular interest.

In considering helicopter first cost, the committee received unanimous opinion that the helicopter was particularly suitable to mass production, and therefore first costs (in lots of 500 machines or more) could compare favorably with fixed-wing craft. But the manufacturers further agreed that in quantities of up to about 150 aircraft, helicopters costs per pound would be higher than those of fixed-wing aircraft.

There was also opinion that the scale of first cost would decrease and that a larger helicopter could therefore be built for less cost per pound of weight than a smaller one.

First costs and related charges accounted for about half the total annual fixed costs, the remainder being overhead, administration, rentals, training, advertising and sales expense.

In its consideration of hourly cruising costs, the committee listened to statements that new maintenance techniques could be available to reduce greatly the current high level maintenance costs for the rotary-winged craft. It was proposed that this maintenance system be based on accurate knowledge of component life; that normal maintenance consist of lubrication and running adjustments until a predetermined life is reached; and that parts be replaced at this time.

But the committee was not impressed. In its own words, the new scheme was noted "... as a hopeful augury of future economies ... (but) ... we have not taken it into account in the figure which is put down for this item."

► **Crew and Service**—Crew requirements were considered to be satisfied with two men, pilot and conductor. The latter's duties would include issuing tickets and some baggage handling.

No provisions were made for passenger service in the air, since no need was seen for such service. Indeed, the committee reiterated its belief that the helicopter should avoid the high costs inherent in a luxury service, and that service should be considered as comparable to short-range services carried out by a surface transportation.

Takeoff and landing cycle costs were stated to be of primary importance in helicopter economics. With this view in mind, a completely independent and fresh investigation was made to have a

basis for accurate cost forecasting.

As one phase of the comparison between roof top and ground sites in Glasgow, opinions on rentals were heard. And these opinions were widely divergent. One belief was that total space in a building could be rented economically; the other was that perimeter rentals could be easily let, but that the building interior would be difficult to dispose of. Further, it was believed that there would be additional risks involved in space rentals in a building for which no experience exists.

In view of the divergence of opinion, an annual loss was charged against the roof top landing area.

Again stating that luxury services are to be shunned, the committee said that a fundamental reorientation is necessary in thinking about passenger services. Opinion was that there would be no need for an urban collecting point for passengers, nor for special surface transportation to get them to the landing area. The passenger should be encouraged to help himself at the landing area. Advance bookings might be needed in the early stages of helicopter service, but when full frequency service is reached, it should no longer be needed.

After due consideration, the final figure for passenger ground service was derived from fixed-wing operational experience, recognizing that it was conservative and should be improved upon.

► **Conclusions**—The helicopter is a coming medium of transportation for distances up to 300 mi., concluded the committee. By 1954, a twin-engined, 10-12 passenger craft (such as the Bristol 173) could be in commercial use and by 1958, a 20-passenger helicopter could be at hand. Such a large copter should be able to show:

- **Economy in commercial use** on scheduled service. The 10-12 passenger craft would not be economic, but it might have a limited commercial application and in any event, will be a necessary stage in the development of rotary-winged aircraft.

- **Public convenience** and time saving at a high level, because of the ability to operate between the centers of cities. These advantages will be greatest over the distance range between 50 and 300 mi.

- **Commercial competition** with fixed-wing aircraft.

- **Lower ground organizational costs** than for fixed-wing planes of equivalent carrying capacity and operational frequency. Ultimately, the helicopter can become self-supporting at landing fees below current rates for fixed-wing craft (which by no means support their present ground organization).

- **Space requirement economies** which will release, for other uses, land which would now be required for fixed-wing operations.

- **Benefits to the British transport system** on a competitive economic basis. Present thinking envisages the helicopter carrying passengers, freight and mail between provincial towns and cities, especially on cross-country trips where surface times are disproportionate to the distances involved. In addition, the helicopter would provide speedy and convenient connections between international airports and seaports on one hand, and the provinces on the other.

With the advent of a 20-passenger type, a fleet of 50 helicopters could be absorbed into commercial use on the internal transport service; this number could even increase over a period of a few years.

In concluding its report, the committee stated that "... the contribution which the helicopter can make to our domestic transport system, combined with its export possibilities and inherent physical and financial economy in ground organization, offers an assured basis for embarking on the development and production of helicopters suitable for commercial operation."

## NACA Reports

► **Further Study of Metal Transfer Between Sliding Surfaces** (TN 2271)—by J. T. Burwell and C. D. Strang, Massachusetts Institute of Technology.

Continuing research begun by Sakmann, Grossman and Irvine (TN 1355), MIT technicians, under sponsorship of NACA, have conducted studies to determine what role is played by the transfer of metal between surfaces in the formation of characteristic coatings on piston ring materials during aircraft engine run-in.

Radioactivity technique developed at MIT's lubrication lab for transfer detection was used. Materials examined consisted of Nitralloy steel, both nitrided and un-nitrided, and several types of chrome-plated surfaces. Also checked was transfer to actual piston rings, both new and used, together with the effects on transfer, of load, speed, distance of travel, repeated travel over the same path, hardness of the moving surface, and type of chromium plate.

Test results indicated that under aircraft-engine cylinder operational conditions, some nitrided steel from the cylinder barrel probably will be transferred to the surfaces of the nitrided-steel, cast iron, or chromium-plated rings. Accordingly, this transferred material may be a factor in formation of the characteristic surface layer frequently observed on rings.

The findings strengthen the suggestion made in the previous study that one pretreatment to get a desirable surface layer might be to run rings in a

## New PERSONAL PLANE Lighting...



**Long-burning  
TAXI  
LIGHT**

combined  
with



**12 Volt-10 amp.  
LANDING LIGHT**

## WING-LITES\*

Easy and economical to install on Old and New ...  
Fabric or Metal wings ...  
Light and Medium weight  
Personal Planes!

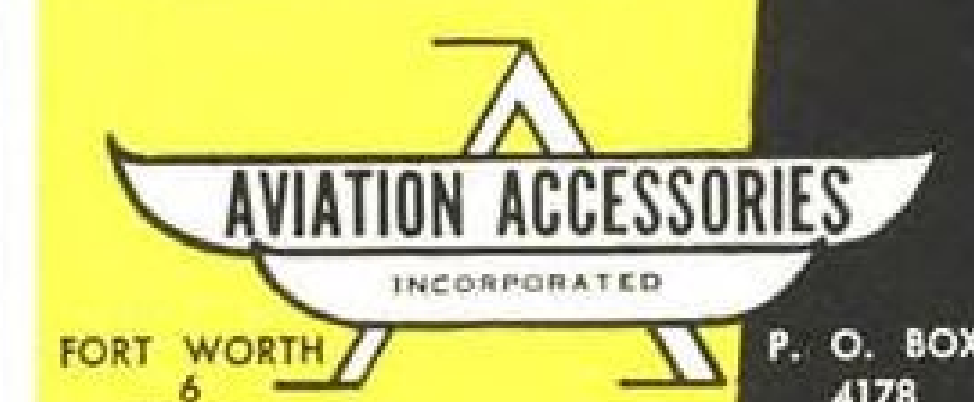
### Low Drag--Lightweight

Negligible speed effect  
... (5% dia.) Weigh 28  
ozs. per pair.

**Economical \$37<sup>50</sup>**  
Sold only in pairs

\* Landing/Taxi combination  
c/w switches—same set—  
Two landing lights \$39.95.)

DEALER INQUIRIES INVITED



FORT WORTH 6 TEXAS P. O. BOX 4178



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.

#### VAPOR HEATING CORPORATION



80 EAST JACKSON BLVD., CHICAGO 4, ILLINOIS  
NEW YORK • ST. PAUL • DENVER • ST. LOUIS • PORTLAND • WASHINGTON  
PHILADELPHIA • SAN FRANCISCO • JACKSONVILLE • RICHMOND •  
HOUSTON • MONTREAL • LOS ANGELES

Write for detailed information and descriptive literature:  
☐ CABIN TEMPERATURE CONTROLS, Bulletin No. 550  
☐ CARBURETOR TEMPERATURE CONTROLS, Bulletin No. 549  
☐ ENGINE OIL TEMPERATURE CONTROLS, Bulletin No. 545

Name.....Title.....  
Company.....  
Address.....  
City.....( ) State.....

special cylinder with walls of selected composition and controlled hardness to give coatings of highly improved characteristics in a minimum time.

#### ►The Effect of End Plates on Swept Wings at Low Speed (TN 2229)—by John M. Riebe and James M. Watson.

Theoretical and experimental studies have long since established the advantages of using end plates on unswept airfoils to improve aerodynamic efficiency. Now, NACA researchers have gone into the application of these devices to swept wings as a means of overcoming some of the lateral-stability difficulties and other adverse effects resulting from this airfoil configuration.

The investigation was conducted in the Langley 300-mph. 7x10-ft. tunnel. Purpose was to determine the effects of various sizes and shapes of end plates on aileron characteristics and on aerodynamic characteristics in pitch and yaw of wings with aspect ratio 2, no taper, 45-deg. sweepback and aspect ratio 4, taper ratio 0.6, sweepback 46.7 deg. Free-roll characteristics were obtained with two end plate configurations on a wing with aspect ratio 3, taper ratio 0.6 and 35-deg. sweepback to establish the effect of plates on wing damping in roll.

The researchers found that addition of end plates to swept wings increased the lift curve slope, reduced maximum lift-drag ratio, generally decreased maximum lift coefficient, and increased longitudinal stability slightly in the low lift coefficient range.

Variation of wing effective dihedral with lift coefficient was reduced with increase in end plate size. Effective dihedral at zero lift could be changed from positive to negative by lowering the end plates. And swept-wing directional stability was increased with increase in end plate area and with their movement rearward.

Flap-type aileron and spoiler-aileron effectiveness increased with addition of end plates to the swept wings. But the increase of the wing damping in roll may reduce the rolling effectiveness for some end plate configurations. And end plates located below the wing chord line reduced the adverse yaw of flap-type ailerons.

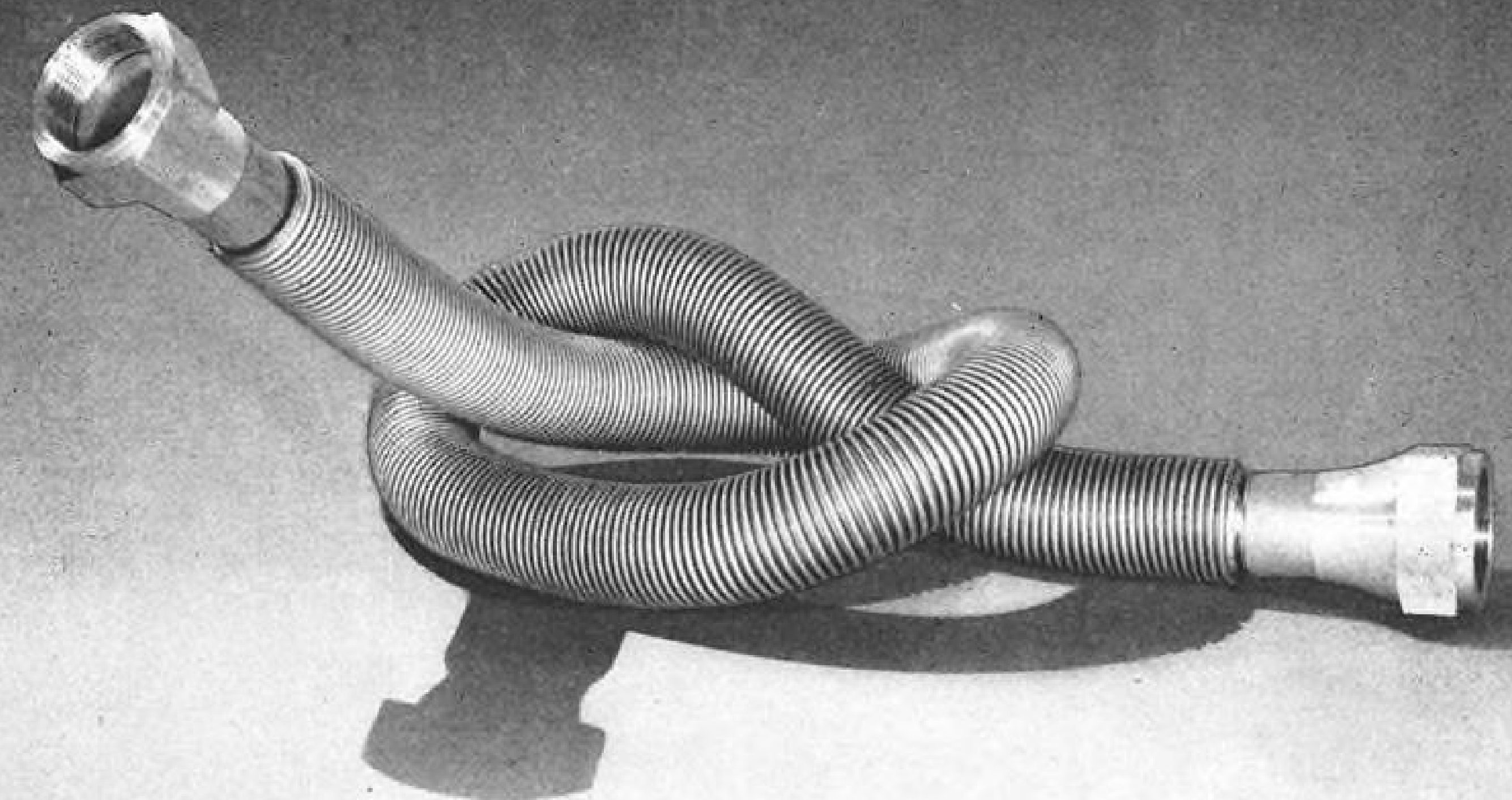
#### Prestress May Up Aluminum Life

New data on the relation of prestress to fatigue of aluminum alloys used in aircraft structures indicate possibilities of improving the life of these metals.

And these fatigue studies, now being conducted at the National Bureau of Standards, may help to determine the mechanism of the metal failure.

The life of aluminum alloys subjected

## this is CMH REX-FLEX flexible stainless steel hose



While the need rarely arises, tying CMH REX-FLEX into a knot does illustrate the high degree of flexibility of this *all-metal* corrugated stainless steel hose. And the same characteristics of stainless steel that make REX-FLEX so flexible also give it the ability to withstand extreme cycles of vibration.

Light in weight... high in strength... and liquid and gas tight, REX-FLEX is the answer to critical aircraft applica-

tions where extreme flexibility must be combined with rugged durability.

CMH REX-FLEX flexible metal hose products are made in a variety of forms that include ducting, flexible connectors, bellows and braided and unbraided hose types that include C.A.A. approved fireproof fuel and oil line hose assemblies.

For complete information, write today outlining your problem.

Flexon identifies  
CMH products that  
have served industry  
for over 48 years.



#### CHICAGO METAL HOSE Corporation

1302 S. Third Avenue • Maywood, Illinois • Plants at Maywood, Elgin and Rock Falls, Ill.  
In Canada: Canadian Metal Hose Co., Ltd., Brampton, Ont.

CMH

#### ONE DEPENDABLE SOURCE for every flexible metal hose requirement

Convuluted and Corrugated Flexible Metal Hose in a Variety of Metals • Expansion Joints for Piping Systems  
Stainless Steel and Brass Bellows • Flexible Metal Conduit and Armor • Assemblies of These Components



Only  
*hi-shear*  
offers the . . .



in a **steel** fastener to  
the aircraft industry

the **HS-2R7**

*Aerodynamicists say -*

"The HS-2R7 permits smooth surfaces, essential to transonic speeds and laminar flow."

*Assemblymen say -*

"... rapid installation, without hand fitting in either cut-countersunk or dimpled holes."

*Inspectors say -*

"... uniform high quality... cuts rework and rejections."

*Other features -*

- The average Hi-Shear weighs 66% less than its equivalent AN Bolt-Nut-Washer combination.
- Strength comparison — One Hi-Shear equals 2.8 AD rivets.
- Self adjusting — no threads in bearing — no washers — no torque inspection.
- Standard rivet guns and squeezers — no expensive pullers or special one-purpose equipment.

U.S. and foreign patents — Trademark registered.

THE *hi-shear* RIVET TOOL CO.

8924 BELLANCA AVENUE  
LOS ANGELES, CALIF.

to vibration and other repeated or fluctuating loads may be affected materially by applying stress to the metal before it is used in service, recent studies by technicians J. A. Bennett and J. L. Baker of the NBS mechanical metallurgy lab have shown.

In some instances, this prestressed treatment increased fatigue life considerably—especially at lower stresses when a comparatively small number of cycles of dynamic prestress were applied.

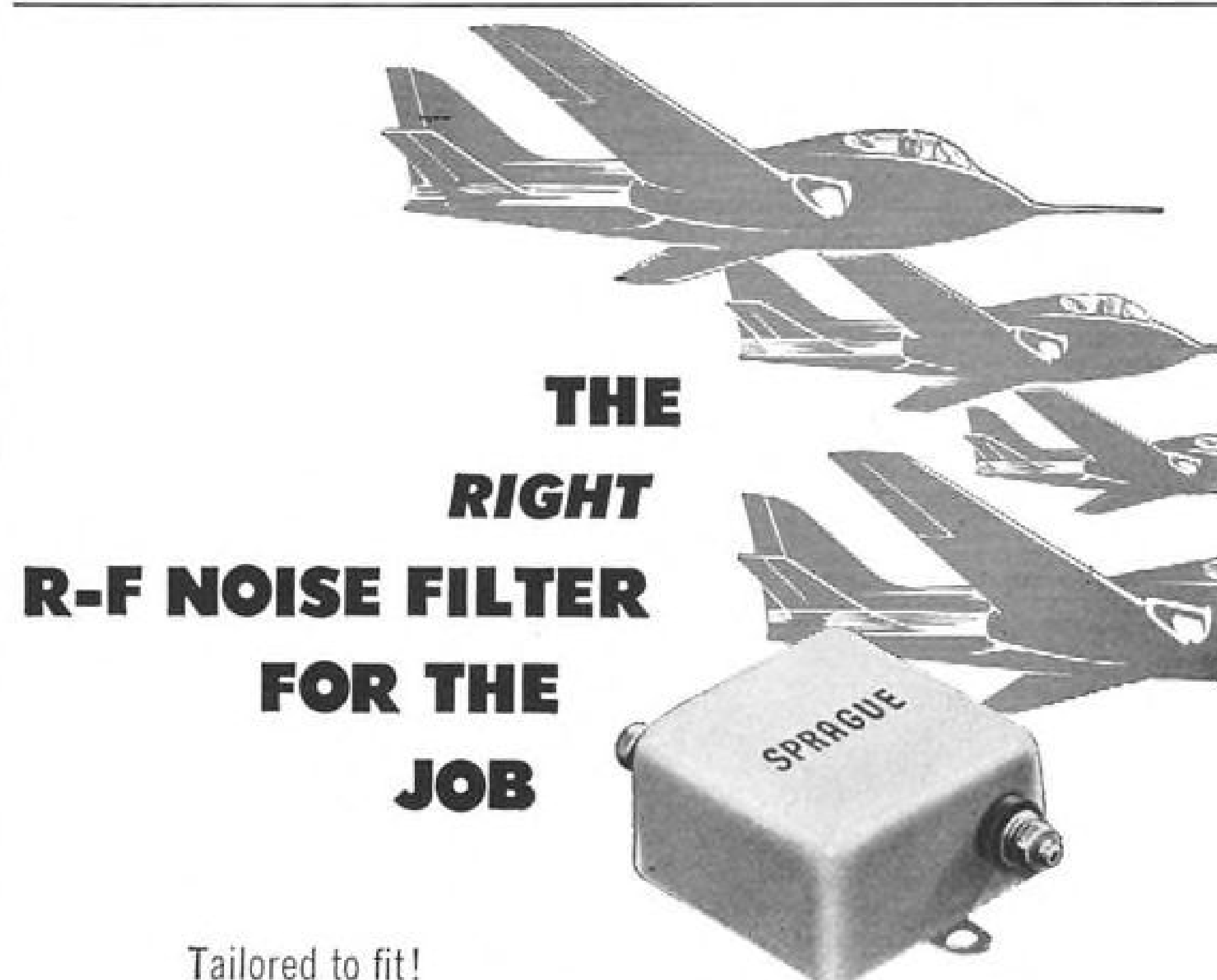
But there were instances where little if any improvement resulted. And at some stresses, the fatigue life was shortened by the prestress.

► **Conditions Approximated**—One of the difficulties in applying the results of lab tests to actual installations is that in many structures the stresses vary in a random manner—as in an airplane wing, which must support not only the weight of the craft (a steady load), but fluctuating gust loads as well.

To approximate this situation, the cumulative effect of fatigue stressing at two or more amplitudes was evaluated, using aluminum alloy sheet specimens for tests.

The researchers applied these two methods of prestressing:

- A high static load was applied to the



Tailored to fit!

That's the way Sprague likes to make radio interference filters for aircraft electrical and electronic equipment. Sprague filter engineers have a wealth of experience in designing ingenious mounting arrangements and case shapes to fit in cramped quarters. Moreover, the filters they design to meet these tough mechanical requirements have excellent insertion loss characteristics and are designed to withstand aircraft operating temperatures, vibration and shock beyond the stiffest specification limits.

Write today for help in solving your radio noise filter problems!

**SPRAGUE**  
PIONEERS

FILTER DIVISION  
**SPRAGUE ELECTRIC COMPANY**  
NORTH ADAMS, MASSACHUSETTS

IN ELECTRIC AND ELECTRONIC DEVELOPMENT

specimen before the start of the fatigue test.

• **The specimen was stressed** in the fatigue-testing machine for a predetermined number of cycles at one amplitude, then carried to failure at another amplitude.

Thus, data were provided on the effects of both static and dynamic stresses, applied prior to the test, on the fatigue properties of the material.

Conventional repeated-bending fatigue-testing machines were used, but a new specimen design was employed that afforded several advantages over the usual type. Another innovation was a jig that measured the specimen before testing and automatically located the point at which the stress would be a maximum.

► **Static Procedure**—Static prestress studies were with 24ST Alclad sheet. Fatigue tests with these specimens were made in unidirectional bending.

First, specimens were tested without prestress to establish typical relationship between amplitude and frequency to fracture the material. Next, a static load was applied to other specimens before start of the test. In some cases, the bending load in the fatigue test was in the same direction of the static load, and in others these directions were opposite.

► **Opposite Prestress Effect**—At the higher test stresses (25,000, 30,000 and 35,000 psi.), effect of static prestress was negligible.

At a test stress of 20,000 psi. there was an appreciable drop in life for those specimens prestressed in direction opposite to the later fatigue stress.

But there was a slight increase in life for specimens with a prior static stress in the same direction. Net result was a 10-to-1 difference in life between these two sets of specimens.

► **Dynamic Runs**—Effect of dynamic prestress was studied on bare 24ST sheet. Fatigue loading was applied in completely reversed bending. Prestress amplitude was applied for a given number of cycles before the specimen was taken to failure at the test stress. Three values of prestress amplitude and four test stresses were used.

At the two higher prestress amplitudes (22,500 and 32,500 psi.), fracture occurred earlier in the prestressed samples than in the original material, indicating that a portion of the fatigue life is used up by the prior stress. Within experimental error it was found that this portion was about equal to the ratio of the number of cycles run at a given prestress to those which will cause failure at that stress.

For the lowest prestress (17,000 psi.) the behavior was entirely different. At a slightly higher test stress (20,000 psi.), there was a substantial improvement in specimen life, in specific cases being as high as 400 percent.

WHY DO SO MANY PEOPLE SAY...

SEND IT TO

**Airwork**

More and more, airline officials and owners of executive aircraft are saying, "Send it to Airwork". Here's why:

Month after month, the newly overhauled Pratt and Whitney engines and accessories from our production lines are setting records for dependability, extra performance, more economical operation and longer life between overhauls . . . You will profit by saying, "Send it to Airwork".

Airwork Corporation also distributes the following aviation products: Bendix, BG, Champion, Continental, Jack & Heintz, Packard Cable, Pesco, Pratt & Whitney, Romec Pumps, Thompson Products, Titeflex, and U.S. Rubber.

ONE OF THE FOUR



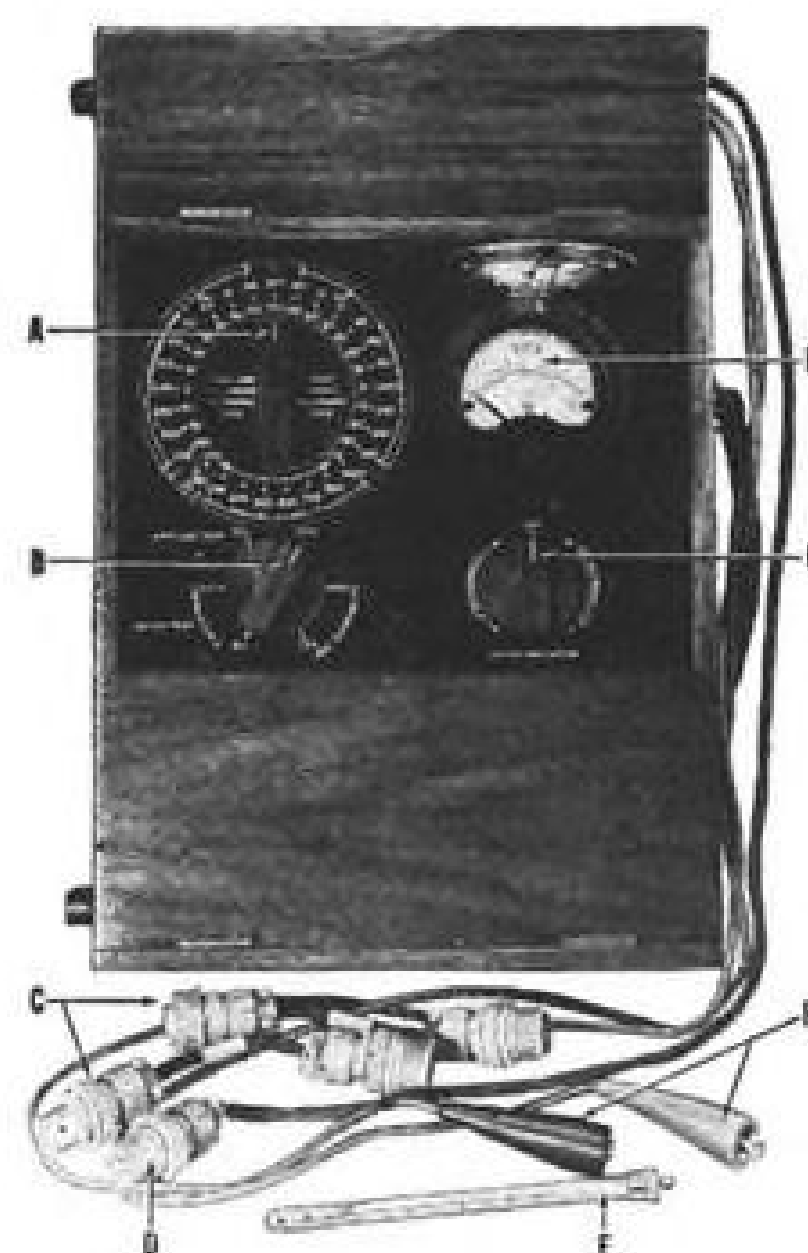
PRATT & WHITNEY DISTRIBUTORS

**Airwork**  
CORPORATION  
MILLVILLE, NEW JERSEY



# LEWIS

## Aircraft Thermometer Testers



- A Temperature selector switch
- B Resistance-voltage selector switch
- C Adaptors for connecting single ratiometers
- D Resistance thermometer plug lead
- E Liquid-in-glass thermometer
- F Thermocouple thermometer clip leads
- G Rheostat. H Standardizing voltmeter

PORTABLE WORKING STANDARDS . . . EASY TO OPERATE . . . FOR USE IN THE SHOP OR . . . IN THE AIRPLANE  
SELF-CONTAINED BATTERIES . . . STURDY HARDWOOD CASE

Only a few simple operations are required to test temperature indicators with these instruments. Connect the indicator under test with the plug lead or the clip leads, turn the resistance-voltage selector switch as required, adjust standardizing voltmeter to a red line by means of the rheostat and turn the temperature selector switch to the calibration points. By comparing the indicator reading with the switch setting, the scale error is determined. Liquid-in-glass thermometer is used to determine ambient temperature when setting thermocouple indicators.

**MODEL 81TT9** is provided with the following calibration ranges for Thermocouple Thermometers — 0 to 1000°C chromel-alumel, minus 50 to plus 350°C iron-constantan and minus 50 to plus 350°C copper-constantan. Calibration points for ratiometer are provided for the following in centigrade — 70, —50, —30, —10, 0, 10, 30, 50, 80, 100, 120 and 150, for dual or single indicators, in accordance with the AN-B-19 Curve.

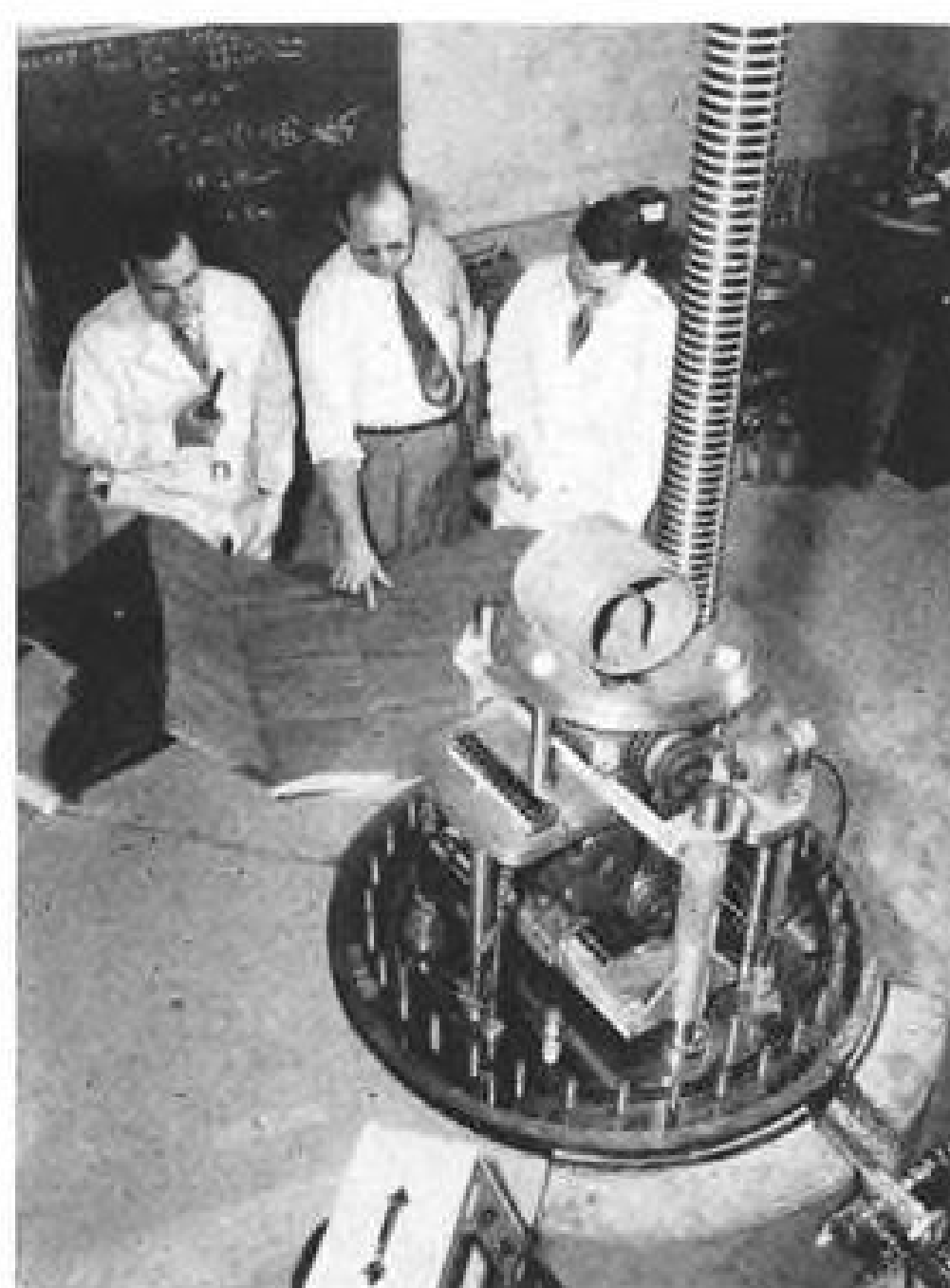
**MODEL 81TT5** is provided with calibration steps similar to the 81TT9, except that a range of zero to 600°F copper-constantan is substituted for the 0 to 1000°C chromel-alumel range, to provide means of checking this type of indicator found on some commercial aircraft.

**THE LEWIS ENGINEERING CO.**

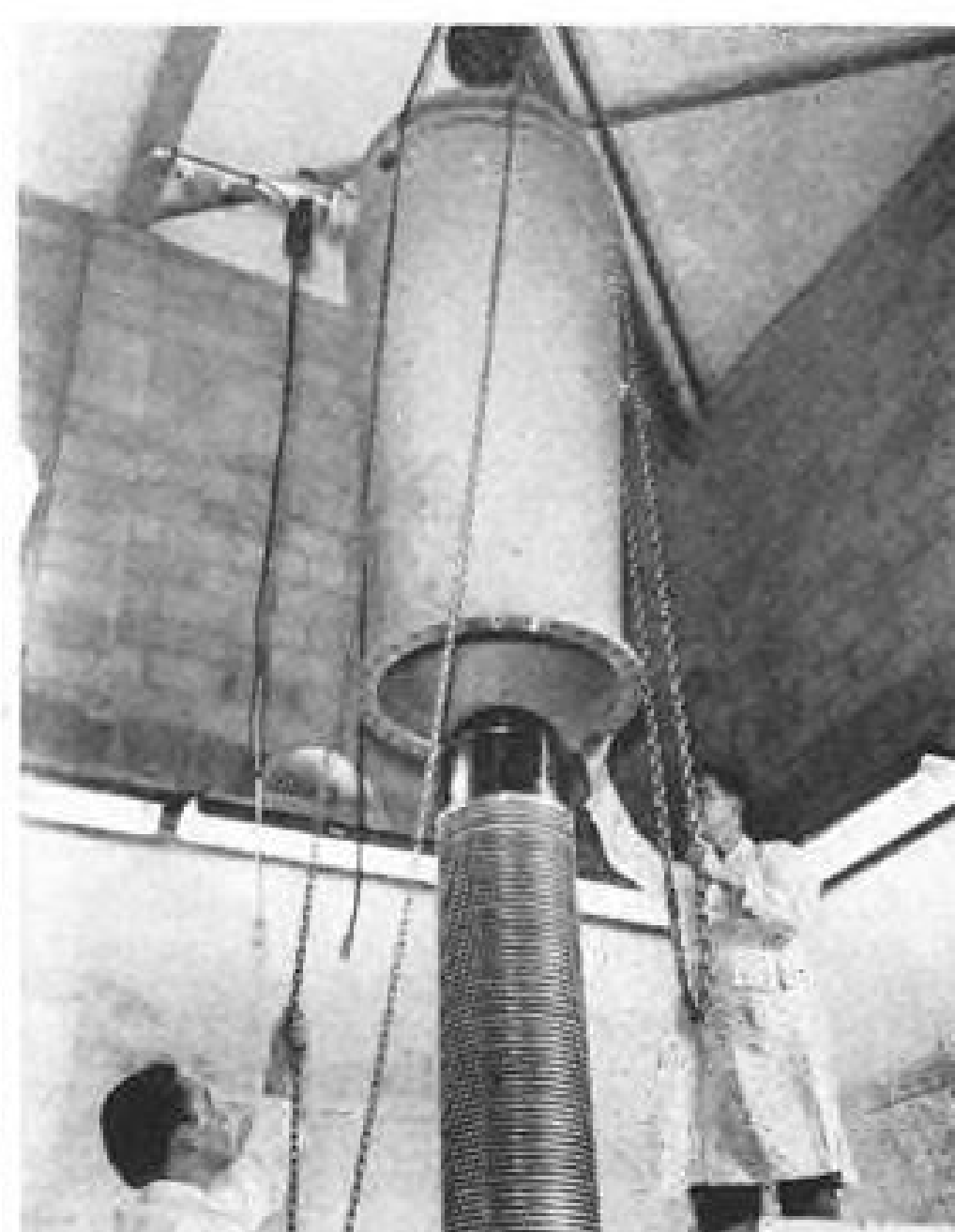
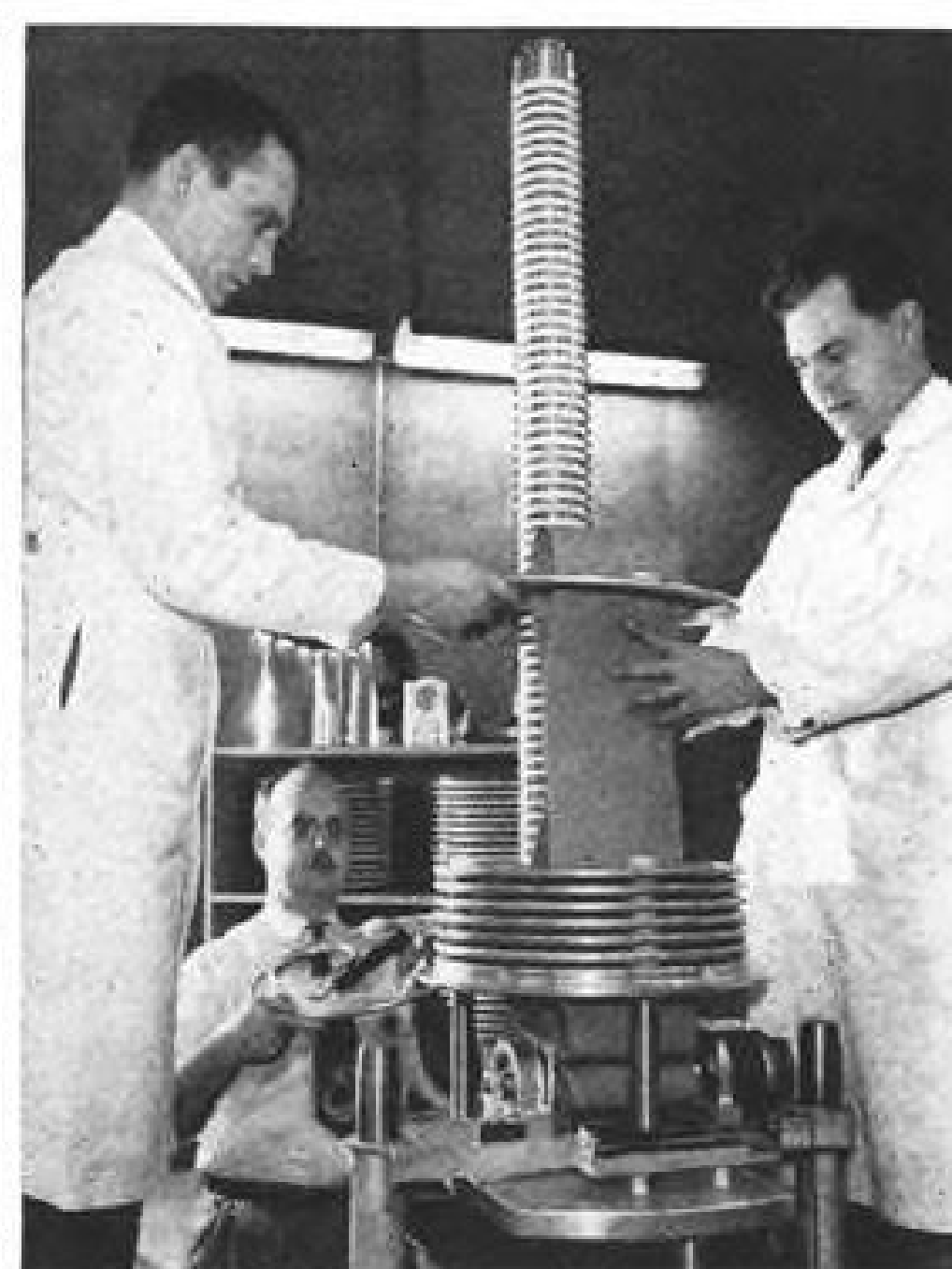
Manufacturers of Complete Temperature Measuring Systems for Aircraft.

NAUGATUCK, CONNECTICUT

## AVIONICS



STATITRON gets final blueprint check before equipotential rings, which help kick electrons along, are slipped over the endless belt which carries the particles up the "energy hill" past the ribbed accelerator to the dome.



LAST ACCELERATOR ring, with auxiliary high voltage mechanism, is put in place. Then the shiny metallic dome is attached, and the whole mechanism covered by 1800-lb. metal tank. Statitron boosts electron speed close to that of light.

## Electron Hammer: Research Tool

NAA's statitron uses very-high-speed, high-energy electrified particles to probe metals' secrets.

Avionics is playing a large part in metal research at North American Aviation's Downey, Calif., Atomic Energy Development Laboratory.

NAA technicians are using a statitron—electron hammer—to displace atoms in test metal and thus change the material's physical properties. The amount of energy required for displacement is established by determining the physical

changes, as in the electrical resistance of the metal. The common analogy offered by NAA technicians is the reversed bending of a thin piece of metal until it breaks from work hardening. With the statitron, the same effect is obtained and the reason for the result can be established.

► Impact Action—According to the company's Skyline magazine, which



## Laurence Arpin leads double life

It's a double *business* life, of course. Mr. Arpin operates a heavy-grading contracting firm on the West Coast, also sells a variety store product all over the U. S. "Managing *two* businesses is possible because of the extra working hours provided by my Bonanza," says Mr. Arpin. "This plane has *doubled* my earning ability.

"Now, after three years of ownership, I realize that not only can I afford the Bonanza—I can't afford to be without it."



## How the C35 Bonanza has been further improved:

**Higher performance levels.** Take-off rating of 205 hp at 2,600 rpm, plus new Beechcraft metal propeller, improves short-field performance, gives the C35 Beechcraft Bonanza a rate of climb of 1,100 feet per minute.

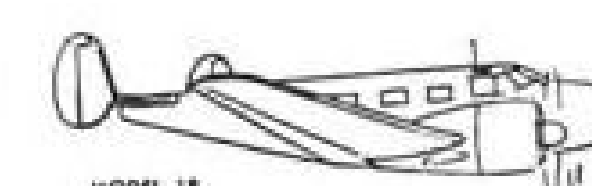
**Lower operating costs.** Now you get 19.9 miles per gallon of fuel. Because there's less engine strain, there's less engine wear and fewer engine repairs. All-metal construction means ruggedness and extra safety.

**Comfort, safety, style!** Two-position rear seat with headrests. New Beechcraft-designed Hi-Strength safety harness, unmatched for comfort, protection, ease of movement. New all-over paint design now standard.

Want *more* reasons for Beechcraft superiority? Contact your Beechcraft distributor, or write Beech Aircraft Corporation, Wichita, Kansas, U.S.A.



Higher top speed, 190 mph  
Higher cruising speed, 175 mph  
Longer range, 775 miles  
Better fuel economy, 19.9 mpg



MODEL 18



TWIN BONANZA

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS



TEMPERATURES?  
ATMOSPHERES?  
PRESSURES?

for the  
finest in  
Test Chambers

TEST WITH **Tenney**

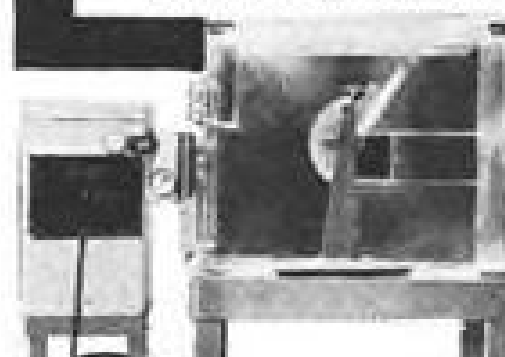
Tenney has combined years of specialized experience with the most advanced engineering methods. Results have convinced industry that Tenney testing equipment is the finest available. For complete confidence, specify Tenney.

TENNEYSPHERE  
ALTITUDE  
CHAMBERS



Designed to withstand atmospheric pressure and to simulate global conditions of pressures, temperatures and humidities. Altitudes from sea level to approx. 75,000 ft. Temperature range from plus 200°F to minus 100°F. Also simulates desired relative humidity.

TENNEY  
SERVO  
UNIT



Portable air conditioning unit which may easily be attached to various types of laboratory enclosures—impact machines; tension machines; torsion testers; cold boxes and similar equipment. Through its use, articles undergoing testing, aging or weathering can be subjected to wide variations of humidity, heat and cold.

TENNEY  
TEMPERATURE  
AND HUMIDITY  
CHAMBER



Designed for positive control of temperature, humidity and air circulation. Permits the accurate checking of physical quality, fragility, tension and other factors.

TENNEY SUB-ARCTIC  
INDUSTRIAL CABINETS

Designed for low-temperature testing of metals, radios, instruments, plastics, liquids, chemicals and pharmaceuticals. Temperature ranges of -40°F, -60°F, -95°F and -150°F are standard for each size.

For further information on these and other Tenney test equipment, write to Tenney Engineering, Inc., Dept. G, 26 Avenue B, Newark 5, New Jersey.

**Tenney**  
Engineers and Manufacturers of Automatic Temperature, Humidity and Pressure Control Equipment

describes the research equipment, the operational basis underlying the statitron (Van de Graaff generator) is the bringing of elementary charged particles to very high speeds and high energies.

The device does this by hauling the particle slowly up a high "electrical hill" on a moving insulated belt, then dropping it from the top of the "hill" onto the test specimen with a very high energy impact.

►How It's Done—An 1800-lb., 40-in.-diameter tank, pressurized to 200 psi. with dry nitrogen, houses the working mechanism. This includes a highly polished, ribbed, evacuated accelerator tube, with each of the ribs connected by

small steel balls to equipotential rings surrounding the charging belt and tube.

When the generator is operating, the belt (traveling at 3000 fpm.) conveys electrons to the top of the equipment where they are stored on a metal dome, building up a tremendous charge—a potential of about 2,000,000v. at the top terminal of the accelerator tube.

Released by a hot filament, thermionic electrons are accelerated down the evacuated tube, about 60 thousand billion per second striking the experimental target at the tube's base at about the speed of light, the tremendous energy displacing the atoms of the test metal.

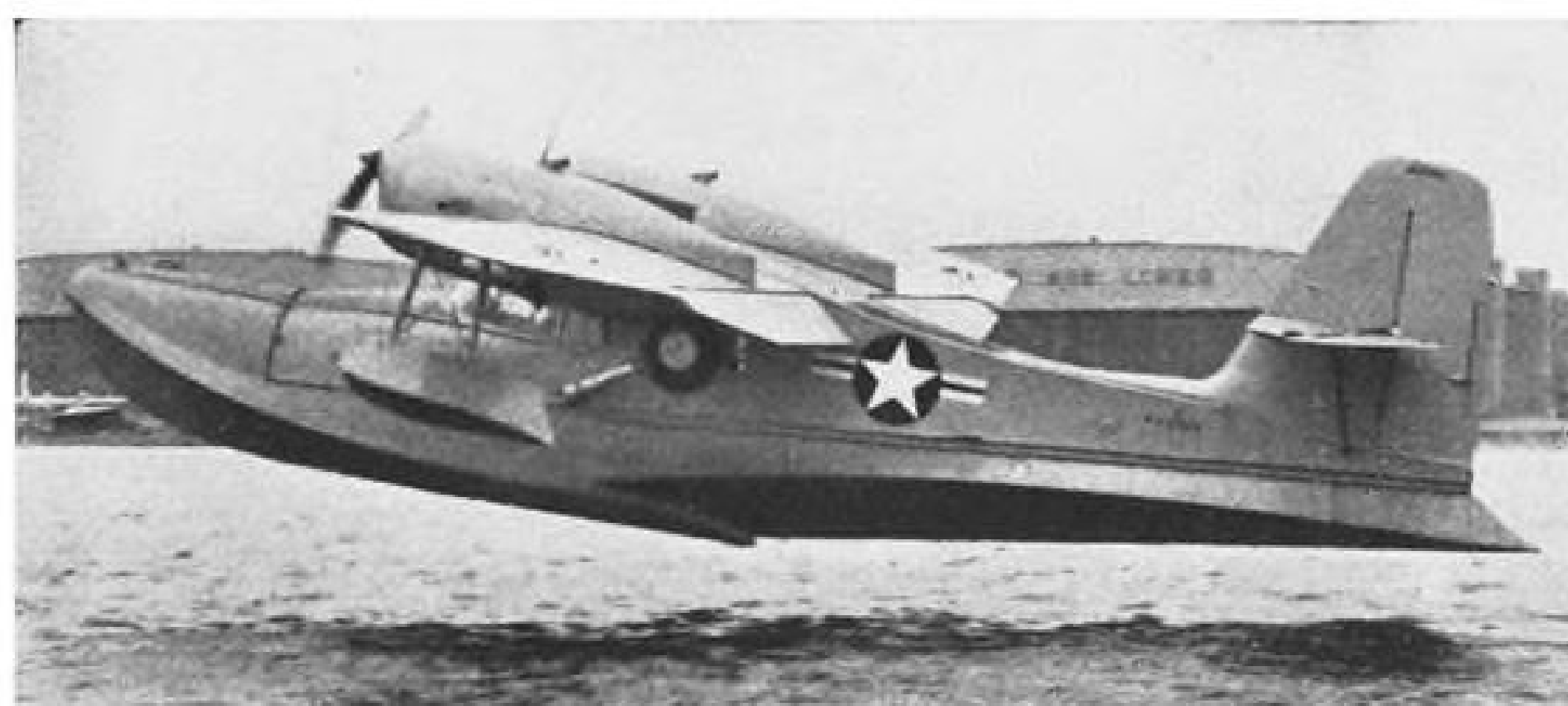
NEWS



NOTES

#### HULLS TESTED BY FLYING SCALE MODEL AT EDO

A great deal of research and development on the shape of flying boat hulls has been accomplished in recent years by the National Advisory Committee for Aeronautics. Improved water handling characteristics, take-off performance and cleaner aerodynamic design which have resulted from these tests indicate that the flying boat can play an increasingly important role in naval and commercial aviation.



To evaluate in actual usage various new flying boat hull shapes, without the tremendous expense of building full-scale prototypes, the Navy turned to Edo, the pioneer in seaplane development, to build one-third scale bottoms which could be easily bolted onto a modified Widgeon. These tests, still going on with a variety of different hull shapes, have proven invaluable in

the future development of flying boats of maximum efficiency for combat and cargo.

This is but one of a wide variety of projects in research and development which are currently being undertaken at Edo in addition to volume production of aircraft components for leading aircraft manufacturers and sonar equipment for the United States Navy.

EDO ODDITIES. The largest Edo floats ever made were those designed and built by Edo during World War II for the Douglas C-47. These floats were 43 feet long and 6 feet across, and displaced 14,500 pounds each. Each float was equipped with a main landing wheel and nose wheel, making them the largest amphibious floats ever made.

**Edo**

CORPORATION  
COLLEGE POINT, NEW YORK

To Every Management Engaged in Defense Production



## Time is on the side of those who use it best!

The one element common to all defense production is time...and nothing saves time like Airfreight

TANKS...planes...ammunition...electronic equipment—no matter what you're contributing to the armed services, time is an all-important element.

One late part out of hundreds can keep a tank from rolling forth on schedule, delay the launching of a ship or a plane. One late company, out of hundreds of contractors and sub-contractors working together on a piece of war equipment, can undo the efforts of all.

When time is at such a premium, the speed and other advantages of Airfreight should be utilized whenever possible by every company engaged in defense production. Already the government and the armed services are showing the way, making ever-increasing use of Airfreight on key projects, saving countless precious hours.

Let an American Airlines representative show you how Airfreight can expedite your production and delivery problems as successfully as our Flagships carry your expeditors. There's never been a time when saving time meant more. There's never been a time when Airfreight was so important.



FIRST AND FOREMOST—AMERICAN AIRLINES **Airfreight**



**HERE'S  
WHERE  
PLANES  
PAY  
OFF!**

●A famous general of the U.S. armed services recently said, "When an airplane is sitting on the ground, it's going to waste."

This applies to commercial air transports as well as to military aircraft. And today, when *all* aircraft are vitally needed to help sustain our fighting forces overseas and our defense drive at home, Douglas is making every effort to keep more airplanes in the air more hours.

Much of this effort consists of manufacturing and

delivering spare parts. For, under stepped-up flying hours, aircraft parts need replacement more often. Without them the plane is "going to waste."

Supplying tons of spare parts every month for aircraft in all parts of the world is just one segment of the vast Douglas operation. In addition to the many aircraft models currently coming off the production lines, Douglas engineers and research experts have under development advanced types of aircraft, guided missiles and electronic equipment.



*Skilled engineers and technicians find Douglas a good place to work!*

WORLD'S LARGEST BUILDER OF AIRCRAFT FOR 30 YEARS ▶ MILITARY AND COMMERCIAL TRANSPORTS  
FIGHTERS ▶ ATTACK PLANES ▶ BOMBERS ▶ GUIDED MISSILES ▶ ELECTRONIC EQUIPMENT ▶ RESEARCH

## EQUIPMENT

### New Hangar Comes Apart in the Middle

Speedier operation will be possible from unique Mitchell Mobilhangar.

Prototype of a new and ingenious aircraft hangar useful for both commercial and military purposes is nearing completion at the Marine Corps Air Station, Cherry Point, N. C.

And several airlines, says its inventor, John Mitchell, have expressed interest in the hangar, especially for small or overseas stations. Among these carriers are Northwest, Capital, TWA and Air France.

Interesting feature of the building, called the Mitchell Mobilhangar, is that it comes apart in the middle, allowing a plane to taxi under its own power "into" or "out of" the hangar. Elimination of complicated doors and associated operating mechanism, heavy truss structure to give 172 ft. clear span and expensive foundations drops the cost of the Mobilhangar well below conventional structures of similar size according to Mitchell. He adds that the current unit, whose dimensions are 172 ft. wide by 100 ft. long, will be completed for a total expenditure of less than \$100,000.

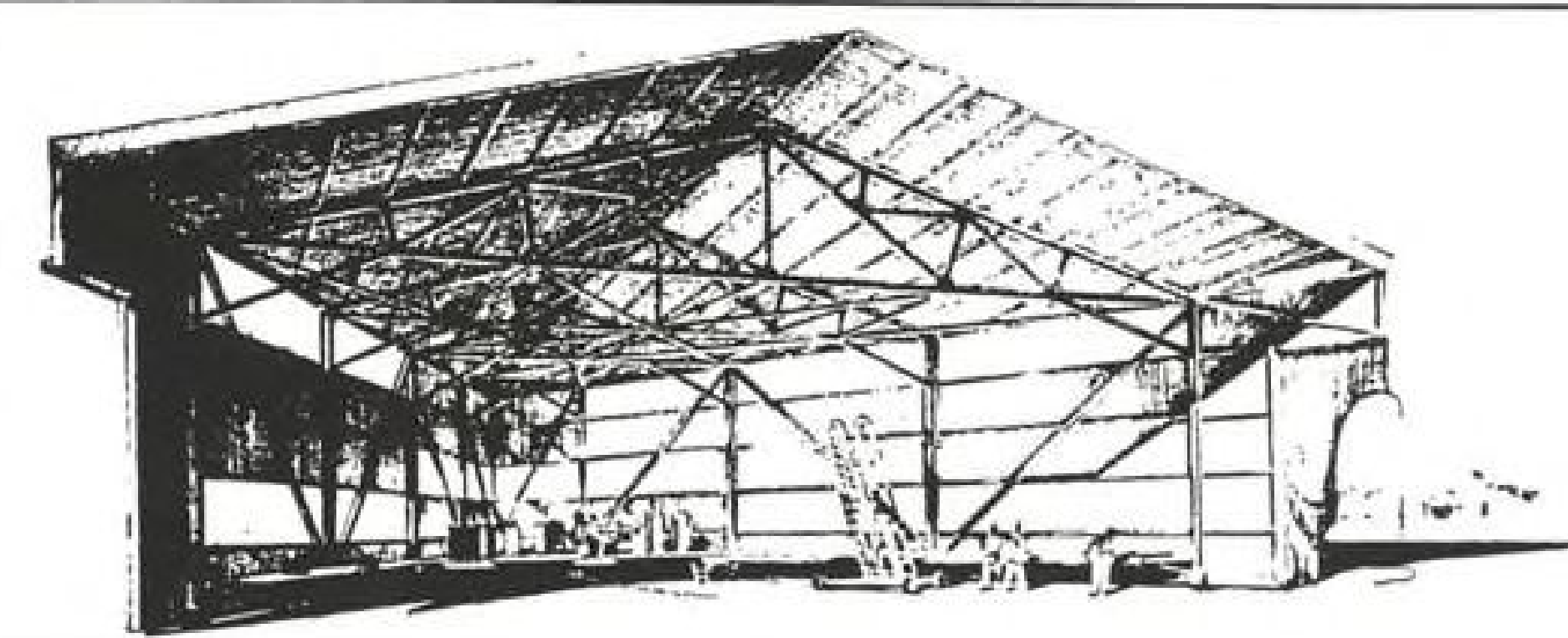
►Why it is Good—Engineers claim these additional advantages for the Mobilhangar:

- Both halves can be used as nose hangars when fully separated, weather permitting.
- Hangar is demountable and can be moved from location to location. Average assembly time, including laying track, is two weeks according to Mitchell.

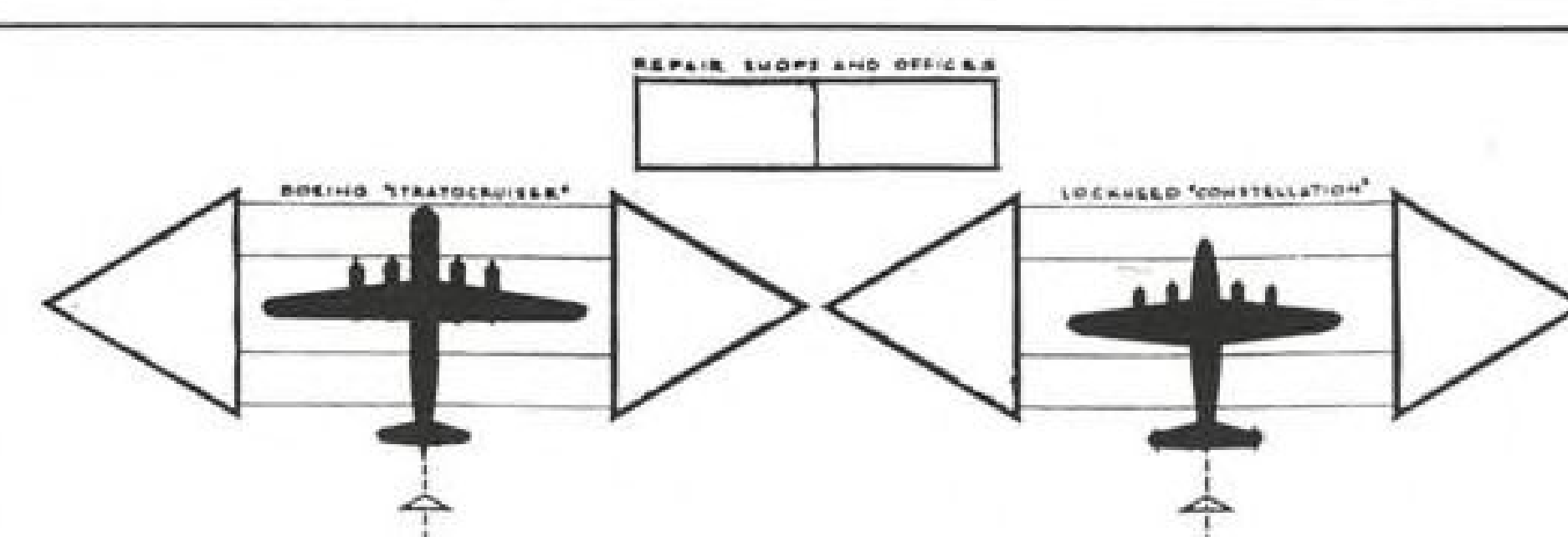
• Not being permanently attached to real estate, the hangar may be considered as a piece of equipment and perhaps depreciated over a much shorter period of time than a permanent structure.

• For defense purposes, hangars could be located at the end of runways. Interceptor fighters on the alert could be kept warm and ready in the hangars. When alerted, crews who would be in the hangars could be in the planes in a matter of seconds, the hangars opened at high speed and the ships taking off on the spot. Elimination of taxiing is particularly important for a jet fighter whose fuel capacity is limited.

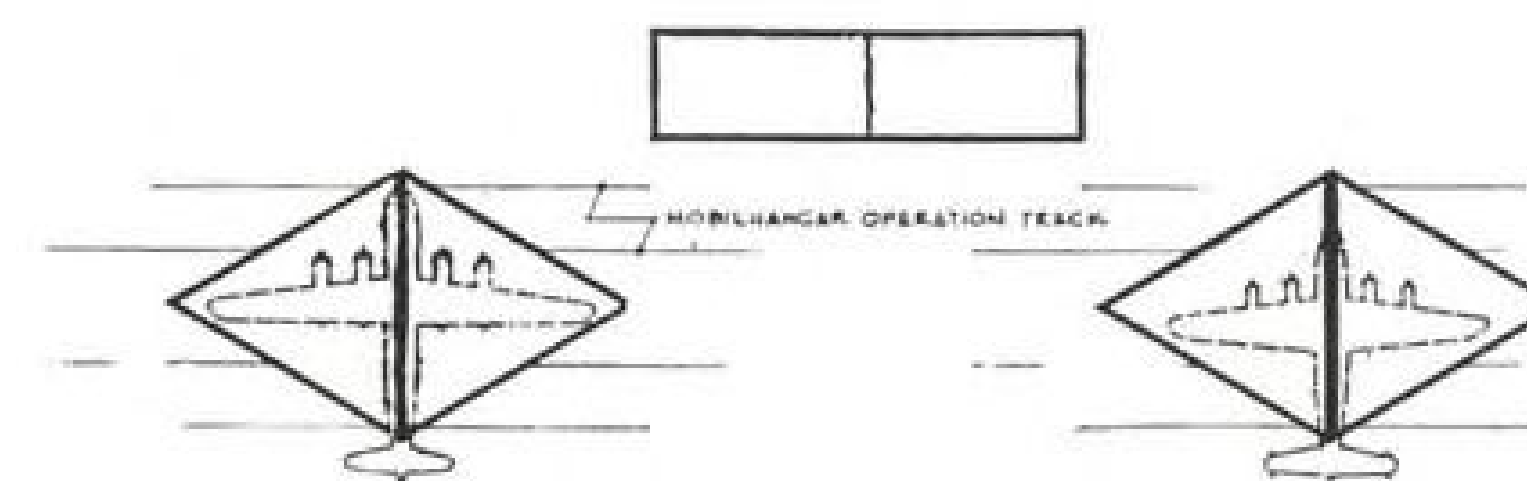
►Construction Details—The Mobilhangar is made up of two equilateral 100-ft. triangles mounted on rails which



HANGAR HALVES can be fully separated, used individually when weather permits.



DUAL INSTALLATION OF MITCHELL MOBILHANGARS IN OPEN POSITIONS



DUAL INSTALLATION OF MITCHELL MOBILHANGARS IN CLOSED POSITIONS

permit a maximum separation of 172 ft. larger units may be provided. Each section is driven by dual 3-hp. electric motors, either of which is powerful enough to do the job. Current may be supplied from outside sources or self-contained motor-generators. Speed of movement is 27 ft. per min., total opening or closing time being 3 min. This can be accelerated if required. Thick rubber seals between mating surfaces make a totally waterproof seal according to the designer. Each triangle is mounted on 18-in. wheels—dual wheel powered trucks are located at the apex of each side, single wheels at the other two sides. In case of total power failure, sides can be towed with aircraft tugs.

Built of steel and of conventional construction, the hangars are covered with corrugated Plasteel. Large panels of translucent Corrugux admit ample light to the hangar's interior. The 100-

ft. units can accommodate any plane up to and including a Boeing Stratocruiser with a part of the tail protruding through a cut-out. Side walls are 25 ft. high, peak is 37½ ft.

►Custom Tailoring—Interior arrangements and furnishings can be individually tailored to customer requirements. Included are wall-side work benches, 740 sq. ft. of work space at each apex, a three-ton overhead traveling crane to change engines. Water and electrical outlets may be piped to flush grated openings placed at convenient locations in the floor.

The floor's high spot is in the center and slopes off slightly to the edges of the hangar to prevent the floor from being flooded in case of heavy rain. Heavy, dual turnbuckle tie-downs are available to anchor the hangar when very strong winds are predicted.

Designer is John L. Mitchell, 509 Fifth Ave., New York 17.



## For Dependable Hose Connections

### WITTEK STAINLESS STEEL *Aviation* HOSE CLAMPS

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 FBSS  
(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)

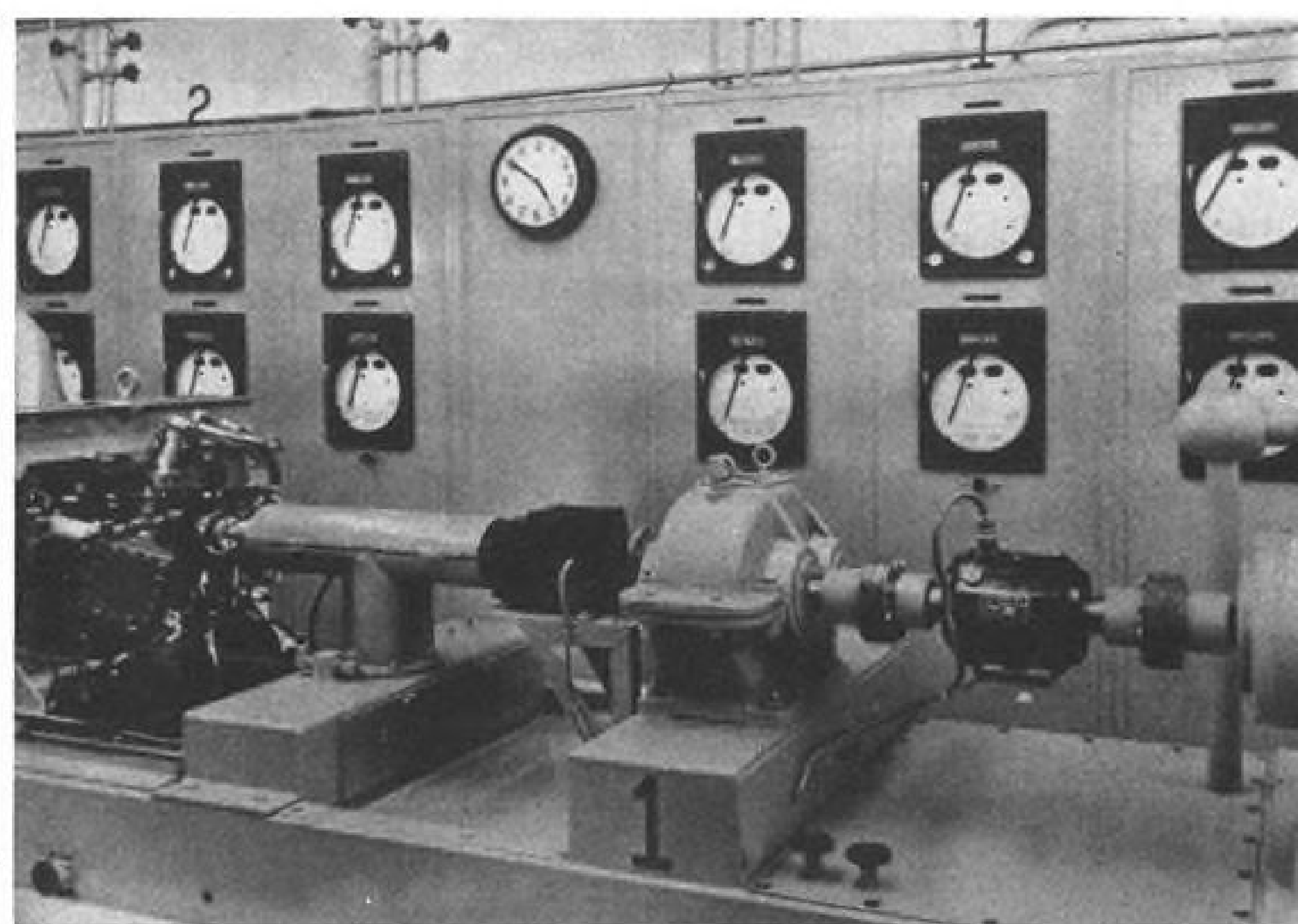
Made of stainless steel and available in all standard aircraft sizes. Also furnished in diameters up to 12" for duct and other special applications. Permits easy installation when hose is in place.



Meet current AN specifications  
and have C.A.A. approval.

Write for Details

**WITTEK** *Aviation*  
HOSE CLAMPS   
MANUFACTURING CO.  
4308 West 24th Place, Chicago 23, Illinois



#### CABIN SUPERCHARGER TEST STAND

This is the cabin supercharger test stand KLM Royal Dutch Airlines has recently installed at its main overhaul base, Schiphol Airport, near Amsterdam. The blower (left) is driven by a 150-hp. electric motor through a variable-speed hydraulic transmission and gear box (center). A torque meter which takes its measurements from a Wheatstone bridge bonded to the drive shaft is mounted

to the left of the gear box. Other instruments on the instrument panel indicate drive shaft speed, supercharger inlet and outlet pressures, Venturi inlet air pressure and temperature, air flow to the supercharger, blower lubricating and hydraulic pump oil pressures, supercharger and hydraulic pump oil flow and impeller rpm. Two superchargers can be tested at once.

#### Turntable Simplifies Compass Swinging

Ground compass swinging of large aircraft is simplified by running one of the main gear on to a compass compensating turntable currently being manufactured by Wakefield Engineering Co.

Two models are available. The B-1 with a diameter of 37 in. has capacity for a 56-in. tire and a weight of 50,000 lb. The unit carries USAF and Navy specification MIL-T-5336 and is CAA-approved says the maker.

The B-2 model has a diameter of 64 in. and a capacity of 100,000 lb.

Wakefield has also developed a 10-ft.-diameter model for the B-36 with a capacity of 180,000 lb.

Address of the concern is P.O. Box 471, Coeur d'Alene, Idaho.

#### USAF Orders 4000 High Intensity Lights

The USAF has contracted for 4000 new type, high intensity runway lights developed by Westinghouse.

The new units use a one-piece multiple glass lens to distribute light in a definite pattern through a 360-deg. circle around the light. Two strong beams of light are projected at 180

deg. to each other and parallel to the axis of the runway. The 180 deg. fan of light emitted by the portion of the light away from the runway shows a definite pattern to help the circling pilot orient himself with the runway. The 180 deg. fan of light shining towards the runway is very dim to avoid confusing and blinding the pilot.

The lamp uses a 200w. bulb and mounts a 200w. insulating transformer. Equipped with a breakable coupling designed to give if struck, the unit is said to be much easier to maintain than previous types of comparable runway lights.

#### British Units Cool Ambulance Planes

Cooling airborne stretcher cases from Korea is being accomplished by British-made refrigeration units at stations between Singapore and England.

First of the small, mobile, two-wheel "Coolair Minors" are in operation at Negombo, Ceylon, where they are used to maintain tolerable temperatures inside the RAF Hastings ambulance planes. Other units will be installed at such stops as Mauripur, India; Habaniya, Iraq; and Luqa, Malta.

Manufactured by the M. L. Co., the units can make 2 tons of ice an hour.

## On the New Douglas Super Airliner *Safety Glass* BY PITTSBURGH

DOUBLE glazing, a prominent feature of this new DC-6, is another example of Pittsburgh's contribution to safe, luxurious air travel. It is designed to provide clear, unobstructed vision through all light and sight openings in this air-conditioned, pressurized transport, under all weather conditions.

The windshield, securely mounted to withstand internal pressure and the stresses of high speed operation at extreme altitudes, consists of an outer layer of Herculite (tempered Plate Glass) and an inner layer of Flexseal (laminated glass and plastic) with space between for the circulation of warm air. So there is no danger of icing, frosting or fogging to interfere with the pilot's safe, speedy operation of the plane.

Side windows, larger than those of any other air liner, are made of two layers of heavy Flexseal, with air space between. This tends to prevent frosting and fogging in cold weather, to assure all passengers of a clear outlook.

On practically all the latest models of military and large commercial planes, you will find other Pittsburgh products, such as aircraft type Safety Glasses, transparent laminated plastics, photographic glasses and precision ground bullet- and bird-resisting glasses.

Pittsburgh has also developed advanced glazing methods which provide ample rigidity and structural strength and permit flush mounting of flat and curved panels of all sizes and shapes.

The priceless fund of glass-making experience which we have accumulated during many years of service to the aviation industry and our unexcelled research and production facilities are at the disposal of all aircraft manufacturers, large and small. We invite you to bring your new problems which involve airplane Safety Glasses and glazing techniques to Pittsburgh for prompt solution. Pittsburgh Plate Glass Company, 2117-1 Grant Building, Pittsburgh 19, Pennsylvania.



PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY





THE ALCHEMISTS OF OLD  
TRIED THEIR DARNDDEST TO  
CHANGE LEAD INTO GOLD

*but it's a cinch  
for you to change*

**Days**  
*into*  
**Hours**  
*with*  
**Flying Tiger**

## AIR FREIGHT

And, there's gold in those days you save, in the sense of new marketing possibilities that come only from Flying Tiger speed and economy.

Advance Manifest System keeps tab of your shipments constantly.

Multiple daily schedules.

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

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

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

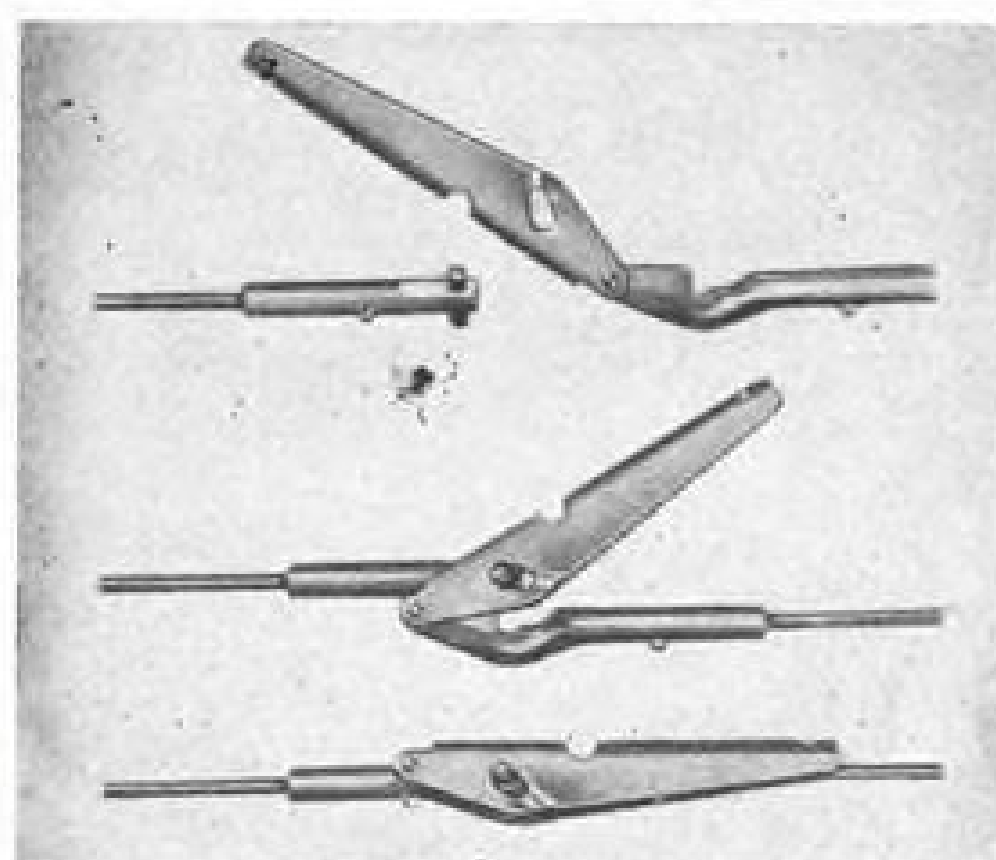
**FLYING TIGER**  
... a better way of shipping,  
a better way of buying,  
a better way of selling,  
anywhere, anytime, anything.

**The Flying Tiger  
Line Inc.**

General Offices: Lockheed Air Terminal  
Los Angeles, California

**WORLD'S LARGEST OPERATOR  
OF AIR FREIGHT AIRCRAFT**

## NEW AVIATION PRODUCTS



### Speeds Rigging

A quick-disconnect turnbuckle with a lever which provides a good grip and makes it easier to reconnect cables under tension has been developed.

Disconnects can be made without disturbing the turnbuckle adjustment simply by cutting one wire loop which safeties the lever in the closed position. No tools are needed to adjust tension as the "Speed-Rig" lever provides an easy method of turning the barrel, says the maker.

The unit is designed to withstand 110 percent of the breaking strength of the cable. It is designed with a small cross-section area to operate efficiently in confined areas. The device is available in the standard turnbuckle type which fits existing turnbuckle terminals, and the swaged type which may be swaged directly to the cable, eliminating terminals. The unit will fit cables of 1/16 through 3/16-in. dia. Made by Pacific Scientific Tool Co., 1430 Grande Vista Ave., Los Angeles.



### Low-Cost Mask

Expendable "Econo-Masks" are designed to meet the oxygen needs of airlines and executive plane passengers at a fraction of the cost of conventional rubber masks. They are made by Scott Aviation Corp., Lancaster, N. Y.

The pliofilm re-breather bag, nor-

mally discarded after use, is rugged enough to be used over many times and its stowage life is equal to that of regular masks, according to the maker. This could mean added savings where the Econo-Mask finds non-public use. Provided with the mask for permanent use are a plastic tube and metal connector which fits the oxygen outlet in the cabin.

This is the second oxygen mask for transport passengers announced by Scott recently, the other being a reusable mask (AVIATION WEEK Mar. 5, p. 24).

### Speedy Fastener

A small, low-cost metal fastening designed for use with access covers, radio parts, metal housings, panels, brackets and other parts that may have to be rapidly removed or assembled has been developed by the American Shower Door Co.

The "Thumweld" fastener, as it is called, can be inserted from one side and requires only the drilling of one 3/16-in. hole. Thumb pressure is sufficient to lock it in place and a quick pry with a screwdriver will release it. The fastener grips securely and will not shake loose, according to maker. It soon will be available in hole sizes ranging from 1/4 to 1/2 in. and for metal thicknesses up to 1/2 in., says the company, whose address is 1028 La Brea, Los Angeles.

### ALSO ON THE MARKET

Improved Cherry Rivet hand guns are designed for easier operation. Construction modifications also have increased capacity of tools and service life, says maker, Cherry Rivet Co., 231 Winston St., Los Angeles 13.

Double stepladder is designed to increase work capacity and minimize chances of accidents. Platform at top accommodates two or more people. Empty, 30-in. high ladder rolls easily on swivels, but weighted with person, it is secured to floor by rubber-tipped legs. Made by Ballymore Co., 139 Pennsylvania Ave., Wayne, Pa.

Portable steam space heater for hangars and other large areas is designed to give clean, safe heat where there ordinarily might be danger of carbon monoxide poisoning. Heater is fully automatic and oil fired. Made by Quiet Automatic Oil Burner Corp., 33 Bloomfield Ave., Newark, N. J.



## NO MORE FRONTIERS?

From oceans to the sonic wall, there's no frontier the aviation industry has not crossed.

And each crossing has meant withstanding more greatly elevated temperatures—high rotative speeds—more grueling punishment of every functioning part—especially upon ball and roller bearings.

Through a continuing program of research and development—through constant vigilance over every step of manufacture—through frequent and exhaustive inspection—SKF has kept pace with the progress of the aviation industry.

Today, when the need for even swifter progress is essential, SKF pledges continued production of bearings that are right for the most rigorous of service.

7227



integrity  
craftsmanship  
metallurgy  
tolerance control  
surface finish  
product uniformity  
engineering service  
field service

**SKF**  
BALL AND ROLLER BEARINGS

**SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.**  
—manufacturers of SKF and HESS-BRIGHT bearings.





## GOOD ENGINEERING COMES IN SMALL PACKAGES

Designing and building compact, light and efficient equipment for cooling and pressurizing aircraft is a Stratos specialty. Typical of Stratos creative engineering is the air cycle cooling unit which conditions the air for the crew of the Boeing B-47. Weighing less than 45 pounds it delivers 60 pounds of minus 3 degree Fahrenheit air per minute. Like other Stratos equipment it can be relied on to give long and trouble-free service. Stratos cooling units with air flow capacities ranging from 12 pound/min to 90 pound/min are standard equipment in many combat aircraft of the Navy and the Air Force.

Stratos units, engineered to the precise requirements of the installation, are now in use in such typical military aircraft as the McDonnell F2H2, Douglas XA2D, the North American YF93A and such commercial aircraft as the Convair 240 and the Lockheed Constellation.

Those who build and equip the nation's top aircraft know that good engineering comes in small packages—

For information  
on this and  
other Stratos  
equipment, write:

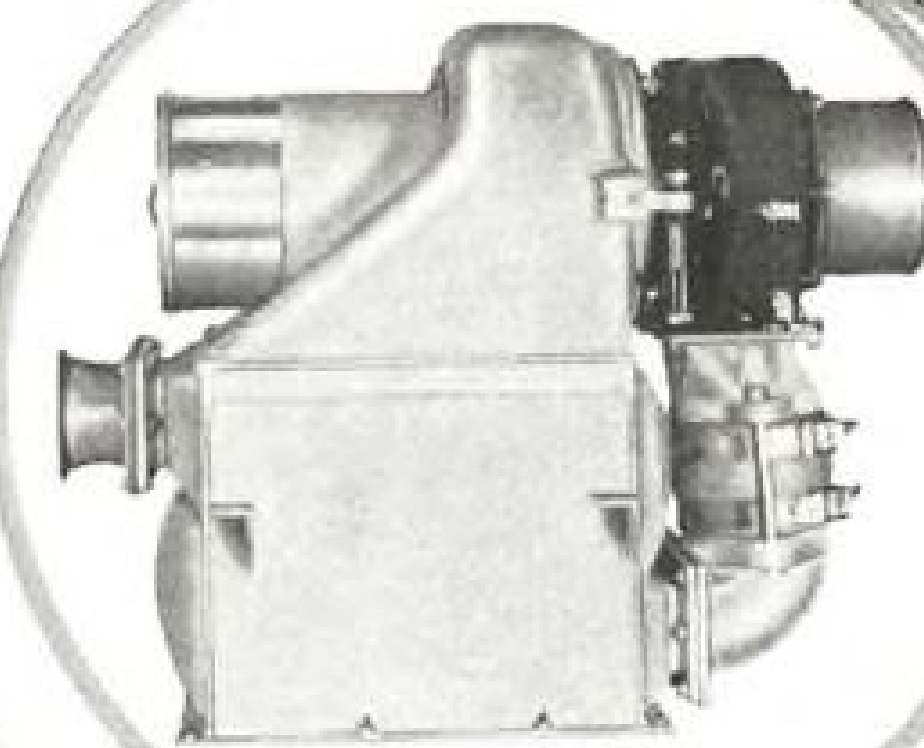


**Stratos** DIVISION

FAIRCHILD ENGINE & AIRPLANE CORP.

Main Office and Plant: Farmingdale, Long Island, N. Y. • West Coast Office: 1307 Westwood Blvd., Los Angeles 24, Calif.

Other Divisions: Fairchild-NEPA Div., Oak Ridge, Tenn. • Fairchild Aircraft Div., Hagerstown, Md.  
Fairchild Engine Div., Guided Missiles Div., Al-Fin Div., Farmingdale, N.Y.



## PRODUCTION

### How to Up Your Tool Productivity

Engineers tell how to better performance, increase life and speed operations of industrial machines.

Production know-how for speedup of industrial mobilization took on added emphasis when process experts exchanged new data at the recent annual meeting of the American Society of Tool Engineers, at New York.

Cutting across a wide field of industry, tooling engineers gave details of these approaches to increase aircraft component production:

► **Carbide Tool Capabilities**—Industry hasn't even begun to reach the speeds at which metals can be machined with carbide tools, in the opinion of W. R. Coomey, general superintendent of Rice Barton Corp., Worcester, Mass.

Holding that tools can be developed to increase machine output considerably, Coomey said company tests indicate that cutting speeds through steel at about 16 mph. or better are entirely feasible, the main requirements being machines that will take the speed and feed requirements.

He cited an experimental run where milling cutter and workpiece remained cool at 1435 fpm., with .020 in. feed per tooth. When feed was reduced to  $\frac{1}{16}$  this value, cutter and material became too hot to touch, indicating that the feed decrease was detrimental to tool life.

In another trial, a planing machine consumed 92 hp. when cutting steel at 100 fpm., but power consumption dropped to 55 hp. when speed was tripled.

Another slant on carbide cutting tools was given by Thomas Badger, of Westinghouse Electric Corp.'s Headquarters Mfg. Engineering Lab., Pittsburgh. He said that high speed steel tools still are most widely used, but rapidly are being replaced by carbides to cut production time and conserve plant space, machines and manpower.

Where carbides do not promise good results, he indicated that cast alloy tools should be tried before switching back to high speed. Under average shop conditions, Badger said, carbide tools will reduce cutting time by 40 to over 80 percent, and that for the same tool life, speeds eight times or more as high can be used.

Explaining how productivity can be increased on older machine tools which cannot use the superior cutting qualities of carbides, Dr. W. R. Frazer of Union Twist Drill Co., Athol, Mass., described

new grades of high-speed steel containing ultra-hard carbides. The new steels allow tools to be sharpened to knife-edge keenness and comparatively sharp angles (60 deg.), to reduce power and rigidity required in the machine tool, it was reported.

► **Measuring Machinability**—A new approach for accurately determining metal machinability was described by Francis W. Boulger, supervising metallurgist at Battelle Memorial Institute, Columbus, Ohio, who gave details of a new research device, a lathe that operates with constant pressure in feeding the tool to the work.

Boulger reported that feed is a more sensitive indicator of machinability than tool pressure, test results agreeing substantially with other means of determining machinability and very closely with tool life observed on production runs.

► **Gears and Tool Life**—Multiple thread hobs were advanced as speeding gear production and boosting tool life by D. A. Moncrieff and Harry Pelphrey, assistant chief engineer and research engineer, respectively, of Michigan Tool Co., Detroit.

They said that multiple thread hobs cannot increase production in direct ratio to the number of threads, due partly to machine limitations, but a

double thread unit will boost output about 35 percent over a single thread hob.

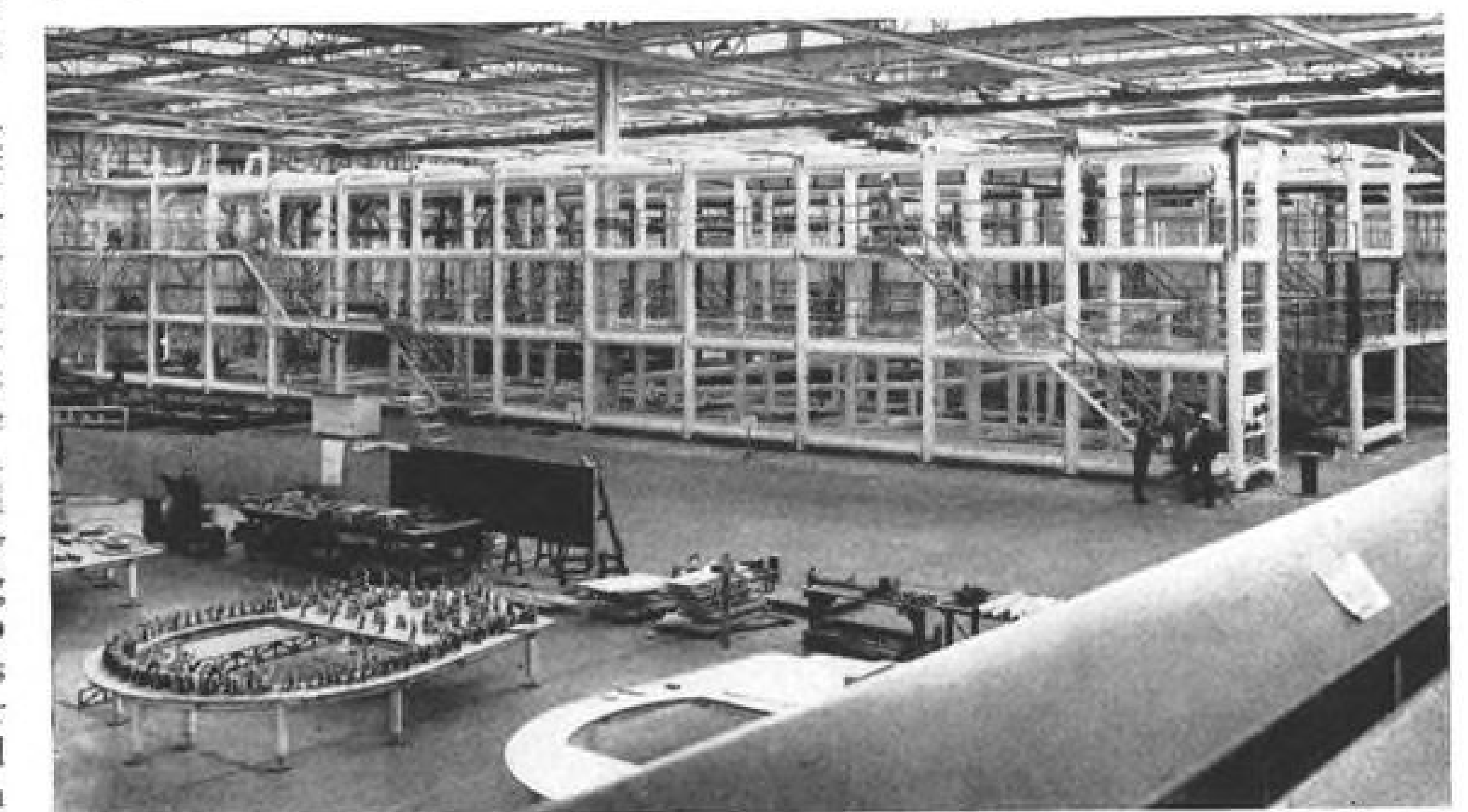
Prime reason offered for increased tool life for multiple thread units in climb hobbing was better chip load distribution obtained on the hob tooth. When multiple thread hobs are used, they recommend that these should be of larger diameter than comparable single thread units to permit employment of a larger number of flutes. Spiral-gashed multiple thread hobs are preferred to straight-gashed hobs, these engineers reported.

► **View on Tolerances**—Requesting that a rational approach be taken in the specification of tolerances for the purpose of boosting production and paring costs, Massachusetts Institute of Technology's Professor Earle Buckingham, gear authority, contended that unnecessarily close tolerances frequently are chosen to play safe rather than because of any definite need for such tolerances.

Holding that too many are looking for some form of standardization or some prefabricated specs that will relieve the necessity for analytical thinking, Buckingham cited examples of gear applications, showing how analytical approach to specification of tolerances could cut manufacturing costs and step up output, or avoid failure of gears in service.

► **Press Utility**—Industry can get greater production from mechanical presses through a thorough analysis of the mechanics of these machines it was suggested by S. D. Broetzkoos, mechanical engineer with the General Services Administration, Washington, D. C.

He outlined fundamental methods for analyzing press action, presented comparative advantages and disadvan-



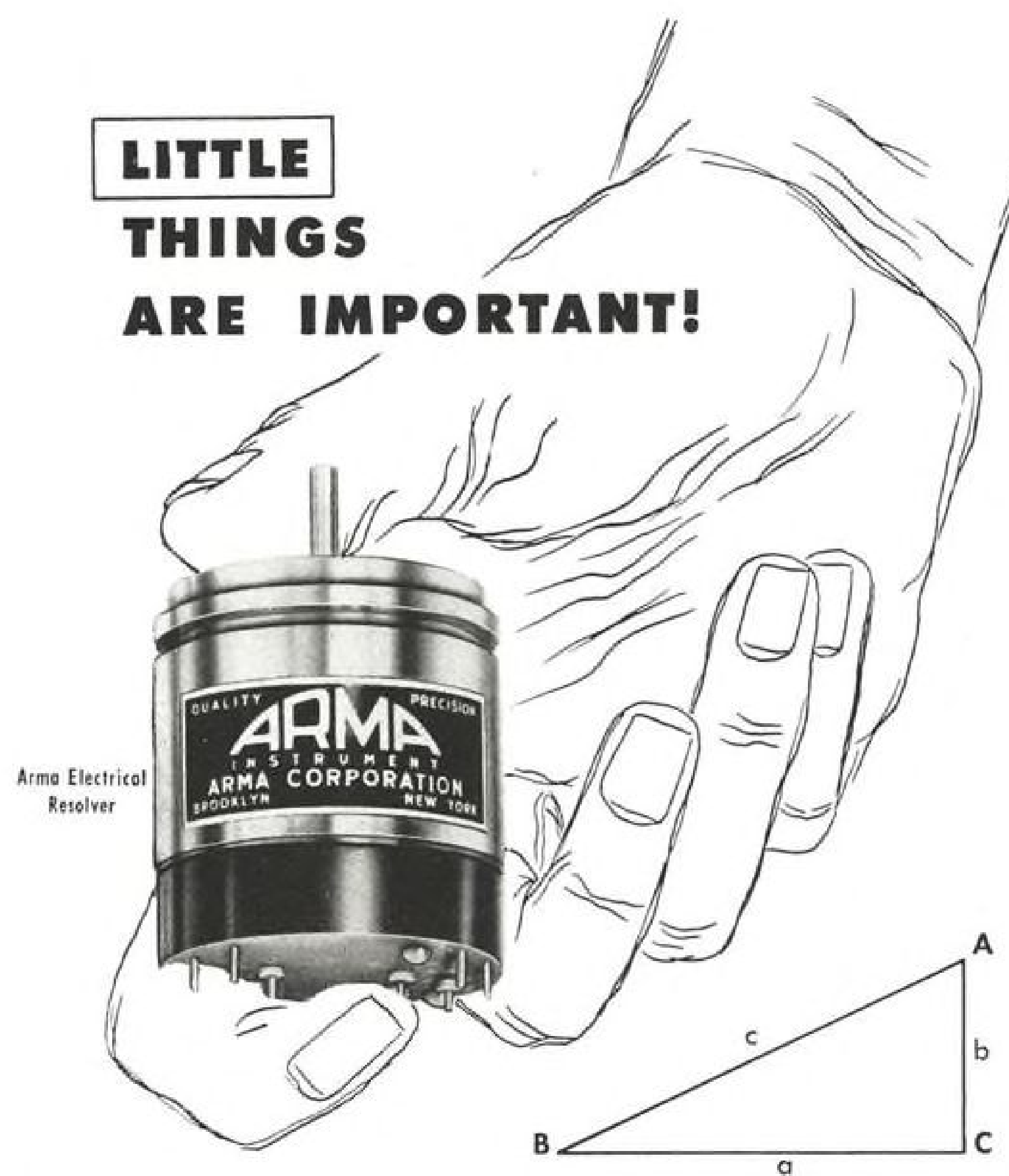
### BUCK FOR ASSEMBLING R3Y-1 HULLS

Convair has set up this massive hull assembly buck to be used in building R3Y-1 turboprop flying boats at San Diego. The huge structure, 150 ft. long and 65 ft. wide,

uses nearly two miles of metal pipe, has twin wells so that two R3Y hulls can be assembled simultaneously. Weighing nearly a million pounds, it is demountable.



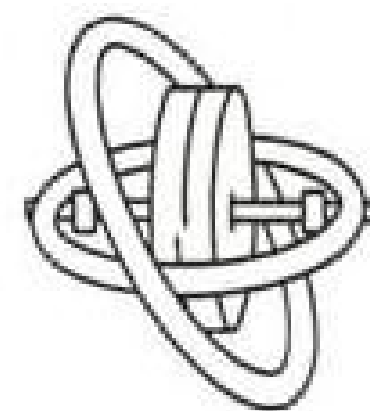
## LITTLE THINGS ARE IMPORTANT!



Making important things little is a militarily vital objective of the accelerated engineering activity which characterizes Arma. Making them little and interchangeable and more accurate... all at the same time.

An example of advancing miniaturizing accomplishment is the new lighter, more accurate and interchangeable Arma electrical resolver. This is one of the computing components that replaced a formidable aggregation of gears, bearings and slides previously used in fire-control equipment to solve the trigonometric functions. It is the "thinking" mechanism in modern military instrumentation which solves such gun-laying equations as  $a = c \sin A = c \cos B$  instantaneously.

The mechanical resolvers of World War II have since given way to the electrical. Application of the new miniature Arma electrical resolvers to the needs of all the Services is widening as rapidly as accelerated engineering can push it. This is another way Arma engineers work to help make America safe against those who wish to destroy it.



QUALITY **ARMA** PRECISION  
INSTRUMENT

**ARMA CORPORATION**

254 36th STREET, BROOKLYN 32, N. Y.

SUBSIDIARY OF AMERICAN BOSCH CORPORATION

**PRINCIPAL PRODUCTS** Gyroscopic Compasses • Gunfire Control Systems • Airborne Instrumentation  
Navigational and Plotting Instruments • Automatic Control Switchboards  
Electrical Computers • Mechanical Computers • Stabilizing Devices • Servo Mechanisms • Electrical and Electronic Equip.

ages of mechanical and hydraulic presses, and explained reasons why presses sustain damage.

► **Optical Checking**—New inspection procedures with optical projection using 1000w. lamps afford high checking speeds and accuracy according to E. C. Polidor, chief engineer of Engineers Specialties division, Rochester, N. Y.

The new method renders the image of the inspected part distinct even in daylight, he said, and other advances are in chart forms which indicate instantly the high and low limits as well as whether the part is within tolerance.

► **Grinding Hints**—Potential of plunge-cut grinding for cutting costs and stepping up output in close-tolerance operations were described by Frank W. Curtis, chief tool engineer of the Van Norman Co.'s Machine Tool division, Springfield, Mass.

Notable advantage of the process, he said, was the speed with which bearing surfaces can be finished to close specifications. Described were effective techniques for plunge-grinding diameters and shoulders simultaneously, together with dressing procedures for flat or formed surfaces. Curtis contended that the limiting factor in the plunge-cut technique is the length of the journal, or the spacing between surfaces to be ground at the same time.

► **Automatic Operation**—Automatic machines were represented as the answer to manpower scarcity in defense production by J. M. Delfs of General Electric Co.'s Machine division, Schenectady, N. Y. With new controls, he said, machines can be made automatic within themselves, or can automatically transfer the part to other units for subsequent operation. Results are to speed production and alleviate the lift-and-carry burden.

He showed how this could be accomplished by using both standard machine tools and special transfer machines.

► **Production Aid**—Sorting, measuring and counting devices, capable of high accuracy, to relieve operators of repetitive tasks, were described by A. C. Sanford, Federal Products Corp., Providence, R. I.

One method of applying the gaging units is directly to production machines so that they will produce only acceptable parts, thus eliminating inspection requirements. For sorting parts to extremely close dimensional accuracy, one device is said to have a theoretical capacity of 30,000 measurements per second.

► **Liquid Blast Finish**—The process of using water containing fine abrasive dust for producing fine finishes on metal and non-metal parts was outlined by B. H. Marks, Pangborn Corp.'s manager of its Hydro-Finish division, Hagerstown, Md.

Abrasives as fine as talcum powder,

suspended in a liquid (usually water and a corrosion preventive), is directed against the part by high-pressure air. Impact of the particles removes minute amounts of the surface and leaves it clean. The process is held useful on instruments and tools. Cutting tools last longer, Marks said, if liquid-impact blasted, the operation having the same effect as if the cutting surface were honed by hand.

## J-40 Subcontracts To Reach 25 States

The Navy's large-scale plunge for the powerful new Westinghouse J-40 axial-flow turbojet engine will send ripples of subcontracts out through 25 states, affecting almost as many outside workers as are on the rolls of the prime contractor.

The huge engine, unofficially reported to have a thrust—with afterburner—of approximately 12,000 lb., contains about 14,000 separate parts, from the simplest washer to the most complicated electronic tube. The engine, having recently passed its 150-hr. qualification test, is slated for a series of new Navy planes, including the radical, variable sweptwing Grumman XF10F-1, and the McDonnell XF3H-1.

Some measure of Westinghouse's subcontracting and supply set-up can be gained from its 1950 program, when the firm's outside parts and materials purchases provided some six million man-hours of labor to its subcontractors and vendors in addition to approximately eight million man-hours expended in its own plants and several millions more at other company locations. The order ranged from \$13.20 for gaskets to a firm in Indiana to a \$4-million purchase of blading and sub-assemblies in Ohio.

The J-40 will be produced at the Westinghouse headquarters plant of its Aviation Gas Turbine division in Philadelphia and its new facility in Kansas City.

## C-W Closes Year On Strong Note

With 1950 heralded in advance as the "year of decision" for Curtiss-Wright Corp.'s new management, the annual report of the company has given the management a high mark.

C-W turned up with its highest sales and profits figures since the end of the war, \$135,662,863, and \$7,278,564, respectively. Of the two sums, the profit is more noteworthy. In 1949, C-W sales were \$128,578,227, and profit was \$2,750,361.

Board Chairman Paul V. Shields and President Roy T. Hurley recalled that

Performance puts more Sensenich Propellers

## Right on the Nose

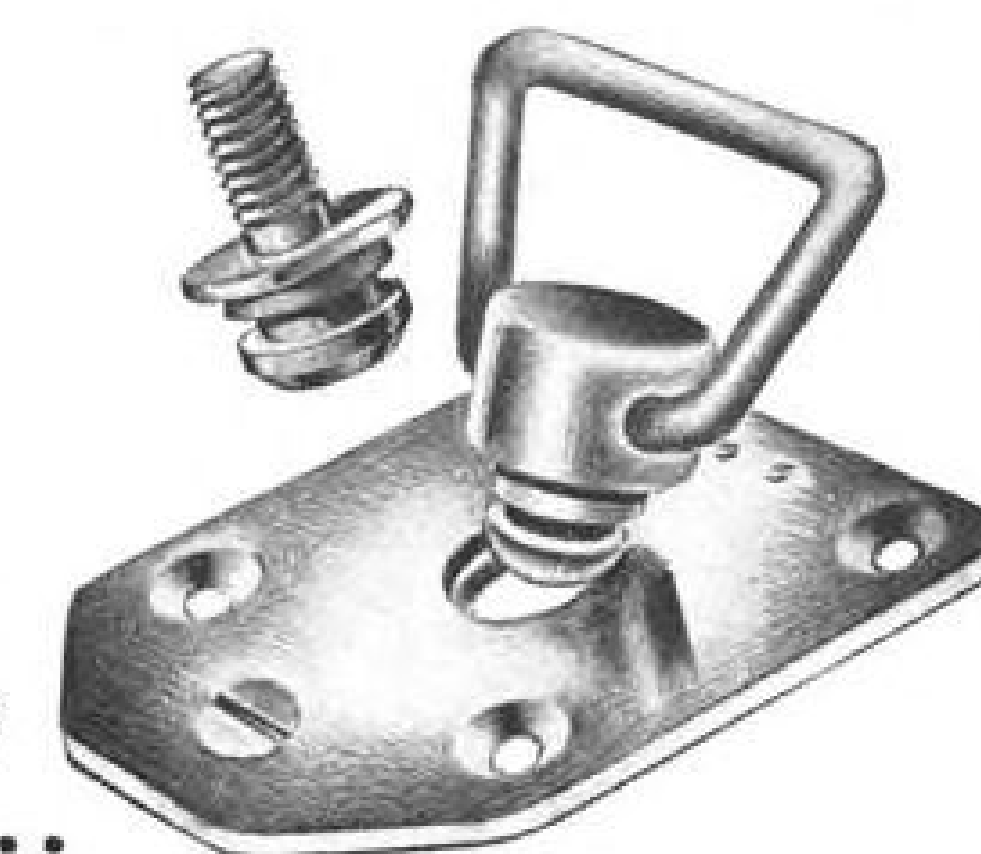
Experience is the most reliable teacher... and Sensenich, as the largest manufacturer of light aircraft propellers, has more designing, more engineering and more production experience than any other manufacturer. Performance dictates Sensenich propellers... and pilots prefer them!

<b>METAL</b> ... Fixed Pitch CAA approved up to 125 hp.	<b>WOOD</b> ... Fixed Pitch CAA approved up to 225 hp.
<b>SKYBLADE</b> ... Controllable CAA approved up to 165 hp.	<b>TEST CLUBS</b> up to 3,000 hp.

Write for Bulletin and Price List

**SENSENICH CORPORATION • LANCASTER, PA.**

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



**FROM PASSENGERS TO FREIGHT...**  
*"quick change" with WEDJIT*



From seats to cargo tie-downs in minutes flat with Adams-Rite WEDJITS.

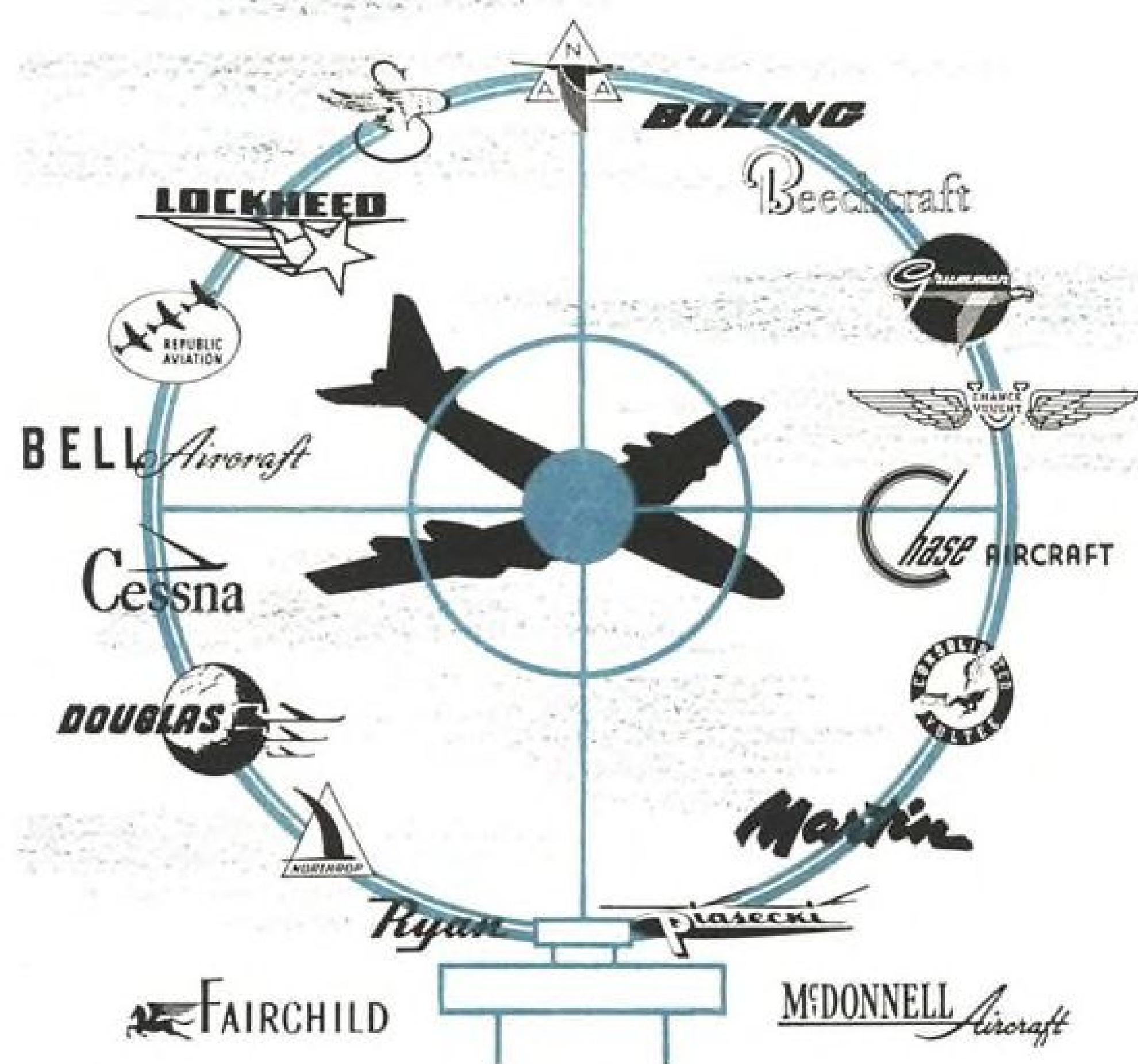
Just as efficient with electronic gear and other removable equipment, these heavy duty, positive locking fasteners insure built-in strength with twist-of-the-wrist interchangeability. WEDJIT'S anchor plate contains a rugged, spring-actuated, locking mechanism. The stud snaps in under hand pressure, releases instantly at the turn of a screw head.

How many ways can you use WEDJIT? Your inquiries are invited.

Monadnock, with a wealth of fastening experience, also has reliable development and production facilities available to manufacturers of quality products.

**MONADNOCK MILLS** San Leandro California  
subsidiary of UNITED-CARR FASTENER CORP.





## Highest Scorers in the World's Toughest Game win with ADEL

Time and again, the world's leading aircraft manufacturers have scored with ADEL products in meeting the severest requirements of both civil and military aircraft and helicopters. Since the beginning of World War II, ADEL has worked closely with prominent planemakers to develop and manufacture hydraulic control equipment surpassing the industry's most exacting standards.

Today, ADEL is intensifying its program of advanced research in aircraft hydraulics, and is solving the many problems born of the new developments in military aviation. ADEL offers the world's most complete line of aircraft hydraulic control equipment, including a full complement of hydraulic, fuel heater and anti-icing accessories, clips and line supports, PLUS an engineering service which assures the "solution to satisfaction" of your most critical hydraulic problems.

Whatever the nature of your problem in aircraft hydraulics, it will pay you to call on ADEL first. Address:

ADEL DIVISION, GENERAL METALS CORPORATION,  
10775 Van Owen Street, Burbank, California.



DIVISION OF GENERAL METALS CORPORATION • BURBANK, CALIF. • HUNTINGTON, W. VA.

CANADIAN REP.: RAILWAY & POWER ENGINEERING CORPORATION, LIMITED

in September, 1949, the stockholders were told actions then were being taken to put the company "in a substantially improved position with respect to future earnings." New management could point to the report as confirmation, and add a further note that the improvement was only in a negligible degree due to the post-Korea defense orders.

Last year, as it did in the four preceding years, C-W paid out more in dividends than it earned. That was necessary because of the huge cash reserves the corporation had at the end of the war, pressure from the stockholders and extremely low earning power for a company of C-W's size. The 1950 results indicate that that situation may be at an end.

Not only does C-W now have a fat backlog—\$300,400,000 as of Dec. 31, with more added since—but the report shows another significant change in C-W operations. C-W's costs and expenses in 1949 were \$125,999,583. Against approximately \$7 million more in sales in 1950, costs and expenses were trimmed to \$122,980,038.

## Republic Aviation Reports Sharp Gains

Just about the most impressive increase in business among the major aircraft manufacturers was reported last week by Republic Aviation, Inc. in disclosing that its backlog is over 1200 percent that on Dec. 31, 1949.

Unfilled orders totaling more than \$500 million would seem to call for either a major expansion of the Farmingdale, N. Y., company, or else a production program spread out over several years. Republic already has made great strides in preparing for its increased commitments. Last summer, employment was down to about 4900; it is now 9500 and still climbing.

At the close of last year, the Republic backlog was \$245 million. An almost equal amount of business has come in since that time. At the end of 1949, the backlog was \$36,983,000.

Republic's income for the year ending Dec. 31, 1950 was \$57,843,076, compared to \$48,421,934 in 1949. Profit after taxes jumped disproportionately, from \$876,632 in 1949, to \$2,355,006 last year.

## Airframe Shipments Decreased in 1950

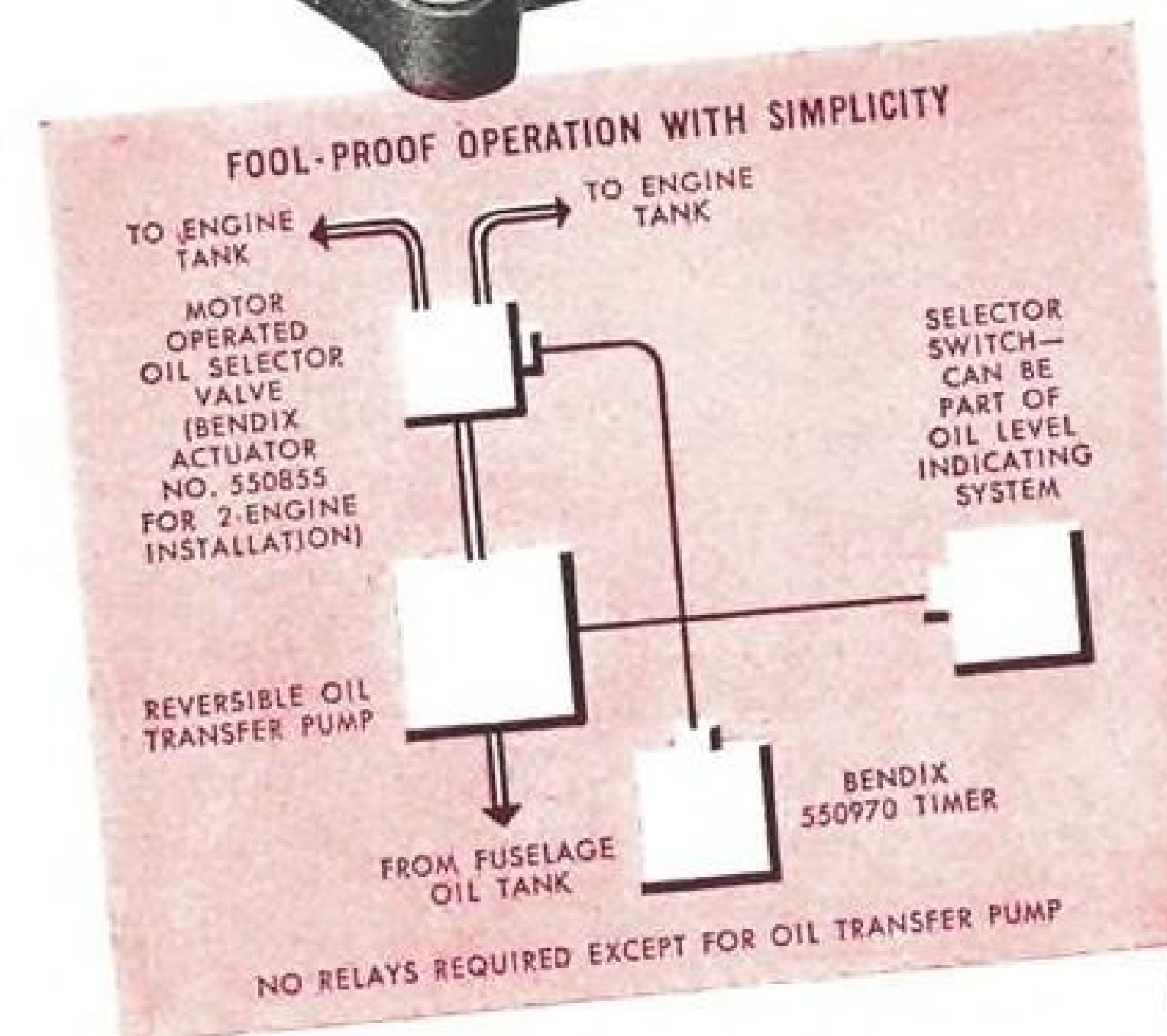
U. S. aircraft shipments (excluding restricted figures on U. S. military shipments) totalled 5,924,400 lb. of airframe weight for the year 1950, Department of Commerce figures have disclosed, as compared to 6,744,400 lb. on a comparable basis for 1949.

December 1950 shipments of com-

BENDIX-PACIFIC NOW OFFERS

*new simplified automatic protection*

## FOR OIL TRANSFER SYSTEMS



The Bendix-Pacific Oil Transfer Timer eliminates the multitude of relays and complicated wiring otherwise required for complete automatic scavenging of oil transfer lines.

Engine oil in unheated lines will solidify and prevent further transfer of oil unless it is removed after each transfer.

Without numerous relays and wiring to do the job, the Bendix-Pacific Timer accomplishes this operation automatically, relieving the operator of all details.

The Bendix Timer does all this automatically:

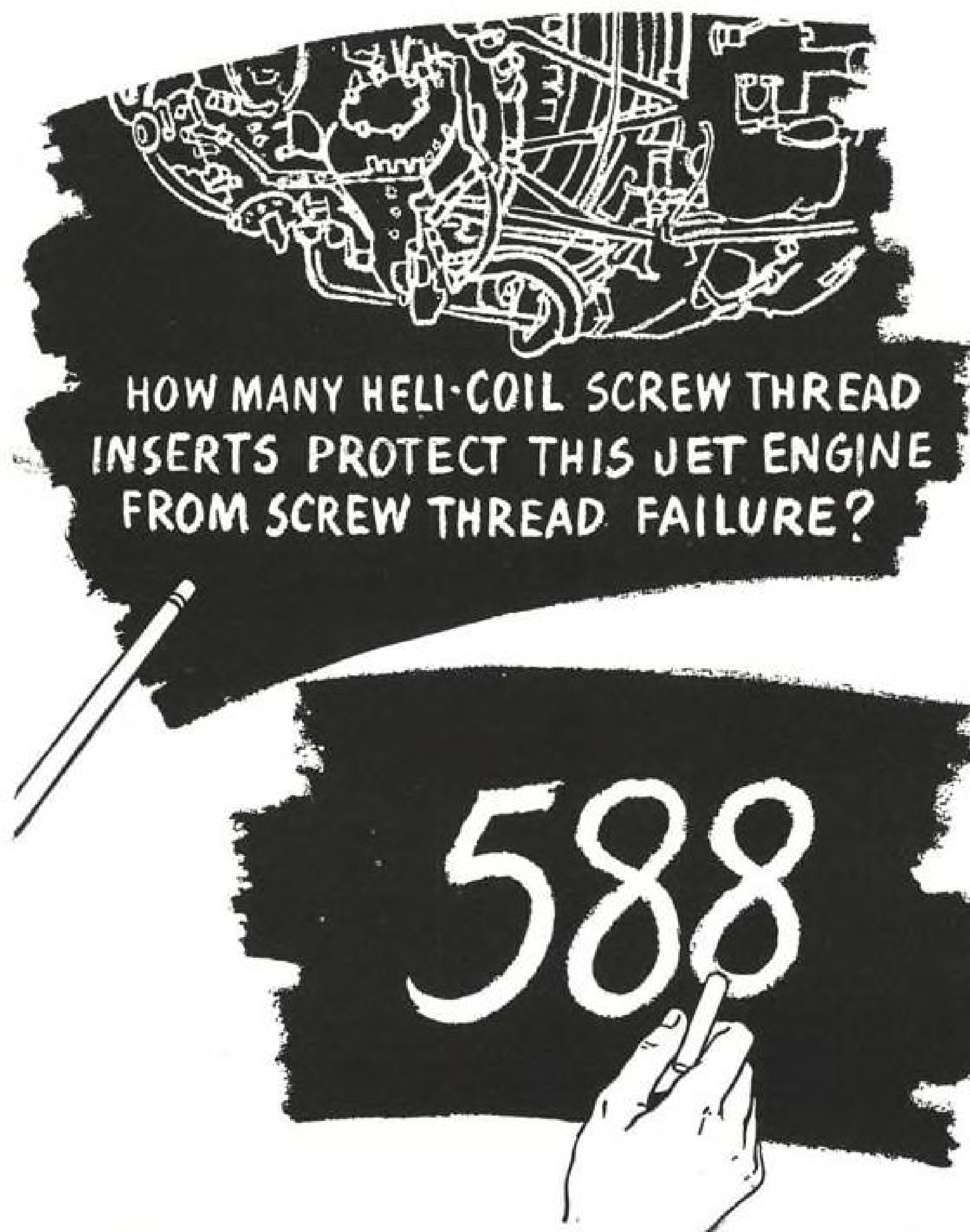
1. Pump will not start until valve is in position.
2. Valve is locked until cycle is complete and line is scavenged.
3. Pump instantly reverses when oil is no longer required.
4. Pump shuts off automatically after a preset period has elapsed.
5. Valve is returned to neutral.
6. Timer shuts itself off.

Write for complete details.



East Coast Office: 475 Fifth Ave., New York 17 • Export Division: Bendix International, 72 Fifth Ave., New York 11 • Canadian Distrib.: Aviation Electric, Ltd., Montreal





HOW MANY HELI-COIL SCREW THREAD INSERTS PROTECT THIS JET ENGINE FROM SCREW THREAD FAILURE?

588



The most advanced design and engineering in the world specifies Heli-Coil stainless steel Screw Thread Inserts to protect threaded members against stripping, galling, corrosion, seizing, electrolysis, and vibration wear.

Heli-Coil Inserts fit National Coarse and Fine Threads, also pipe thread sizes, automotive and aviation spark plug threads. These precision-formed inserts are approved for aircraft, military and industrial use. They also provide increased strength, and permit design simplification in aluminum, magnesium and other light metals.

**HELI-COIL**



Protecting Screw Threads for Industry

**CORPORATION**

HELI-COIL CORPORATION

47-209 Thirty-Fifth Street, Long Island City 1, N. Y.

Please send me ☐ Bulletin 650 on Design Data  
☐ Bulletin 349 on Salvage and Service

NAME \_\_\_\_\_

FIRM \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

plete civil aircraft amounted to 305 planes valued at \$8 million, with airframe weight of 502,700 lb. This compared with revised shipments in November of 242 planes valued at \$15.1 million.

Aircraft engines shipments in 1950 to other than U.S. military customers totalled 1,646,000 hp. as compared to 1,231,500 hp. in 1949.

The summaries were based on reports from 33 aircraft companies operating 39 plants and ten engine companies operating 12 plants.

December employment figures of 222,091 in airframe plants and 50,638 in engine plants were reported, showing a gain of approximately 5 percent in employment in both types of plants over November figures which were 211,864 and 48,274.

## AF Invitations

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

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

Procurement field office locations: Boston Army Base, Boston 10, Mass.; Government Aircraft Plant No. 4, Ft. Worth 1, Tex.; 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

Grinding machine surface, 10 each, bid invitation No. 51-1547, issue date 12 Mar., delivery starting in 45 days, complete within 180 days.

Gage, coating thickness, 117 each, bid invitation No. 51-1549, issue date 12 Mar., delivery within 90 days after date of award.

Lathe, turret, 11 each, bid invitation No. 51-1550, issue date 12 Mar., delivery to start within 60 days, complete in 250 days.

Cutter, 1-23 items, bid invitation No. 51-1553, issue date 12 Mar., delivery starting in 60 days, complete within 90 days.

Grinding machine, 1 each, bid invitation No. 51-1554, issue date 12 Mar., delivery to start in 60 days, complete within 90 days.

Lathe, engine, 1 to 8 items, bid invitation No. 51-1555, issue date 12 Mar., delivery to start in 90 days, complete within 180 days.

Arbor-hole saw, 1-7 items, bid invitation No. 51-1557, issue date 12 Mar., delivery to start in 60 days, complete within 90 days.

Packing, handle, nut-wing, 1-35 items, bid invitation No. 51-1561, issue date 12 Mar., delivery starting in 30 days, complete within 90 days.

Rectifier, 1-6 items, bid invitation No. 51-1563, issue date 15 Mar., delivery starting in 120 days, complete within 210 days.

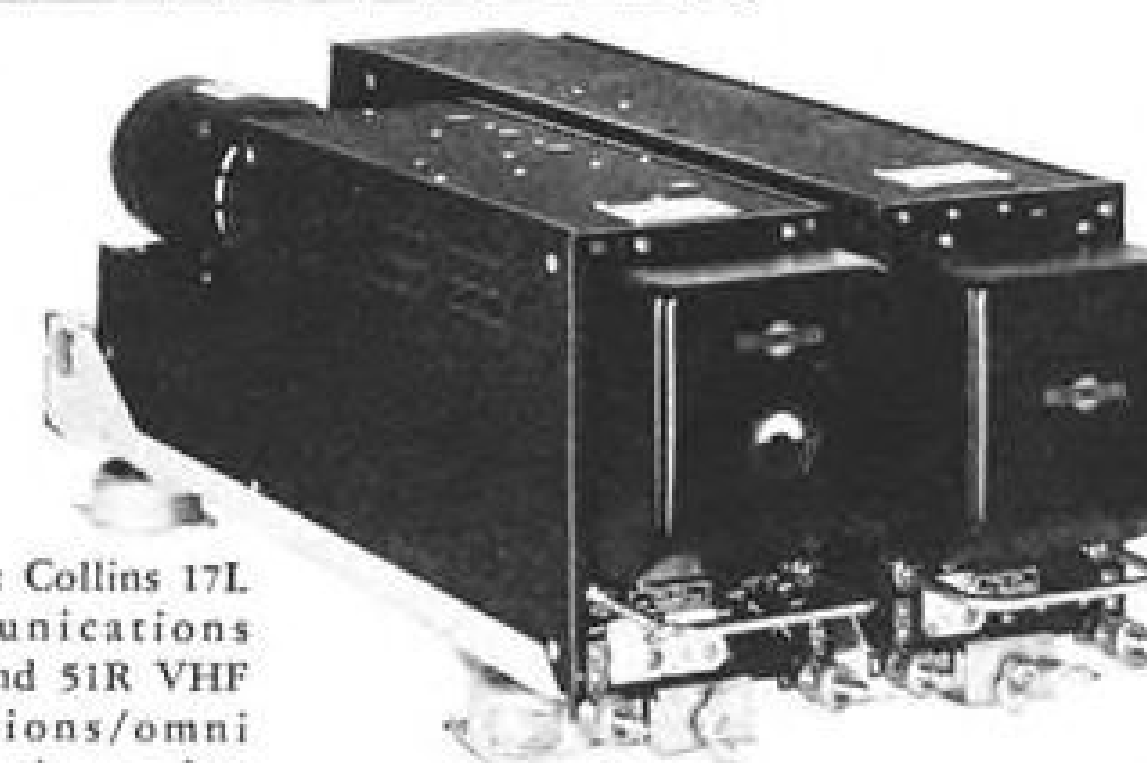
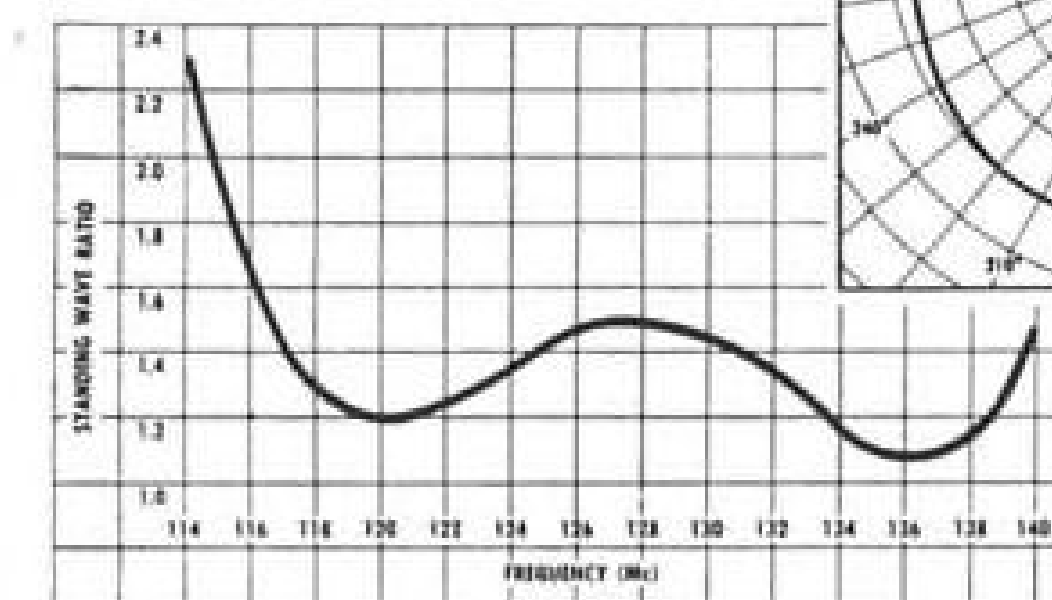
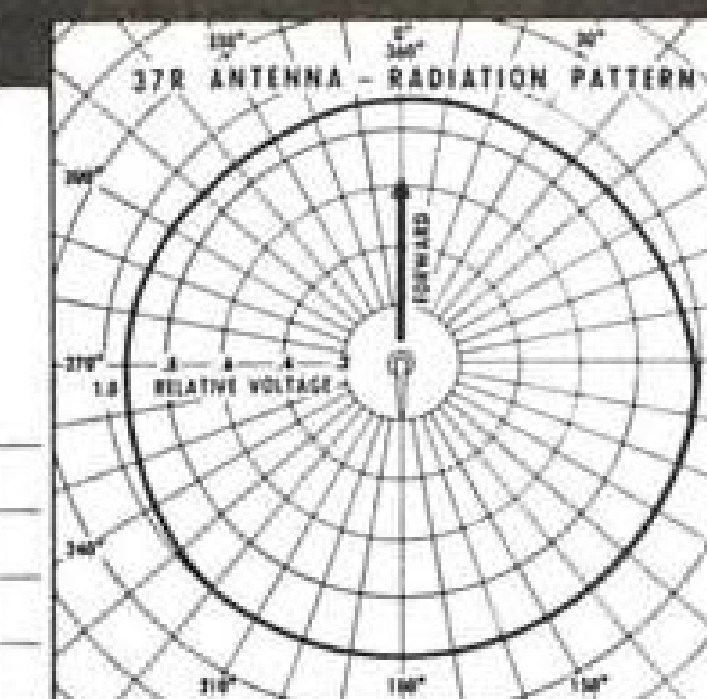
Drill, electric, 766 each, bid invitation No. 51-1575, issue date 16 Mar., delivery starting in 90 days, complete within 120 days.

Kit, welding, 100 each, bid invitation No. 51-1576, issue date 16 Mar., delivery starting in 60 days, complete within 120 days.

Cutter, 1-37 items, bid invitation No. 51-1578, issue date 16 Mar., delivery starting in 60 days, complete within 90 days.



## NEW! VHF COMMUNICATIONS ANTENNA FOR AIRCRAFT



In aviation communications, it's . . .

This is a portrait of the new Collins 37R-1 antenna, made expressly for use with the Collins 51R-17L two-way VHF communications system. It is designed for the most efficient radiation and reception of vertically polarized communications signals in the frequency range of 118 to 136 megacycles. Note the excellent radiation pattern and standing wave ratio graphed on this page.

The 37R-1 mounts externally on the skin of the aircraft. Its mounting base, identical with the Collins type 37J-2 omni antenna, greatly simplifies installation especially on pressurized aircraft. Only the r-f connector protrudes through the skin of the ship.

We invite inquiries and investigation of this highly specialized and effective development.

Left to right: Collins 17L VHF communications transmitter and 51R VHF communications/omni navigation receiver as furnished in specially designed dual shockmount.

**COLLINS RADIO COMPANY, Cedar Rapids, Iowa**

11 West 42nd Street, NEW YORK 18

2700 West Olive Avenue, BURBANK





# You're always right with AUTO-LITE

## Industrial Wire & Cable

• The quality of Auto-Lite Wire and Cable is the result of nearly 40 years of experience, research and advanced laboratory tests. This, plus the tremendous output possible in Auto-Lite plants at Port Huron, Michigan and Hazelton, Pa., makes Auto-Lite a logical source of supply for wire to fit every need. Address inquiries to:

The Electric Auto-Lite Company  
Wire and Cable Division  
Port Huron, Mich. Hazelton, Pa.



WIRE & CABLE • DIE CASTINGS • PLASTICS • INDUSTRIAL THERMOMETERS

## FINANCIAL

### Investment Trust Holdings of Aviation Equities

(1950 Year-End)

	NUMBER OF SHARES HELD	APPROX. CURRENT MARKET VALUE	NO. OF TRUSTS HOLDING
<b>AIRLINES</b>			
American—Common	296,100	\$4,737,600	25
Preferred	53,700	4,457,100	19
Braniff	74,800	1,047,200	3
Chicago & Southern	12,400	136,400	1
Delta	18,800	413,600	2
Eastern	173,800	3,823,600	22
National	35,700	535,500	3
Northwest—Common	69,200	968,800	4
Preferred	29,900	627,900	7
Pan American	103,500	1,138,500	12
United—Common	121,000	3,388,000	19
Preferred	11,200	1,321,600	6
TWA	22,500	540,000	2
Western	13,500	189,000	1
<b>AIRCRAFT</b>			
Bell	262,900	6,309,600	4
Boeing	41,000	1,927,000	15
Convair	494,500	8,901,000	12
Curtiss-Wright—"A"	52,100	1,302,500	5
Common	12,400	124,000	2
Douglas	49,900	4,740,500	24
Grumman	130,200	2,864,400	12
Lockheed	78,300	2,740,500	14
Martin	2,600	46,800	1
North American	206,600	3,305,600	17
Northrop	14,000	196,000	3
Republic	21,900	262,800	4
United—Common	230,500	8,067,500	39
Preferred	14,600	1,576,800	13

## How the Funds View Air Stocks

Aircraft and airline shares, though widely held, do not rank among 'Favorite Fifty' in portfolios.

Aviation securities are not yet very popular with general investment trusts. This is revealed in an exclusive AVIATION WEEK survey of holdings of aviation shares in portfolios of investment funds.

Not a single aviation company was included among the first 50 stocks favored in the compilation of holdings of about 158 closed-end trusts and mutual funds as prepared by Aigeltinger & Co.'s "Guide to Investment Trust Portfolios."

► **UAC Top Aircraft Firm**—The closest any aviation company came to the "Favorite Fifty" was United Aircraft Corp. with an estimated \$8 million of its common shares held by a total of 39 trusts.

The complete list of aviation shares owned by investment funds is revealed in the accompanying table.

In a few instances, concentrated control as special investments must be distinguished from popular interest among the trusts. For example, in the case of Convair, the Atlas Corp. owned

422,400 shares, or 18 percent of the total outstanding stock at the 1950 year-end.

While not shown in the above table, Atlas also owned 209,900 shares of Northeast Airlines common (32 percent of the total), and 77,000 shares, or almost all of the preferred stock of the company.

Similarly, First York Corp. owns 212,400 shares, about 49 percent of the total Bell Aircraft Corp. issue. Other trust interests on the Bell board of directors account for a total of 50,500 shares.

► **AA Tops Airlines**—In the airline group, American has the largest number of trusts, 25, owning its common shares. It also represents the biggest composite aviation investment for the trusts through its combined preferred and common shares.

The distinction of the largest percentage of any airline capital stock owned by general investment trusts goes to Eastern. The 22 trusts accounting for 173,800 shares of Eastern,

collectively own 7.3 percent of the carrier's stock.

Another top airline favorite is United with holdings of 121,000 common shares distributed among some 19 funds. The isolated investments in Chicago & Southern, Delta, National, TWA and Western, are owned by the specialty aviation funds such as National Aviation, Group Securities and Aeronautical Securities.

Of the four funds owning 69,200 shares of Northwest common, 40,000 represents the long-time holdings of Incorporated Investors, whose president is a director of the airline.

In the aircraft group, general investment trusts favor United Aircraft, Douglas, North American, Grumman and Lockheed, in the order named. Such holdings of United Aircraft represent about 8.7 percent of that company's common shares. Similarly, the holdings of 24 trusts of Douglas stock constitutes 8.3 percent of the company's shares.

In these instances and a few others previously indicated for the airlines, investment trust holdings, while representing the largest organized blocks of ownership, are far from being able to exercise effective control. (This excludes the specific control as found in the cases of Bell, Convair and North-east.)

► **No Unanimity**—In view of developments set in motion since Korea, it is interesting to note that professional fund managers were inclined to favor airlines while liquidating aircrafts during the latter part of 1950. As in the past, however, there was little unanimity among these trusts. It was not uncommon for one fund to be buying while another was selling the same aviation security. For example, during the second half of 1950, Wellington Fund purchased 3000 shares of American Airlines preferred while Affiliated Fund liquidated 6000 shares of the same issue.

There was a decided tendency to move out of Northwest Airlines as news on the carrier detailed its series of difficulties. This is another characteristic of most funds—they frequently act after conclusive results are known and substantial market moves have been completed.

It is noteworthy that the 158 trusts surveyed controlled investible assets of over \$3.5 billion at last count. Should even only a very small segment of these funds be turned into the aviation groups, the impact of such investment buying could be of substantial proportions. As aviation companies continue to develop sustained earnings and consistent dividend disbursements they will attract a larger measure of investment support.

—Selig Altschul



# AIR TRANSPORT

## U.S.-French Pact Clears the Air

**PAA and TWA win right to set up their own schedule frequency; Air France gets Houston stop.**

U.S. representatives at Paris have won French agreement to the main U.S. contention: Let air carriers themselves decide frequency of service on their routes. This means TWA and Pan American can write their own schedules New York-Paris.

Former CAB member Russell Adams was in charge of U.S. negotiations as the State Department Secretary's special assistant. With him were CAB Foreign Air Division Chief Edward A. Bolster, CAB Member Harold Jones, who quit the Board after winding up at Paris, and Francis Deak, chief of State Dept. aviation policy staff.

Main points decided at the French-U.S. conference were:

- **TWA and PAA decide** how frequent their service should be through Paris in competition with French government-owned Air France.

Certification of PanAm into Paris last year caused the French to cry for "predetermination of frequency," to protect Air France against too much competition. But the U.S. negotiators wave persuaded France to stick to the "Bermuda principles" of carrier control of frequency—agreed to first by the

U.S. and U.K. at Bermuda, February, 1946, and agreed to by France March, 1946. So PanAm gets into Paris, and TWA and PanAm both may regulate their own frequencies.

The French got the U.S. to agree that any time the U.S. competition should have "undue effect" on Air France, France could call for immediate consultation. Thus, TWA and PanAm will naturally watch that they do not overschedule Paris.

- **Air France gets a stop** at Houston as intermediate point on the Paris-New York-Mexico City run. U.S. granted this to make up for the fact that after the U.S. had granted France service to the Philippines, the Philippines became independent and the original U.S. permit lost its value as a concession. Mexico has not yet granted Air France entry, so the Houston stop is ineffective so far.

- **PanAm gets Rome** as a substitute for Milan on the New York-Far East run, which up to now has only run as far as Nice. This is a big break for PanAm, as Milan is a small traffic point, compared with Rome. This permits TWA-PanAm competition through the Lis-

bon gateway, as called for by the President's American Overseas-PAA merger decision.

- **France gets a new route extension**, New York-French West Indies, to connect its Paris-New York flight through to the French islands of Martinique and Guadalupe.

- **Barter**—Upshot of the negotiations is that the U.S. and France traded route advantages about even, but the U.S. won continuance of its foremost international trade principle of free trade, which in air travel means the carriers' right to decide the economic problem of schedule frequency themselves.

Strangely enough, CAB has meanwhile asked Congress to let CAB control domestic schedule frequency. This domestic parley plan appears inconsistent with our foreign policy position fought for so hard at Paris this winter.

## Hawaii Carriers Hit Fuel Tax

The six scheduled airlines serving Hawaii are united in seeking a reduction in the four-cents-a-gallon aviation fuel tax levied by the territory.

All say they are losing money on their Hawaii operations and put part of the blame on the tax. United Airlines says it lost \$2 million on California-Hawaii operations in 1950 although its overall profit was \$6,429,723.

The major airlines say the tax on 7000 gal. of fuel for a trip to the coast nearly equals a roundtrip fare to Hawaii—\$288.

Operation of Boeing Stratocruisers on the Hawaii run also figured in high costs for Pan-American, Northwest and United.

In 1949, the territorial legislature dropped the tax from five to four cents. This year it has bills before it to drop to one cent and also to raise it by one and one-half cents.

## LAA Certificate Extension Asked

CAB Examiner Ferdinand D. Moran has recommended Los Angeles Airways for a 7-year certificate extension and permission to fly paying passengers as well as mail and cargo.

Moran points out that a short-term extension hobbles a company that must plan ahead. This is especially true of the helicopter service—LAA—which at present is using World War II type helicopters and needs new, more efficient craft to forge ahead.

As to the importance of the helicopter airline experiment, the CAB examiner says: "There can be no doubt that LAA has made and is making an important contribution to the air trans-

port industry and the value of its service as an element of national defense is clear."

Moran says, about LAA's management quality, "... LAA has been aggressive in its promotional efforts and has played an important role in bringing about public acceptance and use of the helicopter. Its intensive development of this type of equipment is attested by the number of persons who have ridden over its routes."

The future of helicopters versus fixed-wing craft on local service is appraised as follows: "(LAA's) operations are economical by comparison with fixed-wing operators and should become more economical in view of its accumulating experience. . . ." LAA will need less and less mail pay even on its present operation and "appreciably less when it gets into passenger and express service."

Los Angeles Airways plans to buy four Sikorsky S-55 copters by spring of 1953, in place of the S-51s it now operates. The new machine has a gross load minimum of 2950 lb., compared to the S-51's 1260 lb.

A 7-year certificate is what LAA needs to assure it the improved new equipment; passenger service is what it needs to make money, Moran has indicated.

## Capital-National Deal Aids Through Service

Capital and National Airlines are competing with Eastern Air Lines on a new front. The two have started through service plane interchange Detroit-Miami, via Cleveland, Pittsburgh, Washington, Jacksonville.

Up to now, southbound passengers have had to change planes from Capital to National at Washington.

Now CAL and NAL offer two round-trips daily on a single plane. Eastern presently offers three trips daily; one Constellation non-stop to Cleveland, one Constellation regular-fare local, and one DC-4 coach local.

CAL-NAL interchange offers one DC-4 regular-fare DC-4 local and one coach DC-4 local.

## Renewals Refused 56 Nonskeds by CAB

The Civil Aeronautics Board has denied or dismissed 56 nonsked airline requests for permission to go on with its operation as "large irregular carriers."

Latest operators denied renewal of their exemptions are: Arrow Airways (Burbank); Missouri Airways (St. Louis); and Central Air Transport (Miami). Central can appeal, but the

Board says it must stop its "route-type" services, Los Angeles-New York.

The Board has given two-year renewals as "large irregular carriers" to 14 nonskeds who operated as fixed-base type carriers, making three or less trips a month between big cities.

## 2-0-2 Groundings Cut NWA Operations

Northwest Airlines is now flying only 65 percent of the seat mile schedule capacity it operated before grounding its 20 Martin 2-0-2s. Top company officers say they are not sure they will keep or sell any or all of their Martins.

They say they can't tell yet how long or elaborate the modifications called for on the plane by the Martin 2-0-2 modification board and the CAA will be.

But a CAA official says the CAA has

trimmed down the preliminary list submitted by the modification board, including mandatory changes (AVIATION WEEK, Mar. 19). CAA hopes to mail its list of mandatory and optional Martin 2-0-2 changes in an airworthiness directive Apr. 18. But that is only the target date.

Northwest officials report they have not discussed with the pilots whether they will fly the plane after it is modified. NWA's pilots refused to fly the Martin after Mar. 17. The preliminary report of the modification board stated that no fault in the plane appeared to have caused any of NWA's recent fatal accidents. But the pilots have not yet said how they feel about this.

One CAA official says that indications are the company and pilots will resume operating the Martin after modification. He bases this assumption on the fact NWA is working all-out on the modification plans.

## How to Get Steel for Maintenance and Repairs use NPA Regulation No. 4

Any business—large or small—may now use a DO rating to obtain limited quantities of steel for maintenance, repairs and minor capital additions. The rating to apply is DO-97 as authorized by the NPA's new Regulation No. 4.

Obviously the use of this rating does not automatically get the steel because it is impossible to maintain complete stocks under present conditions. However, it does assure your order of preference over unrated orders and equal treatment with all other orders bearing a priority rating. If we have the steel you get it. Moreover, we can in turn extend

the rating which should help us to maintain stocks for your future needs.

Because of broken stocks, we suggest you give us alternate sizes, gauges and qualities that would be acceptable. In this way you increase the chances of getting steel you will be able to use.

And remember, if your order falls within the provisions of Regulation No. 4 take advantage of it—use your rating! You can be sure that we will make every effort to take care of you as promptly and fully as possible.

*If you do not have this Regulation No. 4 we will be glad to send you a copy.*

PARTIAL LIST OF PRODUCTS—BARS • STRUCTURALS • PLATES  
SHEETS • TUBING—IN CARBON, ALLOY & STAINLESS QUALITIES

# RYERSON STEEL

STEEL-SERVICE PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI • CLEVELAND  
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

### DEVELOPMENT OF CIVIL AVIATION

International and domestic scheduled airlines

YEAR	Miles Flown	Passengers Carried	Passenger- Miles	Cargo Ton- Miles	Mail Ton- Miles	Average number of passengers per aircraft	Average distance flown per passenger
						(number)	(miles)
	m i l l i o n s						
1937	167	4.1	885	n.a.	n.a.	5.3	360
1947	718	21.1	11 868	203	90	16.5	562
1948	803	23.6	13 173	314	116	16.4	558
1949	836	26.5	14 478	390	128	17.3	546
1950	889	30.3	16 404	518	143	18.5	541
PERCENTAGE INCREASE OR DECREASE BETWEEN YEARS							
1947-48	+ 12%	+ 12%	+ 11%	+ 55%	+ 28%	-	- 1%
1948-49	+ 4%	+ 12%	+ 10%	+ 24%	+ 11%	+ 6%	- 2%
1949-50	+ 6%	+ 14%	+ 13%	+ 33%	+ 12%	+ 7%	- 1%
1937-50	+ 431%	+ 639%	+ 1753%	n.a.	n.a.	+ 249%	+ 50%
1947-50	+ 24%	+ 44%	+ 38%	+ 155%	+ 58%	+ 12%	- 4%

Exclusions: USSR, all years  
China, 1949-50

SOURCE: ICAO

### WORLD'S AIR TRAFFIC

Passenger traffic on the world's airlines in 1950 was 18 times that in 1937, according

to the International Civil Aviation Organization. Increase since 1947 was 150 percent.



## DARNELL CASTERS



It's easy to select the right caster to meet your exact requirements from the Darnell line. There are nearly 4000 models from which to choose.

DARNELL CORP. LTD.  
LONG BEACH 4, CALIFORNIA  
60 WALKER ST., NEW YORK 13, N.Y.  
36 N. CLINTON, CHICAGO 6, ILL.

## Freight Leaders

Air cargo's character is changing radically in mobilization. Machinery took the lead away from cut flowers about mid-1950, an analysis of air freight by United Air Lines shows.

For the full year, here is the order of volume: machines and machine parts; cut flowers; electrical equipment; radios and radio parts; automotive parts and accessories; wearing apparel; aircraft parts; dry goods; printed matter; hardware.

## Transcontinental Pacts Announced

American, Braniff, Delta, Continental and National have made the interchange agreements recommended by the Civil Aeronautics Board to give southern one-plane service to the west (AVIATION WEEK Feb. 19). The three southern transcontinental interchanges will use DC-6 aircraft.

On a Miami-San Francisco trip, for example, a National Airlines crew will start out at Miami, a Delta crew will



• MICROTORQUE Variable Resistors and Potentiometers require as little as .003 in. oz. torque to operate. This unique feature makes the MICROTORQUE invaluable for applications where the position of instrument pointers, gyroscopes, and delicate instruments in general must be recorded, transmitted or indicated at a distance, and Giannini are the sole makers of MICROTORQUE Potentiometers. A variety of resistance values and circuits available.



Write for booklet.  
G. M. Giannini & Co., Inc.  
Pasadena 1, California

**giannini**

take over the same plane at New Orleans, and an American crew will fly the plane on into San Francisco from Dallas.

The other two basic routes are:

• **Atlanta-West Coast**, via Delta flight crew to Dallas-Ft. Worth; American crew from there on.

• **Houston-West Coast**, via Braniff crew to San Antonio; Continental crew to El Paso; American the rest of the way.

Quick CAB approval is expected, as CAB itself recommended the agreements.

## Can Airliner Designs Ignore Service Needs?

Airlines can develop their future plane designs as economically as possible forgetting about military-type airlift specifications, a reliable Pentagon source says.

The services themselves—Air Force and Army—will order such special types as the armor-toting Douglas C-124 and assault transports such as Fairchild C-119 and Chase C-123. A current example of this policy of the services ordering their own transport requirements is the 25,000-lb.-payload all-purpose transport now in design competition state with an Apr. 16 deadline (AVIATION WEEK Mar. 5). Another example is the fact that Air Force is not supporting a civil transport prototype construction program at this time.

But the Air Force will require a few minor provisions for quick adaptation of airliners to military airlift operations.

Economic competition makes airlines and their planes the almost-ideal passenger airlift reserve, some officials are now convinced. The same may come true for air freight in this decade, officials hope. Meanwhile, Air Force is sponsoring its own air freight plane developments.

Mobilization plans still call for charter of airline services by the Air Force in case of need.

## BOAC Gets Comet For Operation Tests

The second Comet jet transport produced by de Havilland has been lent to British Overseas Airways Corp. to gain operational experience with the craft.

Trial tests, including flights, England-to-Calcutta, will study air traffic control, operating techniques, meteorological conditions at high altitudes on overseas routes, radio communications and radar navigation.

This Comet is one of two ordered by the Ministry of Supply. BOAC expects to start taking delivery on its own fleet of 14 Comets this summer.

## Lower Pilot Time

The Canadian government, facing a dwindling supply of civil commercial pilots, plans to modify the regulations to permit this rating to be issued to private pilots with 150 hr. instead of the 200 hr. flying time previously needed. The shortage has been brought on by recall of civilian pilots to active duty with the RCAF, Trans-Canada Air Lines and Canadian Pacific Air Lines.

## C-123, P2V Cited

Eastern Air Lines chief engineer Charles Froesch says there are two military planes readily adaptable to commercial air freight—the Chase C-123, an assault transport, and the Lockheed P2V, a Navy patrol bomber.

As for local service airlines, Froesch says the helicopter will be more practical than the fixed-wing conventional plane for hauls of 200 miles or less.

## SHORTLINES

► **Airlines Clearing House**—Interline traffic business of scheduled airlines through the Clearing House in February totaled \$18,702,659—a 39 percent gain over 1950.

► **British Overseas Airways**—BOAC has opened a Boston office at the Hotel Statler. Two of BOAC's New York-London flights will stop at Boston starting May 1 (subject to U. S. approval). Eric J. Wheatley is office manager and sales manager in New England.

► **Eastern Air Lines**—Perhaps figuring the newly staffed CAB might reverse a prior Board decision, Eastern is filing its second petition of reconsideration of the Southern-Service-to-the-West decision. CAB threw out Eastern's big bid for a southern transcontinental route—instead ordered interchanges between five airlines to provide southern service to the West. (Eastern's new petition has some chance; American Airlines got into San Francisco after its third petition for reconsideration.)

► **Flying Tiger Line**—Tigers have cut west-east rates again—this time on the nuts, bolts and screws classification, down 25 percent. Company reports such reductions on backhaul traffic have already built eastbound freight substantially. . . . Tigers have set up a foreign air freight traffic department, headed by V. John Zabohon. He will develop foreign traffic on the domestic system of the carrier, whose routes connect major U. S. cargo cities with West

# SPS AIRCRAFT FASTENERS

**UNBRAKO**

NAS INTERNAL WRENCHING AIRCRAFT BOLTS

CLOSE-TOLERANCE, HIGH-STRENGTH SHEAR BOLTS—made to latest NAS Specifications. Threads are fully formed by rolling after heat treatment, an important UNBRAKO feature. Full range of standard sizes.



NAS INTERNAL WRENCHING SELF-LOCKING NUTS . . . meet all requirements of latest NAS Specifications. Superior safety nuts. Sizes from 1/4" to 1 1/2".

**FLEXLOC**

EXTERNAL WRENCHING NUTS

. . . 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.

Other outstanding advantages include:

Maximum tensile with minimum weight

Approved under latest NAS Specifications

Large bearing surface

Positive self-locking—"won't shake loose"

Temperature range to +550° F.

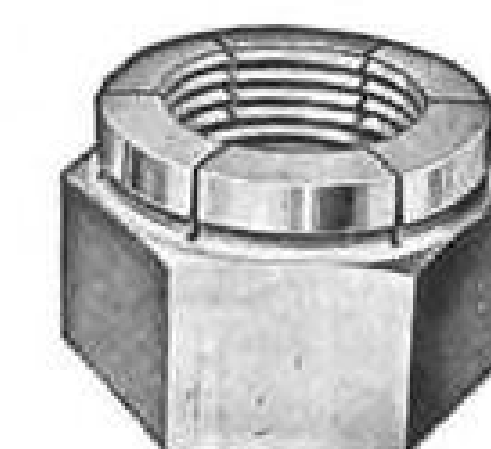
No special tools needed—use standard 12-point socket or box wrenches. Designed for use in cramped quarters. Sizes from 1/4" to 1 1/2" NF Thread Series

Send for samples and information.



ONE-PIECE SELF-LOCKING NUTS

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.



Write for further information on these UNBRAKO and FLEXLOC Products.

**—SPS—** STANDARD PRESSED STEEL CO.  
JENKINTOWN 3, PENNSYLVANIA



# 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.

Coast and northern East Coast ports, where the principal international air and water carriers put in.

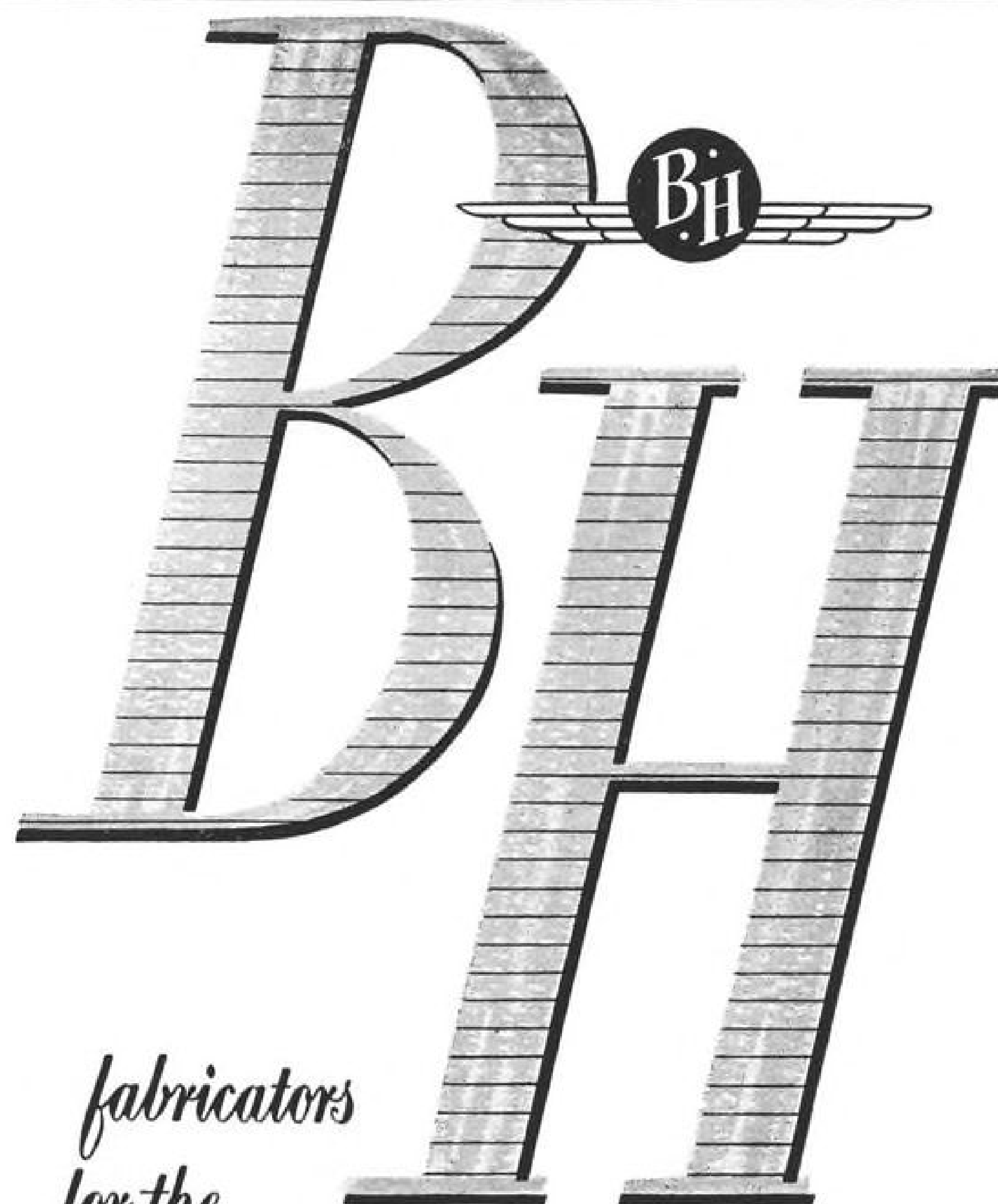
► **Pacific Southwest Airlines**—California intra-state airline has raised its San Francisco-Los Angeles fare to \$11.70 from \$9.95. This equalizes fare with Western, United and California Central. They upped theirs to comply with a CAB order Mar. 1.

► **Pan American World Airways**—PAA has cut its tourist fare, New York-San Juan, to \$64 from the old \$75 to meet Eastern's new service rate. Roundtrip now becomes \$128 instead of \$150. CAB okayed the change providing no free food is served during the course

of the trip.

► **Philippine Air Lines**—Carrier has started DC-6 service, Manila-Tokyo via Okinawa.

► **Pioneer Air Lines**—Pioneer reports 1950 net profit of \$135,611 for 1950, compared with \$126,634 in 1949. Revenues were also almost identical—\$3,335,140 against 1949's \$3,303,735. Mail pay dependence of Pioneer dropped from 51 percent in 1949 to 38 percent in 1950. Passenger revenues gained 20 percent to \$1,793,060. Stockholders got two dividends in 1950—55 cents for the year. First dividend paid by Pioneer was 25 cents Dec. 31, 1949.



*fabricators  
for the  
aircraft industry*

**B.H. AIRCRAFT CO. INC.**

FARMINGDALE, NEW YORK

## AVIATION CALENDAR

- Apr. 11—Wings Club, New York luncheon marking silver anniversary commercial air mail carriage by certificated airlines. Speaker, John Redding, Asst. Postmaster General, 19th Floor, Biltmore Hotel.
- Apr. 12-17—ATA annual airline operations conference, Martinique Hotel, Miami, Fla.
- Apr. 16—(tentative) Wings Club, New York, Armed Forces Day luncheon, Biltmore Hotel.
- Apr. 16-18—Society of Automotive Engineers aeronautic and aircraft engine display, Hotel Statler, New York.
- Apr. 19-20—Three-day welding clinic, Baltimore warehouse of Whitehead Metal Products Co., Inc., Md.
- Apr. 19-21—Airport Operators Council annual meeting, Hotel Peabody, Memphis, Tenn.
- 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.

### PICTURE CREDITS

9—(F-86D) North American; (Hiller helicopters) Hiller Helicopters; 14—Avro, Canada; 21—Bristol Aeroplane Co., Ltd.

No. 9022  
AF Approved  
AN-R-20b

AN No. 3350-2

AN No. 3370-2

No. 237-EAU  
AF Approved

No. 637SS  
Solder Terminal  
AF Dwg 50B6187  
AN 3307-1

No. 637 ANS  
AN-Connector  
AF Dwg 50B6186  
AN 3306-1

No. 9031  
AN-Connector  
AF Dwg 50B6185  
AN 3308-1

# Leach

## AIRCRAFT RELAYS

WHATEVER THE PLANE—  
... OR PURPOSE

LEACH RELAY COMPANY provides the nation's leading aircraft manufacturers with a wide selection of AN, AF and NAF approved relays. New designs and modifications are being constantly developed, tested and produced to satisfy rigid Government specifications. Highest standards of engineering, materials, maximum safety, minimum maintenance and long life performance are built into each LEACH unit. More modern aircraft, military, commercial and civilian, are equipped with LEACH relays than any other kind.

FOR BETTER CONTROLS THROUGH  
BETTER RELAYS—CONTACT LEACH

**LEACH RELAY CO.**

5915 AVALON BLVD., LOS ANGELES 3, CALIF.  
Representatives in Principal Cities of U. S. and Canada

Need  
Help on  
Special  
Problems?

PUT FAIRCHILD  
EQUIPMENT  
TO WORK FOR YOU

- Telemetry
- Computing
- Data Recording

WRITE:

**FAIRCHILD**  
RECORDING EQUIPMENT  
CORPORATION

154th STREET and 7th AVENUE,  
WHITESTONE, NEW YORK  
PHONE: INDEPENDENCE 3-2100

PR 127A

**AMERICAN**  
uses  
**MET-L-FLEX MOUNTS**



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

Robinson unit mounts and all-metal mounting systems aboard American Flagships give maximum protection at minimum maintenance costs. Switch to MET-L-FLEX, made only by Robinson, and SAVE...CAA approved for airlines. Write today.

**ROBINSON AVIATION INC.**  
TETERBORO, NEW JERSEY  
*Vibration Control Engineers*



# SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

## ENGINEERS

**Build your future with a young company  
with expanding opportunities**

Immediate openings for qualified men with engineering degrees, or experience in airplane, guided missiles and helicopter engineering, particularly in

AERODYNAMICS  
DESIGN  
DRAWING CHECKING  
ELECTRONICS  
FLIGHT TEST  
FLUTTER AND VIBRATION  
HANDBOOK WRITING  
ILLUSTRATION - TECHNICAL  
SERVO MECHANISM

STRESS ANALYSIS  
STRUCTURAL TEST  
TOOL DESIGN  
WEIGHT CONTROL  
AFTERBURNER DESIGN  
JET ENGINE CONTROLS  
POWER PLANT ANALYSIS  
RAMJET ENGINE DESIGN  
THERMODYNAMICS

### SERVICE ENGINEERS

Limited number of openings also available for mechanical engineers, engineering trainees and electronic technicians.

Top starting pay . . . rapid advancement based on individual merit . . . liberal employee benefits . . . bonus for extended work week

Send resume of training, experience, date available to

**McDONNELL AIRCRAFT CORPORATION**

"Home of the Banshee"

Post Office Box 516

St. Louis 3, Mo.

## Armament Engineers

**Lockheed offers you a chance to  
live and work in Southern California**

Lockheed invites you to join its long-range production program, building the aircraft of today—and tomorrow.

This is your chance to make Lockheed's future your future—in an area where living conditions are beyond compare.

Increased pay rates and generous travel allowances offered.

Experience in design and installation of aircraft armament required.

Write today for free illustrated booklet, describing living and working conditions at Lockheed in Southern California. Address:

M. V. MATTSON  
Employment Manager

**LOCKHEED**  
AIRCRAFT CORPORATION  
Burbank, California

## Excellent Opportunities for Permanent Employment Available for Qualified ENGINEERS

Interested in various programs of research, development, design and test of fighter aircraft and guided missiles. Ideal location in a rapidly expanding center of the aviation industry with a wide variety of housing immediately available for purchase or rent. Liberal travel allowance.

Submit Resume to Engineering Personnel Section

**CHANCE VOUGHT AIRCRAFT**  
P. O. Box 5907 Dallas, Texas

## CO-PILOT VACANCIES

SOME BASIC QUALIFICATIONS:  
1. College training. 2. Military experience. 3. Minimum 750 hours flight time. 4. CAA Commercial & Instrument Rating. 5. U. S. Citizen. 6. Willing to accept overseas assignment.

APPLY PERSONNEL OFFICE  
**PAN AMERICAN  
WORLD AIRWAYS**  
LA GUARDIA FIELD, NEW YORK

## Openings for ENGINEERS in CALIFORNIA

Positions now available for experienced aircraft engineers

ELECTRONIC SPECIALISTS  
RADAR TECHNICIANS  
AERODYNAMICISTS  
AIRCRAFT DESIGN ENGINEERS  
STRESS ENGINEERS  
DRAFTSMEN

SPECIALISTS IN AIRCRAFT  
ENGINE EXHAUST SYSTEM  
DEVELOPMENT

with background in  
Thermodynamics and Combustion

Send resume of experience and technical training to  
Director of Engineering

**RYAN**  
AERONAUTICAL COMPANY  
Lindbergh Field  
SAN DIEGO, CALIFORNIA

## INSTRUMENT MECHANICS WANTED

Positions open for qualified instrument mechanics—New Equipment—New Shop—Advise previous experience and qualifications in first letter—Replies confidential.

**AIRCRAFT COMPONENTS INC.**  
BENTON HARBOR, MICHIGAN

**HELICOPTER TRAINING**—G.I. Pilot and Mechanic Courses. Train now at the world's oldest helicopter school for a career in aviation's newest and fastest growing industry.

**HELICOPTERS**—Parts—Buy, Sell, Lease. Late Bell 47D-1 now available for immediate delivery. Complete overhaul and repair service.

**NEW ENGLAND HELICOPTER  
SERVICE, INC.**  
State Airport Hills Grove, Rhode Island

## STOP IN TIME

DC-3 C-47  
Put Hayes Brakes on your Bendix  
Wheels, Kit \$600.00 New. In Stock  
**NAVCO, INC.**  
Lambert Field St. Louis, Mo.  
Executive Aircraft Supply

# ENGINEERS



Goodyear Aircraft Corporation, one of the oldest aircraft development organizations in the field, now offers unusual opportunities to engineers, qualified through educational background and experience, in all phases of aircraft design and development.

A foremost producer of military aircraft during World War II, Goodyear Aircraft is continuing its long-range program for the development, design, and manufacture of a highly diversified line of products. In addition to currently manufacturing airplanes and airships, the company also designs and builds a number of vital components, including wheels and brakes, plastic aircraft components, guided missiles, radar, and other materiel for the defense program.

The diversification of products at Goodyear Aircraft Corporation has resulted in an unusually stable and progressive organization throughout postwar years.

You are invited to investigate these opportunities by submitting a resume of your qualifications and experience, which will be given prompt and serious consideration.

Address all correspondence to Mr. C. G. Jones,  
Salary Personnel Department.

**GOOD YEAR**  
AIRCRAFT CORPORATION

AKRON 15, OHIO

## INDUSTRIAL FIRMS

with split plant locations, material shortages, liaison personnel and urgent coordination problems—attention!

**CONTRACT AIR CARRIER**—CAA certificated commercial operator seeks direct contract with industrial firm concerned with such problems to supply complete air transportation program—one or more aircraft (15,000 lb. payload) combination utility cargo/personnel or straight cargo.

For detailed information inquire

**ALLTRANS Company, Inc.**  
756 7th Ave., N. Y. C.

## General Electric Needs

### Engineers and Physicists

Positions available in our Aircraft Gas Turbine Divisions, Lockland, Ohio, and Lynn, Mass. plants for experienced mechanical, electrical, aeronautical and metallurgical engineers and physicists. Please send resume to Personnel Office, Aircraft Gas Turbine Divisions, 920 Western Avenue, West Lynn, Mass.

**GENERAL ELECTRIC**



## AERODYNAMICISTS

**Project Leaders:** 5 to 10 years experience in handling qualities evaluation of all types of aircraft.  
(Also aerodynamicists with 2 to 4 years experience in stability and control.)

## GRADUATE ENGINEERS FOR ENGINE ANALYSIS

**Project Leaders:** 5 to 10 years experience in analysis of performance of aircraft engines (Reciprocating and/or Turbojet).

(Also engineers with 3 to 5 years experience in engine performance.)

**CURTISS-WRIGHT CORP.**  
ELECTRONICS DIVISION  
CALDWELL TOWNSHIP, NEW JERSEY

## ENGINEERS

Career Positions for Qualified Men  
in

Baltimore, Maryland

AERODYNAMICS ENGINEERS  
2-6 Years' Experience

Aerodynamic testing, design and development. Wide variety of progressive projects, including missiles, flying boats, guidance systems, high-performance military airplanes, commercial airplanes, proposals and research contracts.

STRUCTURES ENGINEERS

Openings in all classifications in the wide variety of progressive projects noted above.

POWER PLANT ENGINEERS

3 Years' Experience

Jet engines analysis, design and test background.

CABIN CONDITIONING ENGINEERS

3 Years' Experience

Housing Ample—Rentals Reasonable

**THE GLENN L. MARTIN COMPANY**  
EMPLOYMENT DEPARTMENT BALTIMORE 3, MARYLAND

## AC SPARK PLUG DIVISION

of  
**GENERAL MOTORS  
CORPORATION**

PRECISION INSTRUMENT PLANT

Positions now available for high-caliber personnel in the field of airborne automatic electro-mechanical control equipment.

MECHANICAL DESIGN ENGINEERS  
ELECTRONIC ENGINEERS  
SERVO ENGINEERS  
JUNIOR ENGINEERS

New and expanding division of an established firm with 20 years of successful experience in the instrument field. Work involved deals with the manufacture and development of highly complex equipment of the most advanced type.

Write or Apply

AC Spark Plug Division  
**GENERAL MOTORS CORPORATION**  
1925 E. Kenilworth Place  
Milwaukee 2, Wisconsin

## COORDINATION ENGINEER

Responsible for the establishment of systems and administrative control procedures designed to coordinate the overall activities of an expanding engineering organization. Extensive experience in aircraft engineering practices required.

## PLANNING ENGINEER

To assume responsibility for the overall planning and scheduling of engineering projects through design and development phases. Applicants must have extensive experience in aircraft engineering and experimental planning operations.

## ENGINEERING RECORDS SUPERVISOR

Required to install and maintain a records system for all tracings, reference prints, engineering orders and related records. Applicants should have extensive experience in aircraft engineering records and procedures.

Send detailed resume to

PERSONNEL MANAGER  
**THE KAMAN AIRCRAFT CORPORATION**  
WINDSOR LOCKS, CONNECTICUT

REPLIES (Box No.): Address to office nearest you  
NEW YORK: 330 W. 42nd St. (18)  
CHICAGO: 520 N. Michigan Ave. (11)  
SAN FRANCISCO: 68 Post St. (4)

### POSITIONS VACANT

SALES MANAGER, Assistant: Established aircraft instrument manufacturer, located in the East, with rapidly expanding military and civilian sales volume, desires personable man with good background. Opportunity to obtain excellent long range future. State aviation and technical experience, starting salary desired and earliest starting date. P-9308, Aviation Week.

ACTIVE AIRLINE Co-Pilot under 35 with extensive DC-3 experience needed as co-pilot with major oil co. Based Gulf Coast. Good pay and future. Wire or write P-9412, Aviation Week.

### POSITIONS WANTED

EXPERIENCED EXECUTIVE Pilot, Commercial, S&MEL Instrument Ratings, desires employment. Immediately available. Experienced DC-3, Lodestar, Twin Beech, C-54, C-46, etc. Preferably Gulf, Southwest or Far West Areas. Age 36. Write PW-9189, Aviation Week.

SERVICE ENGINEER—seeks position Power Plant or Airframe Fields—Many years experience in Customer Service—Also Military equipment. PW-9279, Aviation Week.

CO-PILOT on Beechcraft, or DC-3 Commercial and A&E License Executive Co-Pilot Experience, best references. PW-9331, Aviation Week.

SCHEDULED AIRLINE Captain, ATR, 80-10,800 h.p. S&MEL, Fit. Instrctr., domestic & overseas Capt. on DC3, DC4, DC6. Former Experimental test pilot. Age 32. Best references, 2 yrs. college, immediately available. PW-9389, Aviation Week.

PILOT—Age 30—4400 Hours, 4 yrs. Navy and 4 yrs. cargo & executive experience in Caribbean area. Fluent Spanish. Qualified in Twin-Beech, Lockheed, DC-3 & PBV-5A aircraft. Desires position as pilot, domestic or foreign. PW-9428, Aviation Week.

SALES MANAGER, 33, of small electrical firm desires change. Have proven sales record and extensive experience with Government, aircraft manufacturers and electrical fields. PW-9397, Aviation Week.

M.S. IN Aero., 6 yrs. research exp. in super-sonics, rockets, instruments, aircraft; Seeking administrative, liaison, sales, or other work not confined to technical duties. PW-9429, Aviation Week.

### FOR SALE

Five Hiller "360" Helicopters completely reconditioned plus spare parts \$160,000.00. Helicopter Utilities, Inc., P. O. Box 103, White Plains, New York.

### WANTED

Wanted—BTs, with P & W R985 engines only. Will pay highest market price, whether you have one or hundred, either flyable or non-flyable. Write, wire, phone. Citrus 1-5128. Carl Turner, 1007 Airway, Glendale, California.

Wanted: P & W R1340-AN1 engines, engine parts, accessories, AT-6 propellers, blades or airframe parts. Will take any quantity, paying good price. Write, wire, phone Citrus 1-5128. Carl Turner, 1007 Airway, Glendale, California.

### NEED HELP WITH ELECTRONIC UNITS?

Established Eastern avionics company wants production sub-contracts. Investigate this company today. It offers engineering, production, established source of supply and "knowhow" in the airborne radio field.

CWW-9201, Aviation Week  
330 W. 42 St., New York 18, N. Y.

### LET VULCAN HELP YOU COLD ROLL

Inquire our complete service and facilities for aviation cold rolled forms. Modern rolling machines, complete tool and die division, convenient location and adequate labor is available. Subcontract estimates and invitations for bids invited.

VULCAN METAL PRODUCTS COMPANY  
5015 19th Ave., North Birmingham, Ala.

## EXECUTIVE AIRCRAFT

Safe fast private transportation at your convenience

LOCKHEED LODESTAR

14 seats, galley, etc. Deicers. Full instrumentation and radio. Clean solid, perfect, low time. Relicensed, for quick sale. 585 hours since complete airline rebuild-newship guarantee. \$60,000.

D18S BEECHCRAFT D18S

Custom radio and omni, dual instrumentation, deicers, nose tank, 7 parachute chairs (including pilots), 2 spare 14B engines, NTSO. March delivery .....\$57,000.

B-25

Luxury interior 11 place, 240 mph TAS, 800 hours total time—no military (currently in use), Dual instruments, (Electric-Air), Jamitrol heater, 1189 Gals. capacity, Sperry Zero Reader and C-2 Gyrosyn Compass, Collins 18S and 17K1, ARC-3 24 Channel, 3 ADF, A.R.C. 15 OMNI, etc. Edison fire detectors, electric shutoff valves, exterior completely painted, many extras. Immediate delivery—price \$85,000 to \$100,000 depending on spares.

BONANZAS

2 model 35-engines and props 30 hrs. S.M.O.H. Gyros, etc. New interior, Curtains, tires, licensed \$7450.00.

Bonanza B35 80 hours, constant speed propeller, painted, curtains \$12,665.00.

Other DC-3, Bonanzas Etc. available

All Advertised Aircraft On Premises At

**THE REMMERT-WERNER CORPORATION**  
LAMBERT FIELD, ST. LOUIS, MO.

CABANY 5425

CABANY 5425

### LOCKHEED LODESTARS FOR SALE

Custom executive job, completely equipped, nearing completion of modification, 30 day delivery. Two ships "ready-to-go". Interiors have divan, reclining seats, etc. Good condition and equipment. Two ships now completely dis-assembled for overhaul, modification, etc. Can equip and outfit to customer specifications. All planes offered subject to prior sale.

For particulars, address:

STONNELL & HOLLADAY  
AIRCRAFT SALES  
Room 49,  
Transient Aircraft & International Terminal,  
Washington National Airport, Washington, D. C.  
Phone: STerling 5753

DC-3 OIL COOLERS C-47  
BLOW PROOF SURGE CHAMBER  
for cold weather operation  
11", new C.A.A. Approved, Complete with  
Regulator & Adapters \$200.00  
NAVCO, INC.  
Lambert Field St. Louis, Mo.  
Executive Aircraft Supply

### FOR SALE BEECHCRAFT D-18-S

Serial #A-250 Master Radio Panel  
ARC OMNI ARC-3 Trans. Dual ADF  
Delcer Boots—Anti Icers—Nose Tank  
Excellent Condition—Low Time

Hydromatic Props

Contact W. T. Jones  
M. F. PATTERSON  
DENTAL SUPPLY CO.  
2531 University Avenue St. Paul, Minn.

### LOCKHEED LODESTAR

New Executive Interior. Full instrumentation and Radio, V-H-F, 24V Electric System. Engines 1820-87. Tanks resealed. Low Time. New License.  
P. O. Box 395 Rochester, N. Y.  
Telephone: Monroe 8129





**R-2800's**  
31s-51s-75s

price \$3000.00

These engines are 00:00 time since factory new and have had ACES C.A.A. approved outside in lubrication system blower to thrust plates incorporated. They have also been block tested in our modern test cells and have been prepared for long term storage.

C.A.A. Overhauled ..... \$2,500.00

#### C.A.A. APPROVED OVERHAULS

- R-1830-92 without exchange.....\$2,500.00
- Above with exchange.....\$2,290.00

All Engines Complete with Form 60-B

ALL WORK AND ENGINE SALES CARRY OUR 100 hr. WARRANTY

AIR CARRIER ENGINE SERVICE, Inc.

C.A.A. Approved ..... Intl. Airport Branch  
Repair Station No. 3604 ..... P. O. Box 37, Miami, Florida  
Cable "ACENGSR"

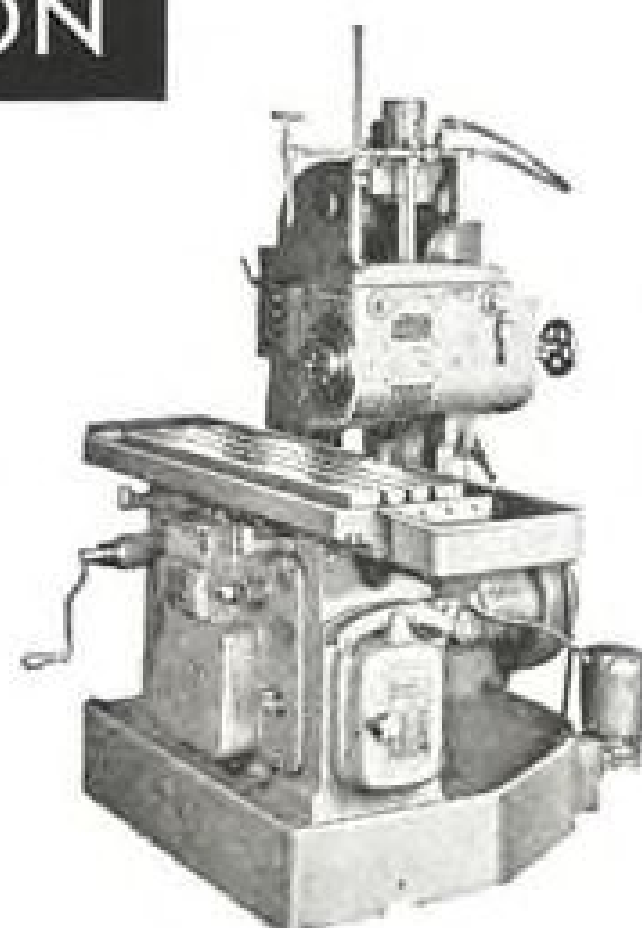


## PRODUCTION

## MILLING

## STARTS

## HERE



Immediate delivery!

CINCINNATI

2-24 Rise and Fall

Automatic Milling Machine.

5 hp motor

direct to spindle, 3480 rpm.

May be rewound

for 1740 rpm.

16 table feeds,

1" to 40" per minute.

Table cycle, automatic;

travel, 24".

Power rapid traverse

to table and spindle carrier.

Completely equipped. New, 1943.

*Tools*  
**LAURENS BROS., INC.**  
2710 HIGHLAND AVE.  
CINCINNATI 12, O.

This hard-to-find miller is typical of the many fine machines we are getting all the time.

Tell us your needs. If we can't fill them from stock, we'll comb the country to find them for you.

Finding good machine tools is our business: we know it well!

## DON'T POP YOUR CORK

Does your DC-3 or C-47 blow its oil coolers in cold weather? Try our blow-proof surge changer radiators—C.A.A. Approved, new 11", Complete with regulators and adapter plates—\$200.00 each—Needs only 5 or 6 hours to change both coolers.

**NAVCO, INC.**  
Lambert Field ..... St. Louis, Mo.  
Executive Aircraft Supply

## AIRCRAFT & ELECTRONIC EQUIPMENT

As a leading supplier we offer a complete line of

### BRAND NEW INSTRUMENTS

- FLIGHT & NAVIGATION INSTRUMENTS
- ENGINE INSTRUMENTS
- AUTOMATIC PILOTS
- INVERTERS
- AUTOSYNS
- PRECISION AUTOSYNS
- RATE GENERATORS
- SYNCHROS
- ALNICO FIELD MOTORS
- GYROS
- A.C. MOTORS
- D.C. MOTORS
- SERVO MOTORS
- TORQUE UNITS
- TORQUE AMPLIFIERS
- FREQUENCY METERS
- BLOWER ASSEMBLIES

Write for complete listings

All Instruments May Be Purchased  
C.A.A. Certified

U. S. Export License-2140

**WUX Great Neck, N. Y.**

### INSTRUMENT ASSOCIATES

37 E. Bayview Ave., Great Neck, N. Y.  
Tele: Great Neck 4-1147

## Chambersburg Cecostamp PNEUMATIC PRESSES

(3) size 24" x 30"—used Limited Time on Aircraft Stampings—Immediate Delivery—Late Type—Ideal for Kirksite or Masonite Die Forming.

**Luria Brothers Company Inc.**  
Industrial Equipment Division  
Rittenhouse 6-7455  
Lincoln-Liberty Bldg., Pa.

### BEECH TIRES \$60.00

New, Not Surplus 11.00-12 ATLAS

**NAVCO, INC.**

Lambert Field ..... St. Louis, Mo.  
Executive Aircraft Supply

### FOR SALE LIBERATOR—LB-30

Foreign registry. 1830-90D engines. No corrosion. Fuel capacity 3122 gallons. 24 passenger. Price \$94,000. Subject to prior sale.

FS-9408, Aviation Week  
330 W. 42 St., New York 18, N. Y.

## BEECHCRAFT D-18S

Slightly over 700 hours total time, hydromatic propellers, one newly overhauled engine, ARC-1, VHF and Omni.

**PAGE AIRWAYS, INC.**  
Rochester Airport  
Rochester, N. Y.

One of America's largest stocks of **UNUSED**

# AIRCRAFT PARTS

We own and offer all parts listed—plus many thousands more—stocked in our Baltimore warehouse!

### PRATT & WHITNEY AIRCRAFT ENGINE PARTS

Quantity	Part No.	Description
166	1045A	Bearing
500	3506	Flange
29	5903A	Bearing
130	8268	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
4900	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	TA12B	Transmitter
150	DA-1F	Dynamotor
162	3611-B	Amplifier
35	MR-9B	Control Box
7	AS27A/ARN-5	Antenna
9000	45	Bulb
11000	1667	Bulb
1000	987	Bulb
300	AN3135-1	Bulb
97	FT213	Mount
54	FT293	Mount
80	BX42-7	Dynamotor

### MISCELLANEOUS AIRCRAFT COMPONENTS

Qu.	Part No.	Description
22	AN 5531-1	Tachometer Generator G. E. 2CM5ABW
1000	AN 5780-2	Wheel and flap position indicator G. E.—individual cans
400	AN 5780-2	Weston model 882-P/N111602 Description as above
1500	AW 2-65B	U. S. Gauge Air Pressure Gauge (0-2000 lb.)
250	2E-492CandF	Pesco fuel pumps
700	TFD 8600	Thompson Fuel booster pump
125	D-7818	Adel anti-icer pumps
170	2P-771-A	Pesco fuel pump
30	TFD-2100	Thompson 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 valves
233	D9530-2	Adel selector valve
428	D9560-2	Adel selector valve
744	D10044	Adel selector valve
2200	AN 4078-1	37D6210 Solenoid United Aircraft etc.
2000	AN 3096-4	Grimes Light assembly
800	AN 3096-5	Grimes Light Assembly
380	AN 3096-6	Grimes Light assembly
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	R5-2	Mallory Selector boxes
490	AN 6803-1	Vickers Hydraulic Accumulator
88	572-3A	Eclipse Distributor Valve
90	JH-950R	Jack & Heintz Starter Motor for JH5 starters
492	S841 (94-32253)	Electric box
17	FA122	Flasher Exterior lights Wallace & Tiernan

### HAMILTON-STANDARD

Propeller blades, hubs and component parts.

Blade part Nos. - 2H17K3

2H17F3

Hub Nos. - 23260-1

23260-15

### HUGE STOCK OF ALL TYPE AN HARDWARE INCLUDING:

AN3 through AN 81 Bolts  
AN500 through AN545 Screws  
AN380 through AN398 Pins  
AN6225 through AN6231 Packings  
AN310 through AN372 Nuts  
AN425 through and including AN470 Rivets  
plus many, many other items of AN standards—terminals, washers, fittings, turnbuckles, thimbles, bearings, etc.

**281 Pieces #921B  
STEWART-WARNER  
SOUTHWIND HEATERS  
output 200,000 BTU's/hr**

★ Watch our future ads for further listings of all types of aircraft parts.

★ Send us your material lists for screening!

WRITE—WIRE—PHONE

## COMMERCIAL SURPLUS SALES CO.

4101 CURTIS AVENUE, BALTIMORE 26, MARYLAND  
TELEPHONE: CURTIS 3300



## SIDELIGHTS

(Continued from page 8)

prospects (to be investigated) is the CAB. If only a fraction of the rumors about political shenanigans in the CAB are true, this also should provide some very fruity probing. In this case, however, the Republicans may not be so eager for the fray, since a number of Republican senators have been extraordinarily responsive to the desires of Pan American Airways, whose remarkable political influence would certainly come under scrutiny. . . . Financial page of N. Y. Times Apr. 1 said "You can buy all of the nation's airlines for \$705,000,000 (stocks and long term debt) whereas even one railroad—the Pennsylvania—could command a market value of \$965,000,000."

### That CAB Gossip

There are still some prospects for a major Congressional investigation of CAB as reported in AVIATION WEEK last week. The relation of its members, past & present, with the industry, the whys & wherefores of several Board over-rulings of examiners' reports and several White House over-rulings of Board recommendations may be looked at.

Neither Republicans nor Democrats in the Senate wholeheartedly want the quiz. But the "friends & influence" investigation situation has gotten out of hand in the Senate. And Congress may have to go ahead with it.

This is the background, in brief: Sen. William Fulbright and Sen. Paul Douglas, who captained the quiz into RFC, saw little real pay dirt in digging skeletons out of the closets of other government agencies. They urged, instead, establishment by law of a code of ethics for members of the executive branch and Congress (see page 18).

Last week, Fulbright introduced legislation setting up a commission to survey industry-government-Congress relations and write out a code.

But the clamor is on in Congress to dig all the skeletons up. Republicans prodded it, hopeful it would bring Democratic scandals into the headlines. Burned members of RFC propagandized for inquiries into CAB, Maritime Commission, and others, apparently thinking their agency would show up better than it has, in the limelight alone. Newspaper writers are joining in. The move for investigations of favoritism by all federal agencies "just grewed." Some of the senators who started it are now wishing they could stop it.

Right now, Maritime Commission is under fire. Outlook is that CAB will be next—with several other agencies to follow, unless a political deal between Republicans and Democrats stems the avalanche. It will embarrass both parties.

Meanwhile, Democratic leaders are urging Truman to take the offensive and name a commission, as proposed by the Fulbright bill, to write out an ethical code for government officials.

## USAF

A Flying Training Force will be set up May 1 at Waco, Tex., as a component of Air Training Command. While it has the organizational set-up of one of the Air Force's numbered air forces, confusion already resulting from the nomenclature prompted changing the name from the original title, Flying Training Air Force.

## Congress

Action on separation of subsidy from mail pay will start in Congress soon. The New York accountant firm of Ernst & Ernst is due to submit its report covering cities that were subsidized by non-economical air service in 1949 to Senate Interstate & Foreign Commerce Committee early this month. Air Coordinating Committee is making a study of separation over international routes for the committee. . . . The House Appropriations Committee's drive to call off Chicago copter mail service has been halted. House voted against the drive in passing the fiscal year P. O. appropriation bill. There's little chance of the Senate reviving it. The House Committee objected that the Chicago service costs around \$300,000 a year more than it would by substituting trucks.

## CAA

The agency will sell state listings of aircraft owners, at a rate of \$4 a thousand names, in order to meet expenses of compiling the lists. CAA says this should make it possible to compile a new up-to-date list for each state every 10 months, on a cycle basis, for commercial users. Lists will include a total of 60,000 aircraft owners in the U. S. and outlying areas. The problem of compiling similar lists from the 500,000 names of licensed pilots is now being studied.

## Army

Army Signal Corps reserve lieutenants are being asked to volunteer for flight training as Army aviators. Corps seeks about 2500 new pilots to fly its liaison and helicopter types.

## People

At long last, Charles E. Yeager, pilot of the Bell X-1, first plane to exceed the speed of sound, has been promoted from captain to major by USAF at Edwards AFB, Muroc, Cal. . . . Haven B. Page has resigned as a director of Air Associates, Inc. . . . Jerome Lederer has returned from a two weeks trip to London & Amsterdam where he gave lectures to the British air insurance market and to pilot groups of BEA, KLM, Sabena. . . . Igor Sikorsky is wearing a bandage on his swollen right hand, which was bitten severely by a dog. . . . That pioneer aviation writer, George F. McLaughlin has joined Facts, Incorporated, 270 Madison Ave., NYC, as director of its Aviation Research Division. The company has enlarged its work in problem, market and attitude research projects. . . . A. P. Higgins is promoted to the new position of development manager for Convair's Fort Worth plant.

## WHAT'S NEW

### New Books

Aimed especially at plant safety engineers, **Safety Manual for the Die Casting Industry**, published by the American Die Casting Institute, contains authoritative instructions aimed at the small and medium size plant concerned with safety procedures in their die casting operations.

The volume breaks its subject matter down into two large categories; plant and departmental recommendations, detailing procedures for each. A special appendix contains blueprints of safety devices, typical record and report forms, list of safety organizations, periodicals, etc.

Available from the American Die Casting Institute, Inc., 366 Madison Ave., New York 17, 78 pp., size 8½ by 11½ in., price \$5.00.

**Modern Methods of Materials Handling**, is as its title indicates, a survey of materials handling equipment, procedures, and materials in actual use by industry. Profusely illustrated, the volume gives before and after examples and case histories of varied types of plant operations. Aircraft production and maintenance operations are rather briefly touched upon, there being only four pages dealing with this industry, although many of the operations shown for other types of plants probably could be readily adapted to aviation.

Published by Prentice-Hall, Inc., 70 Fifth Ave., New York, 248 pp., price \$5.50.

### Telling the Market

Illustrated 244-page booklet, **Armco Aluminum Steel**, describes the steel's aluminum surface, its heat and corrosion resistance and good heat reflectivity—80 percent up to 900 F. Included are data on mechanical and forming properties, available sizes and gages, and detailed welding recommendations by various means. Write Armco Steel Corp., Middletown, Ohio. . . . **It's Easy to Bend** is a manual covering the capabilities of rotary bending machines in detail. Well illustrated, easy-to-read, the booklet covers many types of rotary bending operations. Write O'Neil-Irwin Manufacturing Co., Lake City, Minn.

**Guardian Aircraft Controls, Bulletin A-1** provides pictures, drawings and technical data on the electrical controls made by Guardian Electric Manufacturing Co., 1621 W. Walnut St., Chicago 12.

## ADVERTISERS IN THIS ISSUE

AVIATION WEEK—APRIL 9, 1951

ADEL DIV. GENERAL METALS CORP.	46
Agency—The McCarty Company	
AIRBORNE ACCESSORIES CORP.	8
Agency—Gray & Rogers Adv.	
AIRCRAFT RADIO CORP.	5
Agency—Burke Dowling Adams Adv.	
AIRWORK CORPORATION	31
Agency—J. Branch Briggs Adv.	
ALLISON DIVISION, G.M.C.	Fourth Cover
Agency—Kudner Agency, Inc.	
AMERICAN AIRLINES, INC.	35
Agency—Ruthrauff & Ryan, Inc.	
AMERICAN NON-GRAN BRONZE CO.	65
Agency—Norman P. Hewitt Adv.	
ARMA CORPORATION	44
Agency—The Schuyler Hopper Co.	
AVIATION ACCESSORIES, INC.	27
Agency—Kimball Adv. Agency	
BEECH AIRCRAFT CORP.	33
Agency—Erwin, Wasey & Co., Inc.	
BENDIX RADIO DIV. OF BENDIX AVIATION CORP.	23
Agency—MacManus, John & Adams, Inc.	
B. H. AIRCRAFT CO., INC.	56
Agency—Harold Marshall Adv. Co.	
BOOZ-ALLEN & HAMILTON	65
Agency—Doremus & Co.	
CHICAGO METAL HOSE CORP.	29
Agency—Russell T. Gray, Inc.	
COLLINS RADIO COMPANY	49
Agency—W. D. Lyon Co., Inc.	
DARNELL CORPORATION, LTD.	54
Agency—Rhea Advertising Service	
DOUGLAS AIRCRAFT CO., INC.	36
Agency—J. Walter Thompson Co.	
EASTMAN KODAK COMPANY	25
Agency—J. Walter Thompson Co.	
EDO CORPORATION	34
Agency—Davis-Parsons, Inc.	
ELECTRIC AUTO-LITE CO., THE	50
Agency—Ruthrauff & Ryan, Inc.	
ELECTRICAL ENGINEERING & MFG. CORP.	3rd Cover
Agency—West-Marquis, Inc.	
FAIRCHILD RECORDING EQUIPMENT CORP.	57
Agency—Michel-Cather, Inc.	
FLYING TIGER LINE, INC., THE	40
Agency—Heintz & Co., Inc.	
GENERAL ELECTRIC COMPANY	10
Agency—G. M. Basford Co.	
GIANNINI & CO., INC., G. M.	54
Agency—Western Adv. Agency, Inc.	
GOODRICH CO., THE B. F.	3
Agency—Batten, Barton, Durstine & Osborn, Inc.	
HELI-COIL CORP.	48
Agency—John Mather Lupton Co.	
HI-SHEAR RIVET TOOL CO., THE	30
Agency—John T. Hales Co.	
JOY MANUFACTURING CO.	20
Agency—Walker & Downing Adv.	
LEACH RELAY COMPANY	57
Agency—The McCarty Co.	
LEWIS ENGINEERING CO., THE	32
MARMAN PRODUCTS CO., INC.	26
Agency—West-Marquis, Inc.	
MINNEAPOLIS-HONEYWELL REGULATOR CO.	Front Cover
Agency—Foote, Cone & Belding	
MONADNOCK MILLS	45
Agency—H. B. Humphrey, Alley & Riebard, Inc.	
NORTH AMERICAN AVIATION, INC.	56
Agency—Batten, Barton, Durstine & Osborn, Inc.	
NUTT-SHELL COMPANY	22
Agency—Paul Sauer Adv.	
OHIO SEAMLESS TUBE CO., THE	Second Cover
Agency—Howard Swink Adv. Agency, Inc.	
PACIFIC DIV. OF BENDIX AVIATION CORP.	47
Agency—The Shaw Company	
PIASECKI HELICOPTER CORP.	65
Agency—D. K. Davis & Bro.	
PITTSBURGH PLATE GLASS CO.	39
Agency—Batten, Barton, Durstine & Osborn, Inc.	
ROBINSON AVIATION, INC.	57
Agency—J. Branch Briggs Adv.	
ROEBLING'S SONS CO., JOHN A.	4
Agency—Beatty & Oliver, Inc.	
RYERSON & SON, INC., JOSEPH T.	53
Agency—Aubrey, Moore & Wallace Adv.	
SAGINAW STEERING GEAR DIV., G.M.C.	24
Agency—Campbell-Ewald Co.	
SEARCHLIGHT SECTION	58, 59, 60, 61, 62, 63, 65
SENSEICH CORPORATION	45
Agency—Foltz-Wessinger, Inc.	
SERVOMECHANISMS, INC.	7
Agency—Sanger-Funnell, Inc.	
SERVO-TEK PRODUCTS CO.	65
Agency—Gordon-Pilling, Inc.	
SKF INDUSTRIES, INC.	41
Agency—O. S. Tyson & Co., Inc.	

SOCONY-VACUUM OIL CO.	19
Agency—Compton Adv., Inc.	
SPRAGUE ELECTRIC COMPANY	30
Agency—The Harry P. Bridge Co.	
STANDARD PRESSED STEEL CO.	55
Agency—R. E. Lorekin Corp.	
STRATOS DIV. FAIRCHILD ENG. & AIRPLANE CORP.	42
Agency—Hushmann & Co., Inc.	
TENNEY ENGINEERING, INC.	34
Agency—O. S. Tyson & Co., Inc.	
TEXAS COMPANY, THE	6
Agency—Erwin, Wasey & Co., Inc.	
VAPOR HEATING CORP.	28
Agency—William Hart Adler, Inc.	
WITTEK MANUFACTURING COMPANY	38
Agency—The Advertising Corp.	

### SEARCHLIGHT SECTION (Classified Advertising)

EMPLOYMENT	58, 59, 60, 61
Positions Vacant	61
Positions Wanted	61
SPECIAL SERVICES	61
Contract Work	61
EDUCATIONAL	59
Schools	59
PLANES-EQUIPMENT	61, 62, 63
(Used or Surplus New)	
For Sale	61, 62, 63
WANTED	61
Planes-Equipment	61

We are pleased to announce that

ROBERT I. HALE

has been admitted to the  
partnership

BOOZ · ALLEN  
& HAMILTON

Management Consultants

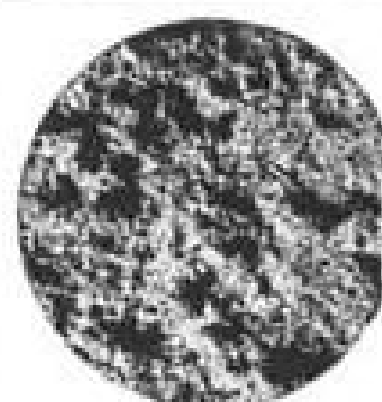
NEW YORK CHICAGO SAN FRANCISCO  
WASHINGTON MINNEAPOLIS LOS ANGELES

Where to Buy  
PRODUCTS - SERVICES  
ACCESSORIES

Which is better  
for YOUR product?

NON - GRAN  
SAND CASTING

NON - GRAN  
CENTRIFUGAL



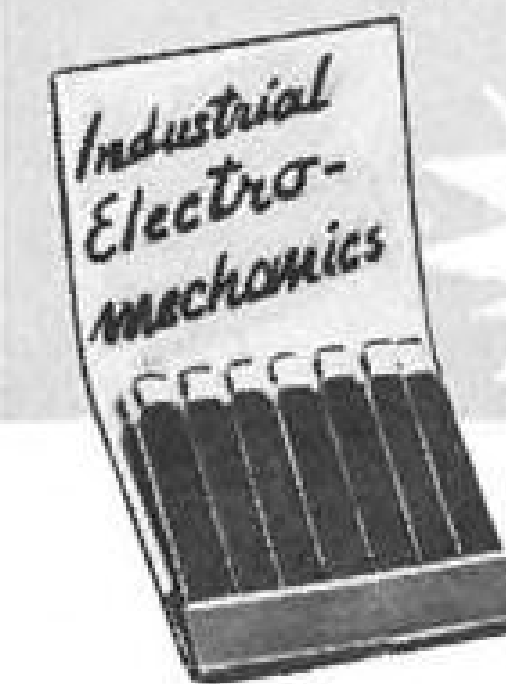
Request Booklet!  
American  
Non-Gran  
Bronze Co.,  
Berwyn,  
Pennsylvania



FOR

Matchless  
performance

Servo-Tek  
MINIATURE MOTORS



- Ball Bearings
- Alnico V field
- Precision type
- Light weight
- Small size

Permanent magnet field type.  
27 volt, 10,000 rpm standard.  
Other voltages and speeds  
available.

Servo-Tek  
products co.  
4 Godwin Ave. Paterson, N. J.

If YOU Are  
LOOKING

To The Future  
With A Leader

PIASECKI

Offers Attractive

Openings For

LAYOUT DRAFTSMEN

WEIGHT ANALYSTS

STRESS ANALYSTS

AERODYNAMICISTS

With Aircraft Experience

Excellent company benefits, paid  
vacations and opportunity to ad-  
vance in a growing industry.

Write, Giving Detailed Resume of  
Experience and Education to—

PIASECKI HELICOPTER CORP.

Morton, Pa.

Near Swarthmore



# SPECIAL REPORT

## Semi-Annual Report of the Secretary of The Air Force

The attached report summarizes, from a budget standpoint, the activities of the Department of the Air Force from July 1 through Dec. 31, 1950. This was a period of continuous action in Korea and of rapid expansion for the Air Force as a whole.

In the emergency created by the Communist invasion of the Republic of Korea, our Far East Air Force, which had maintained a high state of readiness, was the first of the United Nations armed forces committed to the task of opposing the attack. Its first mission was to evacuate American nationals from the threatened area; its second, at the direction of the President, was to retard the enemy's advance by air strikes against his forces and installations located within the boundaries of Korea.

During the early months of the Korean action, the Military Air Transport Service, aided by commercial carriers, provided a vital life-line of men and materiel across the Pacific to Japan. A special task force provided a like service

between Japan and Korea, carrying troops and supplies into the battle area and evacuating the wounded.

Due to the peculiar nature of the Korean action, tactical air operations absorbed most of our air effort. Many air units in the theater of operations were called upon to perform improvised missions because their normal targets were beyond the Yalu River.

While the Air Force thus committed a considerable portion of its strength in Korea, at home it proceeded with the establishment of a firm base for any necessary future expansion. Emphasis was placed on the provision of an adequate air defense of the United States and positive measures were taken to increase our tactical air power. The ability of our Strategic Air Command to strike powerful retaliatory blows in response to any attacks against this nation was increased as a matter of urgent necessity and to lessen the possibility that a major war might be forced upon us.

—Thomas K. Finletter

### FISCAL YEAR 1951 FUNDS, OBLIGATIONS, AND EXPENDITURES AS OF 31 DECEMBER 1950<sup>1</sup>

Organization unit and appropriation title	Available cash and unfinanced contract authority				Obligations				Expenditures
	Unexpended balance brought forward from prior years	Current appropriations and unfinanced contract authorizations *	Net transfers, In (+) Out (-)	Total available	Prior years' unliquidated obligations		Obligations incurred	Total	
					Balance brought forward	Adjustments to prior year annual appropriations			
Aircraft and Related Procurement.....	148,407,885	6,787,344,000	+12,486,472	6,948,238,357	2,344,094,994	-----	3,485,790,272	5,829,885,266	717,456,424
Major Procurement Other Than Aircraft.....	105,599,703	656,107,000	-----	761,706,703	104,498,123	-2,420,246	295,801,162	397,879,039	156,388,137
Acquisition and Construction of Real Property.....	68,542,869	489,818,770	-----	558,361,639	46,872,604	-----	133,250,889	180,123,493	44,792,444
Maintenance and Operations.....	455,527,940	1,879,618,000	-542,879	2,334,603,061	468,785,768	-7,567,067	955,562,005	1,416,580,706	626,881,599
Military Personnel Requirements.....	153,226,606	1,545,800,000	-----	1,699,026,606	149,845,787	20,200,898	796,254,618	966,310,303	747,044,548
Research and Development.....	175,695,077	182,611,000	+35,367,000	393,673,077	139,374,539	-----	98,515,463	237,890,002	65,428,253
Reserve Personnel Requirements.....	-----	39,817,000	-----	39,817,000	-----	-----	13,654,135	13,654,135	10,336,066
Contingencies.....	2,014,598	26,714,000	-----	28,728,598	383,562	36,580	22,885,169	23,005,301	22,068,277
Air National Guard.....	47,200,651	103,935,000	-----	151,135,651	42,040,647	10,800,634	39,372,572	92,213,853	48,435,688
Salaries and Expenses, Administration.....	6,726,521	-----	-----	6,726,521	6,289,135	45,196	-----	6,334,331	4,521,980
Claims.....	1,668,637	-----	-----	1,668,637	137,396	12,359	-----	149,755	140,148
Air Force Reserve.....	30,767,836	-----	-----	30,767,836	25,818,841	2,248,755	-----	28,067,596	13,221,288
Air Reserve Officers' Training Corps.....	6,274,469	-----	-----	6,274,469	2,001,130	174,693	-----	2,175,823	1,363,954
Salaries, Office, Chief of Staff.....	6,497	-----	-----	6,497	-----	-----	-----	-----	-----
General Expenses, USAF.....	132,487,222	-----	-----	132,487,222	111,585,432	-1,868,935	-----	109,716,497	47,775,461
Air Corps, Army.....	58,419,166	-----	-----	58,419,166	39,590,279	-2,310,071	-----	37,280,208	10,795,773
Total, Direct Appropriations and Authorizations.....	1,392,565,467	11,741,764,770	+47,310,593	13,181,640,830	3,451,118,227	19,361,796	5,840,786,285	9,341,266,308	2,516,650,040
Special Funds.....	6,713,073	2,610,738	-----	9,323,811	94,018	-----	461,389	555,407	5,190
Wildlife Conservation, etc., Eglin Field Reservation.....	18,660	-----	-----	18,660	-----	-----	160	160	480
Replacement of Personal Property Sold.....	6,694,413	2,610,738	-----	9,305,151	94,018	-----	461,229	555,247	4,710
Air Force Management Fund.....	8,859,592	-----	-----	8,859,592	672,050	-----	41,565,557	42,237,607	41,010,339
Air Force Stock Fund.....	-----	-----	-----	-----	-----	-----	6,162,401	6,162,401	15,514,928
Air Force Industrial Fund.....	1,000,000	-----	-----	1,000,000	-----	-----	63,835	63,835	15,362
Working Fund, Department of the Air Force.....	23,766,545	-----	-----	23,766,545	17,886,337	865,814	1,887,757	20,639,908	6,323,581
Total, Department of the Air Force.....	1,432,904,677	11,744,375,508	+47,310,593	13,224,590,778	3,499,770,632	20,227,610	5,850,927,224	9,370,925,466	2,506,468,906
Trust Funds, Department of the Air Force.....	10,181,601	2,833,171	-5,530	13,009,242	10,178,374	15,300	2,807,116	13,000,790	2,031,890

<sup>1</sup> Figures are net after deducting reimbursements. Entries are rounded to the nearest dollar and adjusted to add to totals.

\* Amounts shown in this column are as modified to conform to the Department of the Air Force new budget and appropriation structure and exclude amounts in the Second Supplemental Appropriation Act, 1951, approved 6 January, 1951.

† Excludes \$16,024,530 unexpended balance, as of 30 June 1950, of funds authorized for the payments during fiscal year 1950, of obligations incurred prior to 30 June, 1946. This

unexpended balance was transferred to the U. S. Treasury in October 1950.

\* After giving effect of transfer to OSD, Retired Pay, of \$3,000,000, as of 30 June 1950.

† Represents obligations and expenditures after deducting net advances of \$4,595,192.

‡ Represents obligations and expenditures after deducting reimbursements of \$15,537,599.

§ Represents obligations and expenditures after deducting reimbursements of \$30,812.

¶ Excludes advance of \$325,000 contract authority from CAA. This advance is tantamount to a reimbursement even though cash is not involved.



## technical bulletin

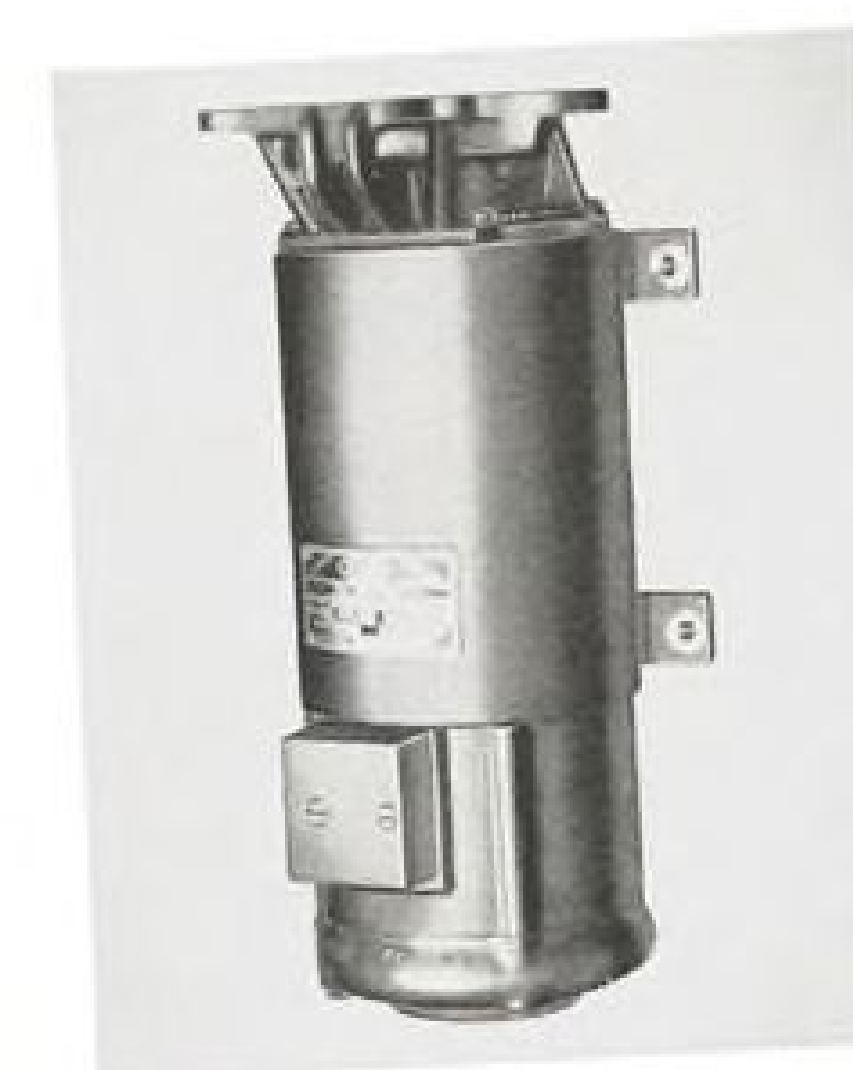


### Unconventional Hydraulic Pump Motor Saves Weight...Increases Efficiency



Hydraulic pump motors normally operate through a reduction to achieve pump speeds of 3 - 4000 R.P.M. Illustrated at the left is a new motor designed for high-speed pumps which requires no such reduction. Developed by EEMCO in cooperation with the designers and builders of leading aircraft, this motor was designed for an allowable pump speed of 7200 R.P.M. The motor mounts directly on the pump with an internal spline drive within the armature shaft providing the coupling.

Use of this new unit achieves significant savings in weight, increases efficiency by eliminating gear loss and makes for a more compact assembly.



### New emergency standby motor for use on Supersonic Research Aircraft

Another new EEMCO development, the explosion proof motor illustrated, was designed to operate under high ambient temperatures of 70°C at 50,000 ft. altitudes. Duty cycle is 1 minute at 1 h.p., 30 seconds at 2½ h.p., continuous. High temperature materials and silicone insulation are used throughout. Motor weight, including gear box - 22½ lbs.

**EEMCO Design and Testing Service Solves Difficult Actuator and Motor Design Problems...** Tell us your requirements on current motor or actuator design problems. Include preliminary data on type of unit, specific function, special requirements, operating conditions, motor and actuator specifications and any available drawings, diagrams and tables.



**SEND YOUR NAME FOR PERFORMANCE CHARTS AND DESIGN DRAWINGS...**

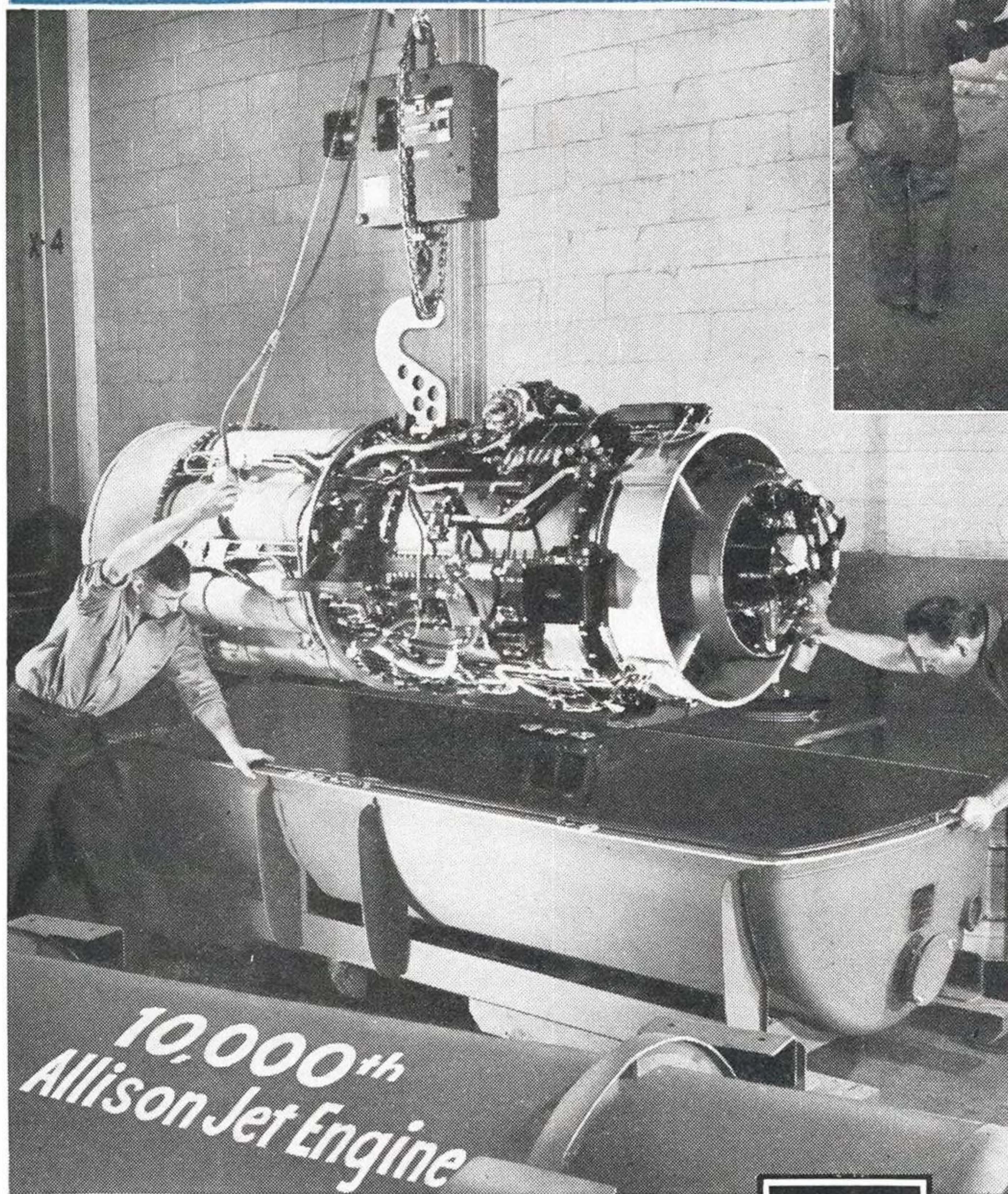
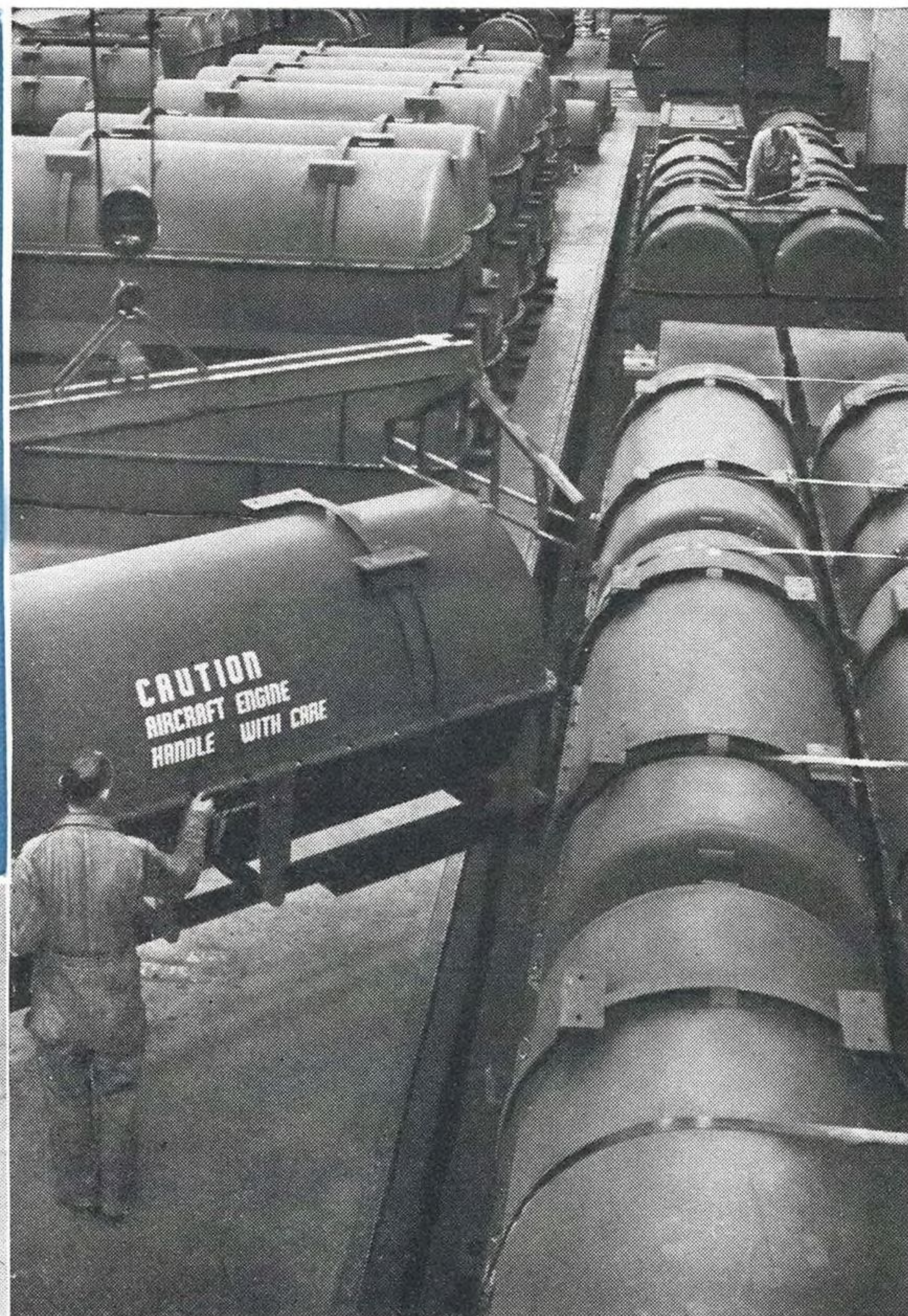
Executives, Engineering and Design personnel making request on company letterhead will be placed on mailing list for performance and design drawings of EEMCO designs for file and reference.

**ELECTRICAL  
ENGINEERING  
and MFG. Corp.**

4612 W. Jefferson Blvd., Los Angeles 16, California



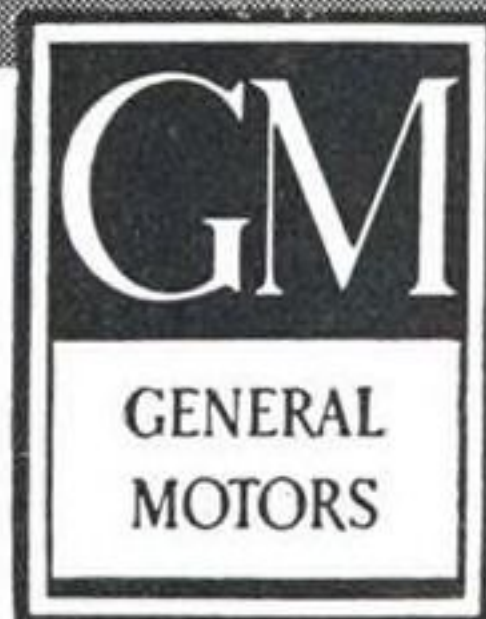
# Allison delivers its 10,000<sup>th</sup> Jet Engine



Builders of the J33 and  
J35 Turbo-Jet engines  
and T40 series Turbo-  
Prop engines.

*Allison*

DIVISION OF GENERAL MOTORS  
INDIANAPOLIS, INDIANA



JUST six years to the month after start of production, Allison delivered its 10,000th jet engine to the U.S. Air Force. Built largely during a period of peace-time activity, these 10,000 engines plot a curve of increasing power and dependability. *Thrust* was stepped up more than 50 per cent per pound of weight; *service life* was extended more than 300 per cent and important improvements were made in *fuel economy*.

These vastly improved engines were in Japan ready for duty at the outbreak of the Korean hostilities. Today, two types of Allison jet engines in three types of U. S. jet fighters are in combat in Korea—spreading destruction among enemy air and ground forces with a degree of availability and reliability never before equaled.

Today, the 10,000 Allison jet engines have accumulated more than 600,000 hours in the air.

This means that Allison jet engines lead the world in experience—where it counts most—in *the air*.