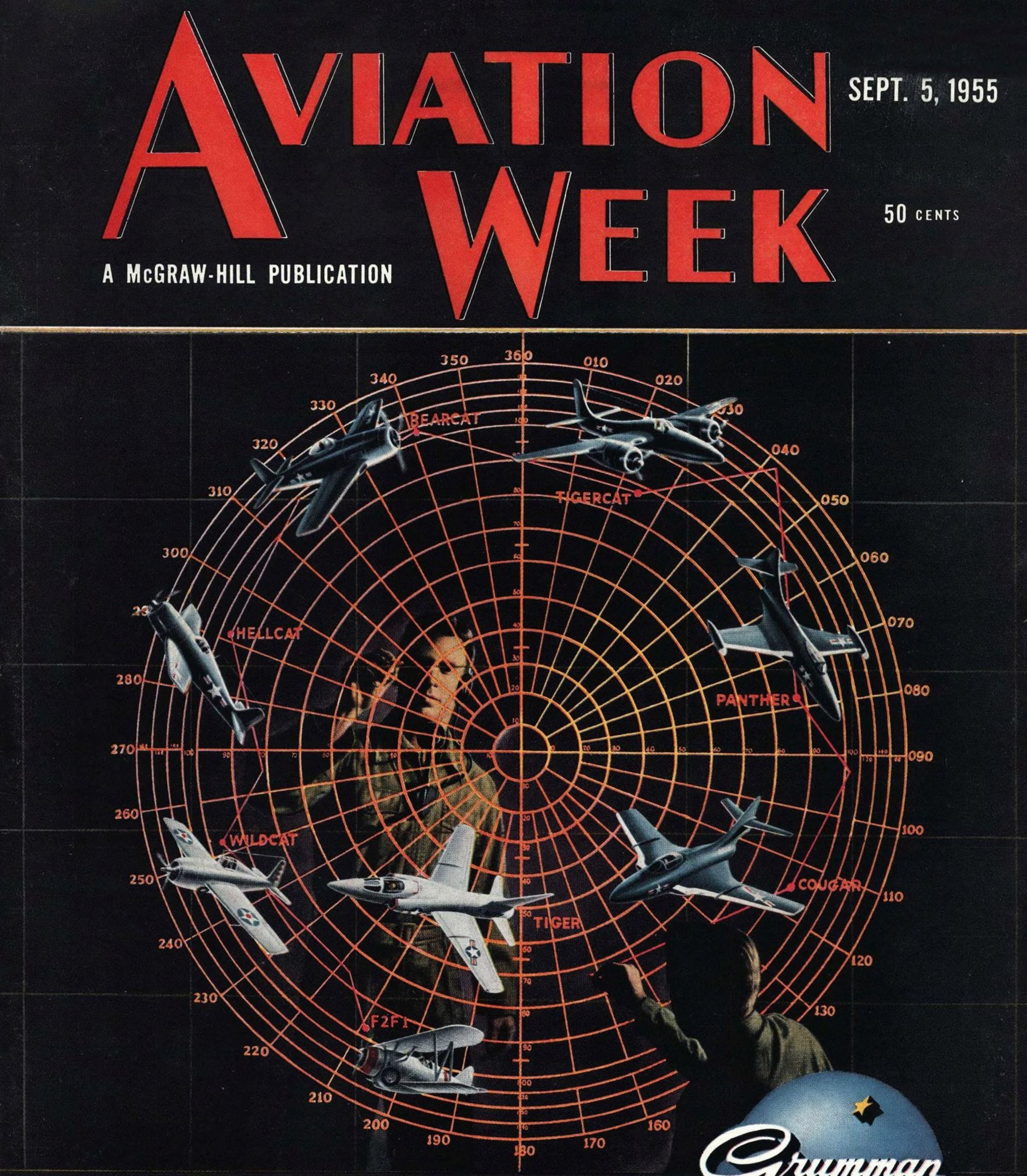
AVIATION WEEK

A McGRAW-HILL PUBLICATION

SEPT. 5, 1955

50 CENTS



A PLOT OF AIR HISTORY

The U. S. Navy tracks aircraft on a transparent board as radar reports their positions. Plot the most famous Navy and Marine fighter planes as reported by history, and Grumman aircraft fill the board.

GRUMMAN AIRCRAFT ENGINEERING CORPORATION

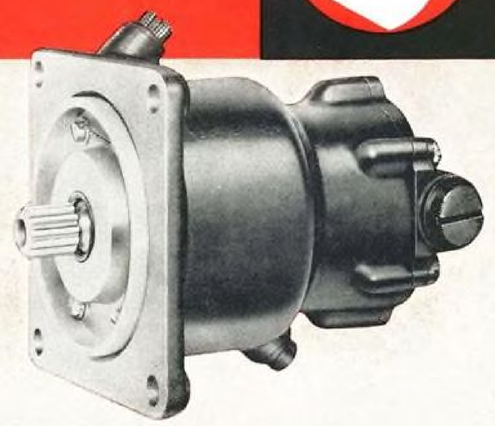
BETHPAGE • LONG ISLAND • NEW YORK

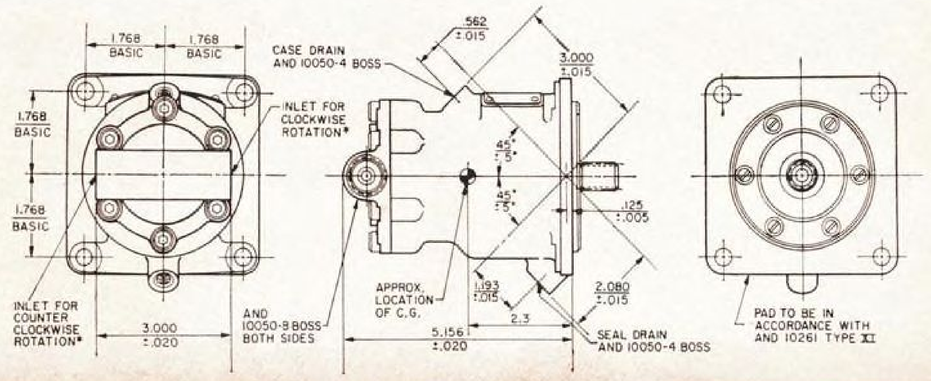
DESIGNERS AND BUILDERS ALSO OF THE ALBATROSS TRIPHIBIAN, S2F SUB-KILLER, METAL BOATS, AND AEROBILT TRUCK BODIES

Grumman

First in Constant Speed Drives . . .

SUNDSTRAND





NEW Sundstrand Aircraft Hydraulic Motors

Sundstrand Aviation announces a new line of Aircraft Hydraulic Motors having unusually high Hp/Wt ratio combined with long life at continuous duty.

Typical of this new line is the model illustrated, which has a displacement of 0.6 cubic inches. While it has a *continuous duty* rating of 25 hp at 6000 rpm at 3000 psi, it weighs only *5.9 lbs.!* Send for Bulletin 124 for more information about this and other motors of the new line. Your inquiry about special motors and controls is invited.

High Hp/Wt ratio

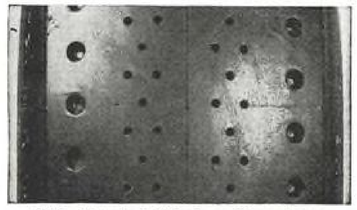
1. Few component parts for maximum reliability
2. Small envelope
3. High operating speeds
4. Capable of continuous operation at 3000 psi at rated speed
5. High overload capacity—intermittent overloads to 5000 psi.
6. High torque-to-inertia ratios for rapid cycling or rapid reversing
7. Dynamically balanced
8. Operating temperatures of —65° to 275° F

SUNDSTRAND AVIATION

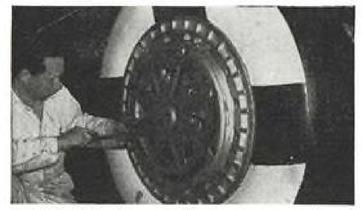
Division of Sundstrand Machine Tool Company, ROCKFORD, ILLINOIS • Western District Office: Hawthorne, California

CONSTANT SPEED DRIVES • AIRCRAFT ACCESSORIES

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



BFG Dimpled Tubeless Tires—save weight, cut costs, make safer landings.

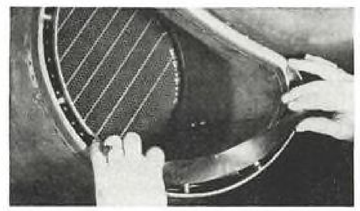


BFG Wheels—combine great strength with lightest weight.

BFG Brakes—stop heavy loads smoothly, efficiently.

BFG Inflatable Seals—keep pressurized canopies airtight.

BFG Pneumatic De-Icers—snap ice off leading edges.



BFG Heated Rubber—provides spot heat, keeps ice from forming.

B. F. Goodrich research develops 11 stars for your team

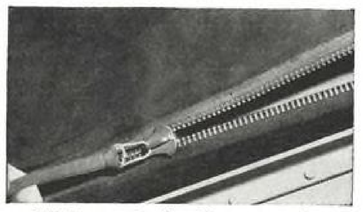
HERE YOU SEE the B. F. Goodrich "varsity"—11 major aeronautical products. Each is essential to the safe, economical operation of modern commercial and military planes. Most are forerunners in the field. Some, like BFG De-Icers and tires, have changed drastically from the designs that were successful just a few years ago.

In fact the evolution of designs is more significant than the impressive variety of B. F. Goodrich products. For it is in research and development that we tackle your toughest problems: how to trim weight, reduce costs, improve performance.

To solve these problems, B. F. Goodrich set up the first laboratory (now at Brecksville, Ohio) for basic research in rubber. There, and at the BFG wheel and brake plant in Troy, Ohio, facilities now include electronic computers that solve design problems in minutes that used to take months to work out. In Akron, there's a task force of engineers who apply the results of research to the development of new products for every conceivable type of plane and use.

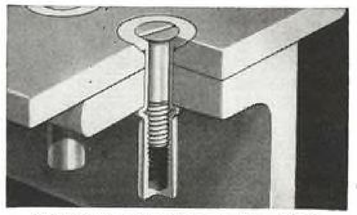
What's new? What's needed? What's tomorrow's problem? Why not call in B. F. Goodrich research and engineering facilities. Phone or write: *The B. F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

BFG Fuel and Oil Cells—provide strength with flexibility.



BFG Pressure Sealing Zippers—make airtight, water-tight seal.

BFG Avtrim—looks like a carpet, cleans like a dish.



BFG Rivnuts—the only one-piece blind rivet with threads.

BFG Adhesives, Hose, Matting, etc.—meet any need for rubber.

B.F.Goodrich
PRODUCTS FOR AVIATION

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

DOW CORNING CORPORATION

Silicone News

FOR DESIGN ENGINEERS

Silicone Insulation Expands Market for Electric Valves

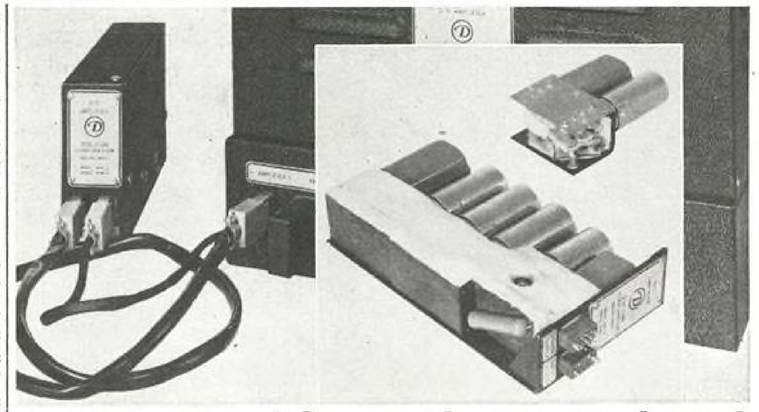
You can open new markets for electric machines and electronic devices simply by offering units insulated with Dow Corning silicones. That's been the experience of many manufacturers including the Atkomatic Valve Co., Inc., of Indianapolis.

The solenoid operated valves manufactured by Atkomatic have always been popular for use in inaccessible locations because of their fast, hammerless operation and remote controllability. Their application has been somewhat restricted, however, by the operating temperature limits of 180 F imposed by the organic insulating materials in the solenoid coils.

Atkomatic designers removed that temperature limitation and at the same time expanded their markets by developing a special series of solenoid coils insulated with heat-stable silicones. Capable of operating to 450 F, the silicone insulated coils can be used on valves exposed to the most rugged high pressure steam service. They open up an important new market by making it possible to use solenoid operated valves in automatic control systems for general space heating and for production lines handling hot liquids. *No. 48*

Silicone products most widely used, are indexed by type of application, in the 1955 Reference Guide to Dow Corning Silicone Products. A brief but comprehensive 8-page summary is given of the properties and applications. With increasing effort devoted to product improvement and cost reduction, such a reference guide to this remarkably stable group of engineering materials becomes increasingly important to design, production and maintenance engineers. *No. 49*

Temperature stable pressure sensitive silicone adhesives that stick to almost any material, can be applied and retain useful bond strength at temperatures from —100 to 500 F. Uses include bonding silicone treated electrical insulating materials and as a temporary bond to facilitate assembly of small parts prior to mechanical installation. *No. 50*



Sensitive Amplifier Made Practical With RTV Silastic Used As Potting Compound

Adequate protection of delicate electronic devices requires a potting compound that has a unique combination of properties. Doelcam Division of Minneapolis Honeywell, Boston, found RTV Silastic* to be the only material with all of the essential properties for potting a very sensitive amplifier.

The problem was to design for the National Bureau of Standards a highly sensitive d-c amplifier that would require minimum space; withstand hard service and still amplify signals as low as 6×10^{-4} volts to a full scale output of 100 volts.

This amplifier was so delicate that merely breathing on exposed vacuum tube terminals when the amplifier was cold caused intolerable outputs. It was necessary to protect the circuitry against moisture; avoid new leakage paths; provide a cushion to eliminate drift errors in the amplifier output. Conventional potting compounds were not practical because they exerted enough pressure on curing to alter the relative positions of the components and change circuit values.

Success of the new unit, therefore, depended upon finding a potting compound which would flow gently into place; cure at room temperatures; exert negligible pressure on components; and exclude moisture. Good dielectric properties, inertness, resistance to fungus growth and the ability to absorb shock and the expansion and contraction of metals were other requirements.

After testing a wide variety of potting compounds, Doelcam found that RTV Silastic in the fluid consistency was the only material with all of the properties required. Leakage current at 500 volts, for example, registered less than 2×10^{-9} amps through a cubic centimeter of cured RTV Silastic. This was below the noise level of the measuring instrument. Even when wires with a 1/32 inch coating of RTV were dipped into salt water, this value remained unchanged. *No. 47*

* T.M. REG. DOW CORNING CORPORATION

Design Edition 12

DOW CORNING CORPORATION - Dept. 0909A
Midland, Michigan

Please send me 47 48 49 50

NAME _____

TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE___ STATE_____

ATLANTA • CHICAGO • CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEW YORK • WASHINGTON, D. C. (Silver Spring, Md.)

Canada: Dow Corning Silicones Ltd., Toronto; **Great Britain:** Midland Silicones Ltd., London; **France:** St. Gobain, Paris

SEPTEMBER 5, 1955

AVIATION WEEK

VOL. 63 NO. 10

Editorial Offices
New York 36—330 W. 42nd St., Phone LOngacre 4-3000 (Night LO 4-3035)
Washington 4, D. C.—National Press Bldg., Phone National 8-3414
Los Angeles 17—1111 Wilshire Blvd., Phone MAdison 6-4323

PUBLISHER.....Robert W. Martin, Jr.
EDITOR.....Robert B. Hotz

MANAGING EDITOR.....Alpheus W. Jessup
ASST. MANAGING EDITOR (Technical).....David A. Anderton
WASHINGTON.....G. J. McAllister
WEST COAST.....William J. Coughlin
ENGINEERING....Irving Stone, Henry Lefer
AVIONICS.....Philip J. Klass
CONGRESS.....Katherine Johnsen
MILITARY.....Claude O. Witze
TRANSPORT.
Craig Lewis, Preble Staver, Gordon Conley
EQUIPMENT.....G. L. Christian
BUSINESS FLYING.....Erwin J. Bulban
ART EDITOR.....Lawrence J. Herb
EDITORIAL PRODUCTION...Jerome E. Kelley
EDITORIAL ASSISTANTS
Victoria Scoparino, Bernie Lang, Betty Hein
LIBRARIAN.....Jeanne Rabstejnek

FOREIGN NEWS SERVICE

EDITOR.....John Wilhelm
LONDON.....Edward W. S. Hull
PARIS.....John O. Coppock
BONN.....Gerald W. Schroder
MEXICO CITY.....John H. Kearney
RIO DE JANEIRO.....Peter Weaver
TOKYO.....Dan Kurzman
BOMBAY.....Gordon Graham

DOMESTIC NEWS BUREAUS

ATLANTA 3.....801 Rhodes-Haverty Bldg.
CHICAGO 11.....520 No. Michigan Ave.
CLEVELAND 15.....1510 Hanna Bldg.
DETROIT 26.....856 Penobscot Bldg.
HOUSTON 25.....1303 Prudential Bldg.
LOS ANGELES 17.....1111 Wilshire Blvd.
SAN FRANCISCO 4.....68 Post St.
WASHINGTON 4..1189 National Press Bldg.
Aviation Week is served by Press Association Inc., a subsidiary of Associated Press.

BUSINESS

BUSINESS MANAGER.....J. G. Johnson
PROMOTION MANAGER.....T. B. Olsen
PRODUCTION MANAGER.....W. V. Cockren

SALES REPRESENTATIVES

NEW YORK.....J. C. Anthony
CLEVELAND.....H. P. Johnson
CHICAGO and ST. LOUIS
D. T. Brennan, J. S. Costello
BOSTON.....E. P. Blanchard, Jr.
DALLAS.....James Cash
ATLANTA.....William D. Lanier, Jr.
SAN FRANCISCO.....T. Evans Wyckoff
LOS ANGELES
C. F. McReynolds, Gordon Jones
PHILADELPHIA.....W. S. Hessey
DETROIT.....C. A. Ransdell

RESEARCH AND MARKETING

Irina Nelidow, Mary Whitney Fenton, Mildred Raba.

BuAer Shakeup Streamlines Operations..... 12
▶ New procurement organization to speed contracting, improve Navy's phasing of weapon systems components.

USAF Wants Industry Help in Research Costs..... 14
▶ Adequacy of nation's research and development program holds important position in Pentagon budget review.

Ground Tests Spur C-133, B-66 Production..... 28
▶ New Douglas laboratory equipped to ground test and prove out aircraft to shorten actual flight-test time.

AERONAUTICAL ENGINEERING
Seamew Makes First Carrier Flight.... 35
Handling of Drawings Streamlined.... 40

AVIONICS
Radar Simulates Aerial Warfare..... 63
Kaiser Given Control over Avionics.... 40
Blind Flight Instruments for Copters.. 65
Blimps Get GE High-Power Radar..... 67
Filter Center 67

PRODUCTION
Martin Automates Precision Miller.... 46
Production Briefing 45

MANAGEMENT
B-47s Win SAC Meet..... 16
Hoover Commission Scores British.... 18
British Reply to Hoover Commission... 18
U. S. Aircraft Exports Lead World..... 21
The B-52 Joins the Air Force..... 22
Small Business Gets Defense Awards.. 40
News Digest 7
Who's Where 9
Industry Observer 9
Washington Roundup 11

AIR TRANSPORT
Canadians Trade Routes..... 21
CAB Asks Equal Pay on Latin Routes.. 25
Florida Nonskeds Reinstated by CAA.. 25
CAA Airways Program Expands Services 65
Freight Forwarder Rules Eased..... 16
Examiner Shuffles North-South Routes.. 95
D-C-8 to Best DC-7 in Flying Cost..... 96
Australian Earnings Set Record..... 96
TWA Hopes to Double Tourists..... 97

FINANCIAL
Navy, USAF Contracts' Fund..... 15
Lobbyists Show Low Expenses..... 25
French End Gas Tax..... 27
Certificate of Necessity for UAC..... 40
USAF Contracts 48
Army Contracts 54
Navy Contracts 54

AVIATION SAFETY
Pilot Off Course, Hits Mountain..... 79
Safety Men Shifted..... 27

EQUIPMENT
New Aviation Products..... 89
Also on the Market..... 91

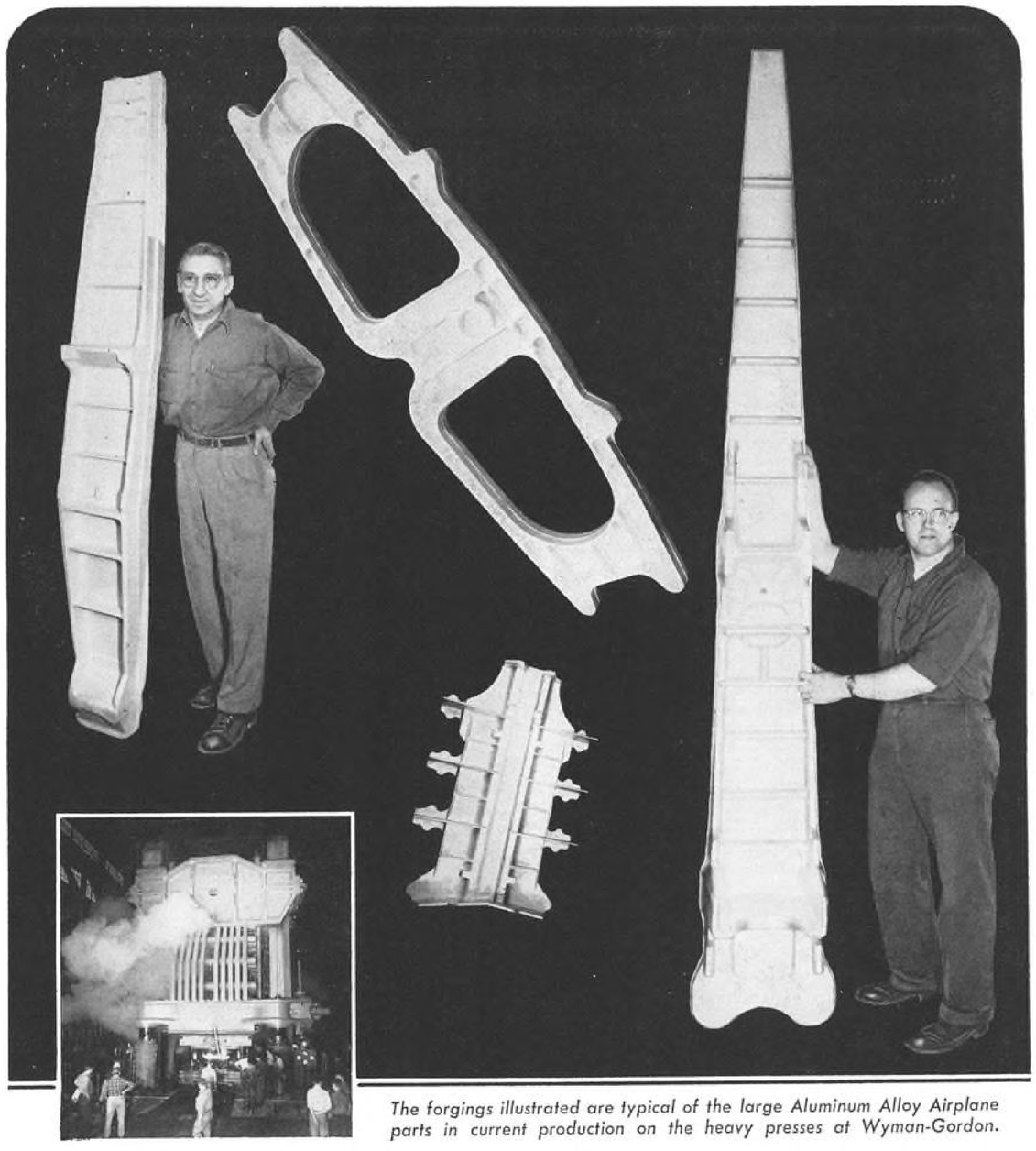
Calendar 8
Letters 69

EDITORIAL
Quarles Choice Is Significant.....110
General Boatner Retires.....110

58,044 copies of this issue printed

AVIATION WEEK • SEPTEMBER 5, 1955 • Vol. 63, No. 10
Member ABP and ABC

Published weekly by the McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder. Executive Editorial, Advertising and Subscription Offices: **McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y.** Publication Offices: 99-129 North Broadway, Albany 1, N. Y. Donald C. McGraw, President; Paul Montgomery, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Circulation Director.
Subscription: Address correspondence to AVIATION WEEK—Subscription Service, 99-129 North Broadway, Albany 1, N. Y. or 330 West 42nd St., New York 36, N. Y. Allow 10 days for change of address.
Subscriptions are solicited only from persons who have a commercial or professional interest in aviation. Position and company connection must be indicated on subscription orders.
Single copies 50¢. Subscription rates—United States and possessions, $6 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. Other Western Hemisphere and the Philippines $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. Second class mail privileges authorized at Albany 1, N. Y. Printed in U. S. A. Copyright 1955 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.



The forgings illustrated are typical of the large Aluminum Alloy Airplane parts in current production on the heavy presses at Wyman-Gordon.

A new era in the art of forging has been demonstrated as production goes forward on this 35,000-ton closed die forging press. Larger forgings with thinner sections and closer tolerances than heretofore possible open new concepts in forging design. Wyman-Gordon continues to pioneer by — Keeping Ahead of Progress.

WYMAN-GORDON CO.

Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM
STEEL • TITANIUM

WORCESTER 1, MASSACHUSETTS
HARVEY, ILL. • DETROIT, MICH.

NEWS DIGEST

XV-3 CONVERTIPLANE starts its first flight at Bell Aircraft Corp.'s Fort Worth Plant. After its vertical takeoff, the Army's new aircraft completed only helicopter maneuvers and did not make the transition to normal horizontal flight by tilting its rotor-propellers.

Domestic

Republic Aviation Corp. will cut its work force at the Farmingdale, N. Y., plant to 17,000 on Sept. 16 to adjust for tapering production of the RF-84F, photo-reconnaissance version of the F-84F Thunderstreak fighter-bomber. The layoff will affect approximately 2,500 employes. The last RF-84Fs now are entering production, and contracts for the aircraft will be completed next June. Thunderstreak output will continue until late 1957, when production of the F-105 fighter-bomber is expected to be under way. Republic's present backlog totals more than $600 million.

Out-of-sight target drone, Beech Air-Craft Corp.'s XKDB-1, won the Navy's competition for a new pilotless remote-controlled aircraft. Deliveries of the all-metal high-wing monoplane, to be used for training ship-to-air and air-to-air weapon systems crews, are expected within a year. The recoverable drone is designed for catapult launchings and can be adapted for air drops. It has a wing span of 12 ft. 6 in., length of 13 ft. 6 in., gross weight of less than 600 lb., and is powered by a six-cylinder two-cycle engine.

Eastern Air Lines ordered 10 1049G Super Constellations from Lockheed Aircraft Corp. Deliveries on the $25-million purchase will begin September 1956 at a rate of three transports a month. The new 1049Gs will give EAL a fleet of 61 Constellation-type aircraft. Eastern earlier increased its DC-7B orders with Douglas Aircraft Co. to a total of 40 transports and announced a program to spend $200 million on turboprop and turbojet airliners (AW Aug. 8, p. 7).

Lt. Col. John P. Stapp of the Air Research and Development Command has won USAF's 1954 Cheney Award for his experimental rides on a high-speed rocket sled to test human limitations in rapid deceleration.

Ryan Aeronautical Co. has been awarded more than $5 million in new subcontracts for airframe parts and jet engines components. Included in the subcontracts were orders from North American Aviation, Ford Motor Co.'s Aircraft Engine Division, Pratt & Whitney Aircraft and the Wright Aeronautical Division of Curtiss-Wright Corp.

Convair YC-131C completed a 2,400-mile flight from Seattle to Kelly AFB, Tex., a new nonstop distance record for the USAF turboprop transport. The YC-131C is powered by two Allison YT56-A3 engines.

Rheem Manufacturing Co.'s Government Products Division received a $6-million subcontract from North American Aviation for production of F-100 control surfaces. The order calls for external slots and flaps, inboard and outboard ailerons, rudders, vertical and horizontal stabilizers and wingtips.

Harry T. Rowland, 56, president of Hayes Aircraft Corp. and former executive vice president of the Glenn L. Martin Co., died Aug. 28 in Birmingham, Ala.

Financial

United Aircraft Corp. declared a dividend of one share of common stock for each two held, payable Sept. 26 to holders of record on Sept. 9. A cash dividend of 75 cents on the increased common will be paid Dec. 10 to stockholders of record Nov. 18.

Los Angeles Airways reported net earnings of $41,408 for the first six months of 1955 from revenues totaling $635,215. Operating expenses for the period amounted to $97,324.

Chance Vought Aircraft declared a 40-cent dividend on common shares, payable Sept. 26 to stockholders of record Sept. 9.

International

Comet III jet transport will begin tropical trials in South Africa at the end of this year as part of a series of tests scheduled by de Havilland Aircraft Co. to aid development of the new Comet IV. The British company is incorporating and testing on the Mark III all modifications recommended after the investigation of the Comet I crashes last year.

British aircraft exports totaled $85,940,509 during the first half of 1955, an increase of approximately $273,560 over the same period last year.

as others see us...

A user tells how AETCO SERVICE helped him

by E. D. HOLLAND
Hydraulic Engineer
OZONE METAL PRODUCTS CO.

"When the qualification testing on one of our units (Hydraulic Thermal Relief Valve) was being discussed it was decided that a firm specializing in the testing field could economically and expeditiously meet the requirements as well as we, thereby leaving free our test equipment for production contract obligations.

"Since Ozone Metal Products Corporation specializes in the manufacture of precision hydraulic units, such as Control Surface Power Assemblies, etc., for the Aircraft Industry, we investigated and found that "Aetco" is recognized as a competent specialist in qualification-testing and reports. This finding supported our decision to utilize the facilities of "Aetco."

"That we are satisfied is evidenced by our using the transcript of "Aetco's" report verbatim. When the occasion arises again, we will utilize "Aetco's" facilities and experienced personnel for qualification tests."

Aetco

GENERAL AIRCRAFT COMPONENT TESTING
including
Hydraulic, pneumatic, electric (400 cycle, AC-DC) and mechanical
IN FLIGHT TESTING, TOO

AIRCRAFT EQUIPMENT TESTING COMPANY
1806-12 FLEET ST.
BALTIMORE 31, MD.

AVIATION CALENDAR

Sept. 12-15—American Meteorological Society's 139th National Meeting and Fifth Weather Radar Conference of Army Signal Corps., Fort Monmouth, N. J.

Sept. 12-16—Instrument Society of America, Instrument-Automation Conference and Exhibit, Shrine Exposition Hall and Auditorium, Los Angeles.

Sept. 17—Institute of Radio Engineers, Symposium on Automation, Cedar Rapids.

Sept. 17-18—Antique Airplane Assn. Convention and Fly-In, Ottumwa, Iowa.

Sept. 19-21—American Rocket Society, Western Fall Meeting, Los Angeles.

Sept. 21—Southwest Airmotive Engine Forum, sponsored by Pratt & Whitney and Bendix, Melrose Hotel, Dallas.

Sept. 21-22—American Helicopter Society, second West Coast Forum, Hollywood-Roosevelt Hotel, Hollywood, Calif.

Sept. 28-29—American Institute of Electrical Engineers and Institute of Radio Engineers, Park Sheraton Hotel, Detroit.

Sept. 29-30—Radio Technical Commission for Aeronautics, fall assembly, Hotel Statler, Washington, D. C.

Oct. 3-5—Eleventh National Electronics Conference, Hotel Sherman, Chicago.

Oct. 4-6—Eleventh annual Aircraft Spark Plug and Ignition Conference, sponsored by Champion Spark Plug Co., Secor Hotel, Toledo, Ohio.

Oct. 5-7—National Business Aircraft Assn., eighth annual Meeting and Forum, Sheraton-Cadillac Hotel, Detroit.

Oct. 5-7—1955 National Airports Conference, sponsored by American Association of Airport Executives and University of Oklahoma, Norman, Okla.

Oct. 5-9—World Plastics Fair and Exposition, National Guard Armory, Los Angeles.

Oct. 7—Escape from High Performance Aircraft Symposium, sponsored by Institute of Transportation & Traffic Engineering Ext. at U.C.L.A., Aeromedical-Engineering Assn., Institute of the Aeronautical Sciences, IAS Building, Los Angeles.

Oct. 11-15—Society of Automotive Engineers, Golden Anniversary Aeronautic Meeting, Aircraft Production Forum and Aircraft Engineering Display, Hotel Statler, Los Angeles.

Oct. 18-19—Seventh annual Aerial Dusting and Spraying Conference, sponsored by the Washington State Aeronautics Commission and the State College of Washington, Wenatchee, Wash.

Oct. 17-21—National Safety Council, 43rd National Congress and Exposition, La Salle and Conrad Hilton Hotels, Chicago.

Oct. 17-21—International Air Transport Assn., 11th annual general meeting, Waldorf-Astoria Hotel, New York.

Oct. 20-21—Sixth annual National Noise Abatement Symposium, Armour Research Foundation, Chicago.

Oct. 24-25—Institute of Radio Engineers' Professional Group on Electron Devices, first annual Technical Meeting, Shoreham Hotel, Washington, D. C.

Oct. 26-28—Southeastern Airport Managers' Assn., annual meeting, Greenville, S. C.

Oct. 31-Nov. 1—Institute of Radio Engineers, 1955 East Coast Conference on Aeronautical and Navigational Electronics, Lord Baltimore Hotel, Baltimore.

WHO'S WHERE

In the Front Office

Gwilyn A. Price, chairman of board and president, Westinghouse Electric Corp. Other new officers: **Mark W. Cresap, Jr.,** executive vice president and deputy chief executive officer; **Latham E. Osborne,** vice chairman of the board; **John K. Hodnette,** vice president and general manager.

Roy J. Bennecchi, vice president, Lear, Inc.

W. V. Neisius, vice president of applications and sales, Logistics Research Inc. Also promoted: **A. Y. Baker,** vice president of development and production.

R. J. Arft, vice president and assistant to the president, Servel, Inc.; **William F. Lange,** assistant to the vice president and general manager, defense division.

Edward F. Norman, vice president of operations, United States Overseas Airlines.

Frank Lynott, vice president of freight operations, Flying Tiger Line; **John Higgins,** assistant vice president of sales; **Walter S. Burns,** Chicago station manager.

William J. Mitchell, vice president of traffic and sales, Bonanza Air Lines; **R. H. Herrnstein,** vice president of finance.

Honors and Elections

Maj. Gen. Lucas V. Beau (USAF), national commander of the Civil Air Patrol, named recipient of the 1955 Hoyt S. Vandenberg Memorial Trophy by the Air Force Association.

C. J. Underwood, export manager of Consolidated Engineering Corp., appointed to a United States Trade Mission for International Trade Fairs.

Dr. Theodore von Karman, chairman of Advisory Group for Aeronautical Research and Development of the North Atlantic Treaty Organization and chairman emeritus of the Scientific Advisory Board to the Chief of Staff, USAF, honored by the presentation of a sculptured likeness to the Western Region headquarters of the Institute of the Aeronautical Sciences in Los Angeles.

Changes

B. W. Dudley, general manager of the propeller division, Curtiss-Wright Corp.

Arthur Wilson Winship, Jr., Cincinnati manager, Emery Air Freight Corp.; **Robert K. Uniacke,** sales representative.

Warren C. Wilson, advertising and public relations manager, Servomechanisms, Inc.

Robert E. Wagenhals, manager of Sales Forecast Department, Timken Roller Bearing Co.

Jeff D. Montgomery, West Coast engineering manager, Andrew California Corp.

Vernon D. Enwald, Midwest regional manager, Warner Electric Brake & Clutch Co.

H. J. Buttner, manager of engineering, Le Roi Division of Westinghouse Air Brake Co.

Rupert R. Westrup, sales manager, Monogram Manufacturing Co.

INDUSTRY OBSERVER

► United Airlines engineering group in its evaluation of the Boeing and Douglas jet transports favors the DC-8. Such factors as price and delivery dates, however, have not been included in their analysis and could influence United's decision.

► **Airlines shortly will have an opportunity to buy military Tacan receivers (ARN-21) from Federal Telephone and Radio Co. with first deliveries in early 1956. FTR, a sister company of Federal Telecommunications Laboratories, also plans to market a new light plane automatic pilot developed by Ansco Division of General Aniline & Film Corp.**

► French naval air force is scheduled to receive during 1955-1956: five Breguet 1050 carrier anti-submarine aircraft, two Hurel-Dubois HD35 anti-sub aircraft, 20 SE3130 Alouette II helicopters, 10 Fouga CM170R Magister trainers, 30 Morane-Saulnier MS733 trainers, 50 Breguet 1070 carrier-based aircraft.

► **McDonnell Aircraft is developing an F4H from the F3H. The new plane will be a two-seater, have a new engine and new armament. It will not be equipped with guns.**

► New optical theodolite for tracking missiles, which automatically and instantly converts information on missile position into punched card or tape data, eliminating present time-consuming process of analyzing each frame of a movie film, will soon undergo evaluation at Navy's Point Mugu missile center. New device, called Radott, (Recording Angular Data Optical Tracking Theodolite), developed by H. A. Wagner Co. of Van Nuys, Calif., requires only one operator instead of two needed for present theodolites.

► **Business is booming for avionics firms that build equipment for airlines and business aircraft. One manufacturer reports its commercial avionics business for business aircraft is double that of last year.**

► Hughes Aircraft has merged its Falcon air-to-air-missile and its interceptor fire control research and development groups into a single weapon systems group, reflecting the close inter-relation between an interceptor's fire control system and the missiles it fires.

► **One of the Convair F-102As now flying (AW Aug. 29, p. 14) is fitted with a rearward sighted camera to record the action of its Falcon-firing armament system, a tray similar to that used by North American on the F-100.**

► Maximum design flexure of Boeing B-52 wing is 32 ft. Directional apportionment of this flexing is 22 ft. up and 10 ft. down.

► **Convair's B-58 Hustler project is progressing satisfactorily. First General Electric J79 engine was delivered to the Ft. Worth, Tex., plant recently.**

► Boeing sources say the hottest prospects for jet transport orders at the moment are Pan American World Airways, United Air Lines and American Airlines.

► **Navy is evaluating "cue" training system as a timesaver in teaching landing techniques at Pensacola, Fla. Developed by Human Engineering Dept. of Navy's Special Devices Center, system is based on the fact that shape of runway and distance to horizon are generally the same regardless of airport. The ground cue trainers teach students to recognize how these standard features ought to appear during approach, simplifying their job when they advance to actual flight training. Initial tests have shown landing instruction time can be cut up to 70% with cue trainers.**

► Pre-production model of the Turbomeca Artouste-powered SE 3130 Alouette II helicopter flew last month in France. Sncase has an order for three pre-production models of this aircraft and a production order for another 100 is planned.

24 Houris...1 Hostage

One by one, the veiled women boarded the plane, bound for the old world after a glimpse of the new. The sheik was still in Washington, attending a diplomatic dinner. He would leave tomorrow — tonight, he was sending his harem home.

But not unguarded. A stout, turbaned officer shepherded them aboard, then motioned politely to the Airwork representative to precede him into the plane.

It was a special service flight for the Airwork man. He had just supervised the engine overhaul of the sheik's plane and was now making the flight to instruct the native mechanics who would care for it in the desert.

Once inside the plane, the guard loosened the automatic in his holster significantly. As the plane took off, he observed, "If these engines sputter, you will be the first to die." His tone was matter-of-fact, yet firm. The Airwork man swallowed hard, but said nothing. What *could* he say?

The rest of the story is anticlimax. The engines functioned perfectly — the flight was without further incident, thanks to Airwork's high standards of overhaul, ensuring factory-new performance. Airwork production line techniques are equal to those of the original manufacturer.

Airwork will gladly handle your overhaul and supply problems. Ask about our personalized service, the Airwork exchange program and our Class A dealer organization.

Distributors for
Pratt & Whitney Aircraft

Airwork
CORPORATION
Millville, N.J.

Overhauled by Airwork

BRANCH OFFICES IN: ARLINGTON • ATLANTA • MIAMI • NEWARK

Washington Roundup

Budget Review

Day and night sessions of top echelon Air Force executives last week followed reports that Treasury Secretary George M. Humphrey has ordered a new effort to cut Fiscal 1956 expenditures so as to face the electorate with a balanced budget in the next election. Rumors were plentiful in the Pentagon as USAF went through three "exercises" to demonstrate how alternate plans for economy will affect its operations. Estimates of the amount sought from USAF planned spending ranged from $900 million to $1.6 billion.

Despite Defense Secretary Charles E. Wilson's previous record as an adherent of the Humphrey philosophy of economy, there are Pentagon observers who believe that Secretary Wilson will take a stand this time and possibly a firm one. Reason: He is committed on Capitol Hill to a program that will keep U. S. air power ahead of the fast-moving Russians. In the face of rapid Soviet advances, Congress already has approved stepped-up production of long range bombers and some fighter planes.

Wilson, fast becoming educated to the perils of crossing a congressman, particularly a Democrat congressman with an abiding interest in air power and experienced in investigative techniques, may put this vested interest above that of the Republican Party's next presidential campaign.

Said a spokesman for the Defense Department Comptroller's Office: "The airplanes that we want and that we had previously told Congress we planned to get, we are going to get them and we hope to get them as far (sic) as we said."

Low Fare Troubles?

Trans World Airlines, American Airlines and United Air Lines may have stirred up some trouble for themselves with their new $80 fares for transcontinental coach service.

Low-fare partisans in the airline industry are presently pointing to coach fares to the interior cities of the U. S. and asking why they haven't been cut, too. In most cases, the standard $99 coach fare is a lower per-mile rate than coach fares on other segments.

Low fares are a popular talking point with Congressmen, and it looks as if legislators from the states between the coasts might be inspired to put pressure on the Civil Aeronautics Board for universal fare cuts when they come back to Washington in January.

Trans-Atlantic Mail Rate

Civil Aeronautics Board has upheld important precedents set in dealing with the trans-Atlantic final mail rate case last December. Pan American World Airways and Trans World Airlines both objected to the CAB findings and asked for reconsideration.

In rejecting the major contentions of PAA and TWA, the Board made some minor adjustments in the mail rates for past and future periods but remained firm on its policy decision.

In its previous December decision, the CAB refused to underwrite strike losses, cut the rate of return on investment and applied income from investment and other non-operational income to offset subsidy. The decision also put the carriers on a uniform rate where their operations are comparable and cut off extra subsidy for PanAm's current operation of the Boeing Stratocruiser.

New Look at BuAer

Part of the new look at Navy's Bureau of Aeronautics, where Rear Admiral James S. Russell is reorganizing things to make life easier for the aircraft industry's contract administrators (see p. 12) will be a waiting receptionist.

Visitors to BuAer's Constitution Avenue home have for years been wandering around the building, foot-weary from the search for the right office, not always received with cordiality when they located the overworked specialist.

Some time soon there will be a new lobby desk, staffed by the kind of personnel found at the entrance of modern offices and manufacturing plants.

Profits Report Due

First report of the Senate Preparedness Investigating Subcommittee, headed by Sen. Lyndon Johnson (D.-Tex.), is expected to deal with profits of airframe manufactures.

It is due out this week. House Appropriations Committee and House Armed Services Investigating Subcommittee are also investigating industry profits, but they do not expect any public developments before next year.

CAA Changes

It will be an entirely revolutionary idea within the Civil Aeronautics Administration, but in the future there is to be less reliance on work by committee and more emphasis on direct exercise of responsibility by department heads.

This change of system, which is slowly taking place, in no way precludes an eventual reorganization of the 16,000-employe agency.

CAA's operation by committee is partially due to that system's popularity within government—there are a total of 4,800 committees and subcommitees in existence in the Department of Commerce alone — but committee work has too often been used in CAA as a device for avoiding decisive action as well as ultimate responsibility.

Change in CAA's attitude, including a switch to a more positive rather than the negative approach, is being directed from the office of Under Secretary for Transportation Louis Rothschild. As a prelude to the coming shake-up, Commerce officials are being taken on extensive field trips of CAA regional offices. There is also a noticeable effort to effect greater co-ordination and cooperation between CAA and the military, which it is hoped will result in improved congressional relations on all future appropriation requests of joint interest.

—Washington staff

AVIATION WEEK VOL. 63, NO. 10
SEPTEMBER 5, 1955

BuAer Shakeup Streamlines Operations

New procurement unit will soon speed contracting, improve phasing of weapon systems components.

By Claude Witze

Washington, D. C.—U. S. Navy's Bureau of Aeronautics is being reorganized and expanded to cope more efficiently with the complexity of modern weapon systems.

A major purpose of the changes, Rear Admiral James S. Russell, BuAer chief, told AVIATION WEEK, is to improve procurement procedures with aircraft and component manufacturers.

This will be accomplished through new emphasis on the contracts division, where the staff will be increased and methods revised to speed processing of agreements with industry.

BuAer's reorganization abolishes the present post of Assistant Chief for Materiel & Services and the former Plans Co-ordination Division that operated under the Deputy Bureau Chief. These new offices are formed:

- **An Assistant Chief for Procurement,** who will place new stress on the importance of BuAer's business activity. He will be concerned with contracting, industrial planning, production and quality control. Until about Oct. 1 the job will be filled by Capt. D. M. Wisehaupt. Then it will be taken over by Rear Admiral George F. Beardsley.
- **An Assistant Chief for Field Activities,** who will seek better support of fleet activities at the Navy's shore air stations. This group will be responsible for overhaul, repair and maintenance of aircraft, supply and the operation of shore establishments. It will design and purchase aerological and photographic equipment for the Navy and Marines. Heading the group will be Rear Admiral Carl J. Pfingstag.
- **An Assistant Chief for Plans and Programs,** replacing the former Plans Co-ordination Division. This office will have increased responsibilities for proper phasing of weapon systems components. A primary mission will be the task of meeting Navy operational requirements with advanced technical developments. Acting Assistant Chief in charge of this program is Capt. Henry T. Dietrich, former head of the Plans Co-ordination Division.

Rear Admiral James S. Russell, Bureau of Aeronautics chief since March, was graduated from the Naval Academy in 1926. He has been a Naval aviator since 1929 and has had a distinguished career as a flier and carrier division commander. He was director of the atomic bomb tests at Eniwetok in 1947 and 1948. In 1953, he was director of the Air Warfare Division, Office of the Chief of Naval Operations.

Navy's FIRM Plan

U. S. Navy's "Murphy Plan"—BuAer's version of the USAF Cook-Craigie procedure—has been renamed since it was put into active operation as a prelude to full-scale production of new aircraft.

It is known as "FIRM"—Fleet Introduction of Replacement Models. In effect, it is an accelerated service test, a fast proving ground run of a new model to uncover as many "bugs" as possible before deliveries to the fleet.

To BuAer, it is the practical application of the "fly before you buy" philosophy, aimed at saving money, time and lives.

Goal: Speed Fleet Use

There has been no change in the Research and Development Group, except that another rear admiral, Robert E. Dixon, has been assigned to head the office as an Assistant Chief of the Bureau. As a captain, Dixon headed the Aircraft Division. In his new R & D post he replaces Admiral Pfingstag, who also received his flag rank recently.

"Top aim of this program," Admiral Russell said, "is to get higher output from each person on the BuAer staff and at the same time get a better coordinated output. Careful study of BuAer's history shows that it has not expanded as the burden of work increased. This is one of the few shops in Washington where we have started work at 7 A. M. in an effort to keep up with the job. At one time the staff worked on Saturdays."

Admiral Russell said BuAer's staff has high standards of ability and morale but has been badly overworked. He added that the aircraft industry, particularly in the field of contracting, has suffered to some extent in the past.

The former Plans Co-ordination Division, he said, was too small to keep abreast of the growing complexity of modern aircraft and missiles, and the first step had to be elevation of this work to place it under direct control of an Assistant Chief. In the future, this office will be responsible for the proper timing of component development and production, keeping the entire weapon systems in phase to speed its development and production for use by the fleet.

Admiral Russell emphasized that he did not feel BuAer was falling down on the job in the past, but "it was straining hard to keep pace with developments and the growing burden of contractual work."

Efficient Contract Handling

"In the future," he said, "we hope to apply better talent to our problems and apply it earlier. This will insure that the work at shore bases on maintenance, training and special equipment will keep pace. There will be fewer problems for the Navy and fewer for the contractors."

In this connection, Admiral Russell placed special stress on Admiral Beardsley's new post as head of the Procurement Group. Contractors, he said, will get faster answers to their questions and more efficient handling of contract problems. He aims to overcome such situations as the one which existed last year, when BuAer gave $165 million of research and development contracts, but $29 million of them were not in proper contract form at the year's end.

On the broader subject of BuAer procurement policy, Admiral Russell said in effect that the Navy is buying the same kind of hardware that is sold to the Air Force and that he intends to push closer co-ordination between the services wherever possible.

'The Minuet'

"BuAer," he said, "wants a high birth rate for new ideas and prototypes. It wants a high rate of infanticide to select the best model for the fleet and to have fewer models in the fleet to reduce the logistics and training problems."

He indicated that BuAer will take a flexible course in accepting a new aircraft.

While USAF has now abolished the design study as a slow and wasteful procedure, the Navy will continue to use the "paper study" in some cases.

Admiral Russell calls it "the minuet." This is the early stage when a number of contractors "show off their steps" to BuAer, after which there is some paper work and a contract awarded, usually calling for an experimental type plane.

He cites the Chance Vought F8U as an example of a good plane resulting from "the minuet."

A second procurement procedure used by BuAer on new weapons systems is closer to the new USAF philosophy of procurement.

A contractor of proven competence, with a record for know-how and production capacity available, can sell a good idea to the Navy. An example of this is the Douglas A4D Skyhawk. A small attack plane, crammed with new engineering ideas, the A4D marked a radical departure from the trend toward larger, more complex and more expensive aircraft.

Obtain Additional Space

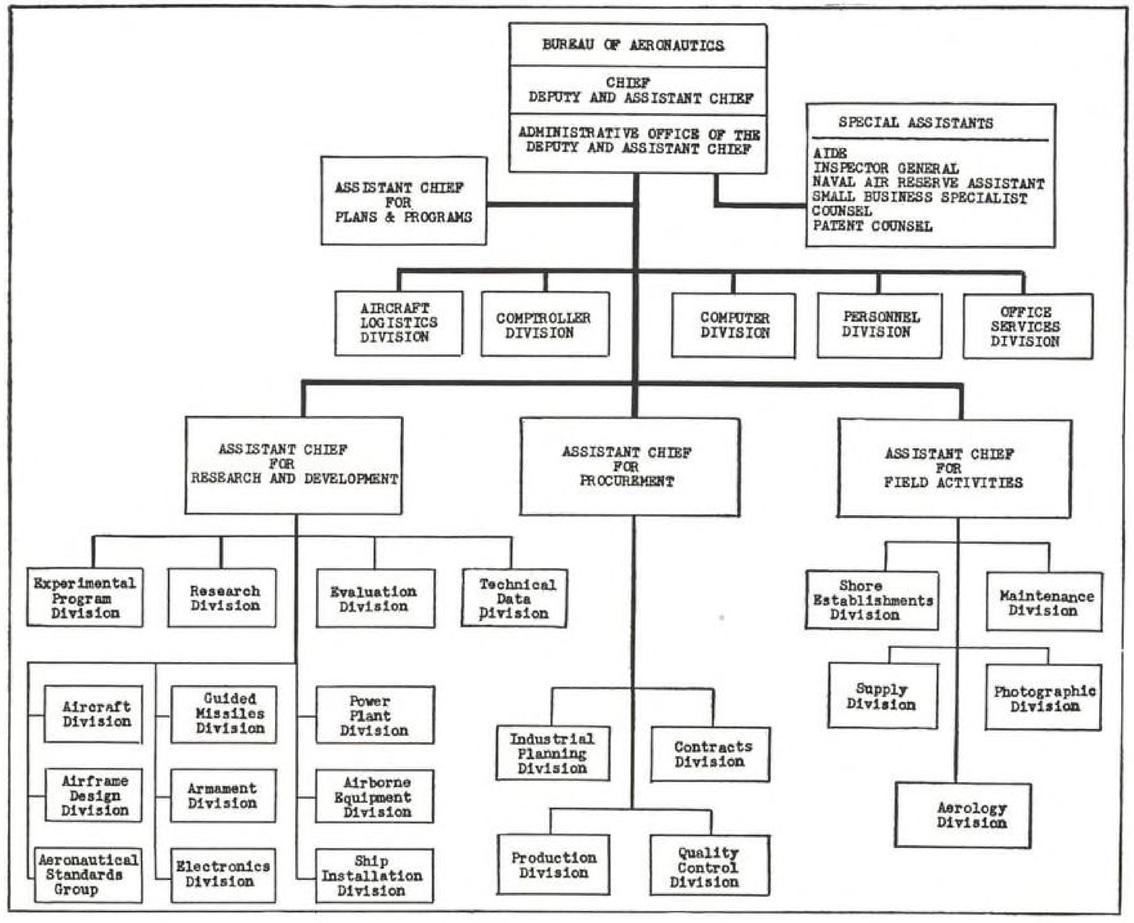
Both Douglas and BuAer won commendation for its development. Success in this case, the admiral indicated, has made his office partial to this kind of an arrangement for weapons development when it is possible. For speedy development at minimum cost to both the manufacturer and the government, the system is close to that recently adopted by USAF.

Admiral Russell said that the Navy, like USAF, is viewing contractor performance with a close eye. BuAer favors a firm, fair contract, with a fixed price if they can get it. Incentive type contracts also are favored, but performance and quality must be guaranteed.

Admiral Beardsley, BuAer's new Assistant Chief for Procurement, is coming to Washington this month from the Naval Air Station at Alameda, Calif., where he was Aviation Engineer.

He has served BuAer in the past as Director of the Production Division and Director of the Fiscal Division.

Discussing the new program with AVIATION WEEK, Admiral Russell said the reorganization ultimately will add about 10% to BuAer's personnel. In a rejuggling of space in the Navy's crowded Constitution Avenue quarters, he is taking over nearly 93,000 sq. ft. of space in the Munitions Building, adjoining the main Navy building. Giving up room in other parts of Washington to consolidate the operation, BuAer will come out with a net gain of more than 41,000 sq. ft.



USAF Urges Aircraft Industry To Use Own Funds for Research

Washington, D. C.—In the midst of a searching budget review under way in U.S. Air Force offices at the Pentagon last week, the question of the adequacy of the nation's research and development effort continued to hold an important position.

Earlier optimism that Donald A. Quarles, new USAF Secretary, would make a strong effort to increase the Air Force's R & D funds was dimmed by this development:

In a speech at the General Electric plant in Schenectady, N. Y., Quarles said: " . . . The research and development program of the federal government . . . amounts to more than $2 billion a year. About 85% of this is for national security including defense and the military-related programs of the Atomic Energy Commisison and the National Advisory Committee for Aeronautics. This federal effort absorbs more than half the R & D activity of the country. . . . It raises a question whether the government is not already taking about as large a cut out of the R & D pool as would be sound and wise for a steady program."

Industry Discussions

Meanwhile, Trevor Gardner, Assistant Air Force Secretary for Research and Development, prepared to push his program to encourage manufacturers of aircraft and related components to invest more of their own money in research. He told AVIATION WEEK he is setting up a special USAF team to tour major aircraft plants and discuss the problem with top executives.

Gardner gave his first blunt lecture on the subject at the Air Force Assn. convention in San Francisco last month (AW Aug. 22, p 12). He said another $100 to $200 million is needed in Fiscal 1956 to exploit recent scientific breakthroughs. Gardner feels strongly that—even if these funds are obtained—he will have achieved only half his goal.

The other half he defines as "a mature industry with confidence in its own future, willing to invest substantial sums exploring new fields that must be exploited for tomorrow's product."

Natural reticence of the industry to make heavy R & D expenditures probably is due to the fact that a substantial number of them have little or no commercial business. At the same time, they have a government backlog of more than $10 billion and operate on a narrow margin of capital.

Must Speed Progress

Gardner said five major airframe companies with total 1954 sales of $3.7 billion spent only $1.4 million of their own money on R & D. Most of this was on in-shop programs aimed at product improvement, an activity that cost $5.3 million in total, but the Air Force met $3.9 million of the bill in overhead and production contracts.

Major reason for Gardner's dissatisfaction with this picture is his conviction that technological progress must be speeded and that USAF and all the other federal agencies cannot supply the necessary money.

He told AVIATION WEEK that the next five years of technical progress in weapons system development must be twice that of the last 50 years, the period in which aviation moved from the Wright Brothers to the achievement of Mach 1. He pointed out that the chemical industry, for example, has progressed faster than aviation and cited the expenditure of $73 million on R & D by du Pont in 1954.

Strong evidence exists that, to be successful, an aircraft company must give ground—which means more money to R & D—if it is to survive future USAF competitions. With the elimination of design studies, more emphasis is being placed on the production of new ideas, and their appearance in a mockup built under a Phase I contract.

If a basic research problem must be solved to achieve a goal, the manufacturer now has more incentive to finance the work.

Security Troubles

This may have to be done despite the fact that there is no profit in R & D and that the instability of military orders may continue to result in widely fluctuating sales curves. Unlike the case of Boeing's investment of $15 million in the KC-135 jet tanker, R & D money spent on weapons systems for the most part will have no direct commercial application.

Another major problem in this field is that of security.

Gardner told AVIATION WEEK he has found one company willing to start a new R & D program with $25 million if USAF will disclose all its secrets so that the money can be channeled into the most effective fields of research.

Another company—this one in the steel industry—has offered to build a laboratory and start its activity with a $10 million fund if USAF will put up another $10 million, lift security wraps and reach a satisfactory agreement on proprietory rights to the technical results.

Gardner, who describes U.S. technical objectives as "fabulous," sees merit in this idea but is handicapped by the security rules. A program of this type, accepted by a large number of firms, would double the effectiveness of USAF's limited R & D budget.

Industry attitude on the security problem appears to be that an easing of the regulations would spur R & D by the manufacturers when the results had commercial application.

Army Spurs R & D

The U. S. Army has joined the U. S. Air Force in putting new emphasis on research and development. It has ordered the "highest possible priority" on the search for new weapons and named a new director of R & D.

He is William H. Martin, shifted from his old post as Deputy Assistant Secretary of Defense for Applications Engineering. In making the appointment, Army Secretary Wilber M. Brucker said Martin will have the same responsibility as an Assistant Secretary and will report to Brucker.

Martin is a former vice president of Bell Laboratories. His shift follows recommendations of a Hoover Commission task force that was headed by Mervin J. Kelly, Bell Laboratories president.

Martin Forms Research Laboratory

Glenn L. Martin Co., Baltimore, Md., has set up a Research Institute for Advanced Science as a subsidiary of its weapons system business. Studies in the field of gravity are high on the laboratory's agenda.

Announcing establishment of RIAS at a time when Air Force officials are urging the aircraft industry to spend more of its own money on basic research, Welcome W. Bender, the laboratory manager, said:

"It is our aim to gather together the most highly skilled scientists we can attract and create an energetic environment in which they may explore both theoretically and experimentally the frontiers of man's knowledge. We will insist that they not be constrained to develop products or to help on our production line problems."

Bender told the Babson Gravity Research Foundation at New Boston, N. H., that there will be no frontal attack on negating gravity, but RIAS will concentrate the best talent on the subject in an effort to fill existing gaps in man's knowledge of the subject. He said RIAS already has contracts with more than a dozen European scientists who are making studies of gravity.

TWA Plans Enlarged Avionics Program

Trans World Airlines will install more than $2.5 million worth of electronic radio and radar equipment in its fleet of 167 aircraft this year.

Breakdown of TWA's expenditures for new electronic communications and navigation aids includes:

- **$1,300,000 for installation of 360 channel VHF radio** in all Constellation aircraft, for improved short range air-ground communications.
- **$660,000 for 144 channel HF radio** in Constellation 749A aircraft used in international service, for improved long range air-ground communications.
- **$400,000 for weather surveillance radar** in 20 Super G Constellations, which is in addition to $210,000 of preinstallation work done on the planes during manufacture by Lockheed Aircraft Corp.

USAF, Navy Have $13 Billion Fund On Hand for Aircraft Contracts

Washington, D. C.—The Air Force and Navy launched the new fiscal year on July 1 with approximately $13 billion available for new contracts for aircraft and related procurement.

Of this total, $7.2 billion were new funds voted by Congress for Fiscal 1956. The balance was carryover—funds voted for previous years which the services had not obligated.

- **USAF's unobligated balance** at the end of Fiscal 1955 was unexpectedly low—$2.48 billion. Six months ago, USAF expected it would exceed $3.6 billion.
- **Navy's unobligated balance,** though, was unexpectedly high—more than $3.2 billion. A few months ago, Navy spokesmen told congressional committees that its carryover would be high due to contract cancellations of obsolescent equipment. But these spokesmen had anticipated only a $1.3 billion carryover.

As of July 1, USAF had $8.8 billion and Navy $4.2 billion available for aircraft contracts.

During June, the last month of Fiscal 1955, Air Force obligated almost $1 billion. Navy, for the same month, showed cancellations of $898 million more than obligations for new contracts. For Fiscal 1955, this was the picture:

- **USAF had obligations** totaling over $5 billion. This was more than three times the $1.6 billion obligated during the first year, Fiscal 1954, of the Eisenhower Administration.
- **Navy's contract cancellations** during the year, though, exceeded by $170 million its obligations in new contracts for aircraft and related procurement.

On the expenditure side, the two services started Fiscal 1956 with a total $25.4 billion available for payments on new aircraft and related procurement contracts and for payments on production underway. Expenditures for procurement largely reflect obligations of two years previous.

During 1955, expenditures totalled $8.7 billion. This was divided: USAF, $6.9 billion; Navy, $1.8 billion.

In the current fiscal year, expenditures of the two services for aircraft in related procurement are expected to drop, reflecting a decline in obligations from $12.4 billion in Fiscal 1953 to $2.3 billion in Fiscal 1954.

Aircraft and Related Procurement Funds

The following details show the obligation and expenditure of funds for aircraft and related procurement since the start of the military build-up after the outbreak of the Korean War in June 1950.

The Air Force and Navy had unobligated funds on hand for new aircraft and related procurement contracts totalling almost $13 billion at the end of Fiscal 1955 and unexpended procurement funds of more than $25 billion. The details:

OBLIGATIONS (in millions)				EXPENDITURES (in millions)		
AIR FORCE	NAVY	TOTAL	FISCAL YEAR	AIR FORCE	NAVY	TOTAL
$7,405	$3,147	$10,552	1951, Total	1,931	591	2,522
10,553	3,925	14,478	1952, Total	4,341	1,328	5,669
9,296	3,117	12,413	1953, Total	6,472	2,127	8,599
1,614	756	2,370	1954, Total	6,909	2,388	9,296
			BY MONTH			
$130	$102	$232	July	519	143	662
33	44	77	Aug	565	157	721
549	115	664	Sept	481	135	617
168	456	624	Oct	538	186	725
354	43	396	Nov	501	162	663
1,613	−24	1,588	Dec	644	165	809
133	−139	−6	Jan	802	120	923
107	27	134	Feb	506	155	661
468	26	494	Mar	595	168	763
218	79	297	Apr	530	122	651
344	1	346	May	570	153	723
903	−898	5	June	708	168	876
5,019	−169	4,850	1955, Total	6,959	1,835	8,794
UNOBLIGATED BALANCE				UNEXPENDED BALANCE		
2,481	3,286	5,767	June 30, 1955	11,745	6,454	18,199
6,306	906	7,212	Fiscal 1956 Appropriation	6,306	906	7,212
TOTAL AVAILABLE FOR OBLIGATION				TOTAL AVAILABLE FOR EXPENDITURE		
8,787	4,192	12,979	July 1, 1955	18,051	7,360	25,411

CAB Liberalizes Operating Rules For Air Freight Forwarders

A new, definitive set of rules has been set up by the Civil Aeronautics Board for regulation of the fast-growing air freight forwarding industry.

The CAB has followed closely the recommendations of examiner Paul N. Pfeiffer in proposing new sections for its economic regulations which set out liberal operating rules for indirect air carriers–air freight forwarders.

The new regulations are oriented toward competition within the developing industry. It is regarded as a potentially potent force in the future development of air freight for the airlines.

In its decision, the CAB extends the operating authority of 34 domestic air freight forwarders for an indefinite period.

It is pointed out that the forwarding operations are conducted without subsidy, and benefit both the shipping public and the airlines through lower rates, advertising and other factors which aid the development of air freight.

In judging the public need for forwarders, the Board says: "We find it in the public interest to maintain competition in air freight forwarding, and believe that the question whether a particular forwarder's services would fill a public need should be left to the judgment of the shipping public itself."

ACI Plea Denied

The application of Air Cargo, Inc. for status as a forwarder is denied. Since ACI is owned by the scheduled airlines, the CAB feels such authorization would tend to discourage cargo competition among the airlines concerned.

Forwarders affiliated with motor carriers or surface carriers are approved as indirect air carriers providing the record shows no basis for denial. Also, non-operation of a current forwarder is not considered a basis for denial since such forwarders complied with technical requirements.

The CAB has approved a new document form which describes the operating authority of forwarders in positive terms, rather than the former negative terms of an exemption. The new form is designed to lend the indirect carriers prestige and present them in a more positive light.

The decision to extend the authority for an indefinite period was made in view of the fact that forwarding is a non-subsidy operation and that the lack of a definite temporary status will help the forwarders in developing their business. The indefinite extension of authority also leaves CAB free to make adjustments in the regulations as they seem warranted in the future.

REA Holds Status

Cooperative shippers associations are also approved as indirect air carriers for an indefinite period for the same reasons applied to forwarders, since their functions are similar. The status of Railway Express Agency in its air express operations remain unchanged.

The applications of two railroad dominated forwarders–Universal Air Freight Corp. and National Air Freight Forwarding Corp.–are also approved. The Board feels the danger of domination by the two companies is negligible in view of the development of strong independent forwarders, and their participation can be a factor in promoting competitive development of air freight.

In the case of the railroad affiliated forwarders, the authorization is for a five-year period to give CAB a chance to review the effect of their operation on the industry.

The Board has decided to waive procedural requirements for forwarders and cooperative shippers associations in the interest of freedom of entry in an industry which doesn't involve air safety or subsidy considerations.

Joint rate agreements with airlines which provide rate differentials in favor of forwarders are approved where differentials are matched by such benefits to the airline as advertising and solicitation done by the forwarder. Such agreements must be open to other forwarders and airlines on the same terms.

Forwarders are also permitted to act as an agent for shipper or airline on particular shipments and to engage in joint loading practices with other forwarders to promote large consolidations and lower rates.

No Charter Curbs

Space allocation agreements with airlines are not allowed by the new regulations. CAB feels such a practice might lead to discrimination, particularly where capacity is in short supply.

The Board finds that restrictions aren't needed on the chartering of aircraft by air freight forwarders. Since restrictions already exist on charter operations of airlines and since there are no restrictions applied to ordinary shippers, the Board feels it is important to avoid unnecessary restriction of forwarders which are promoting greater air freight volume.

Forwarding operations in the Hawaiian Islands are approved on the same terms, and for the same reasons, as those in the continental United States.

Renewal of the authority of Flying Cargo, Inc., Highway Express Lines, Inc. and World Wide Services, Inc. is denied by the CAB since the three companies failed to take any part in the proceeding on which the decision is based:

Insurance coverage required of a forwarder to protect the public interest.

CAB members Chan Gurney and Harmar Denny agreed with the majority on the general disposition of the case, but they dissented on the joint rate agreement issue. The dissenting members hold that approval of such agreements by the majority is both illegal and economically unwise.

Gurney and Denny feel that special rate agreements between forwarders and airlines will lead to bargaining practices among competitors and thus to disruption of the cargo rate structure. Such practices, according to the dissent, would depress the cargo rate level and nullify the protection of economic rate levels provided by the CAB's minimum rate orders.

Hiller Convertiplane Crash

San Francisco–A rocket-powered experimental convertiplane being developed for Hiller Helicopters overturned and burned last week during low altitude hovering tests. It is one of several unconventional designs the company is testing. Injured in the crash was test pilot Robert Hall and Otto Santoff, a research engineer and subcontractor to Hiller on the project.

Guatemala Service

Pan American World Airways' Los Angeles-Guatemala City route has been extended for five years by the Civil Aeronautics Board.

CAB also added San Francisco as a co-terminal with Los Angeles. The route, first certified in 1951, serves a connecting link between the West Coast and PanAm's Latin American system.

The Board decided not to make PAA's West Coast-Guatemala service permanent in view of the fact that it still requires subsidy, and uncertain future conditions call for review after a further period of operation.

Pan American's operation to Guatemala was inhibited before the July 1954 revolution, but traffic has increased substantially since then.

B-47 Crews Take Honors in SAC Meet

By William Coughlin

March AFB, Calif.–The B-47 jet bomber proved its combat worth here last week–effectively silencing critics who had predicted that it could neither bomb nor navigate accurately–as Boeing Stratojet crews walked off with top honors in the annual Strategic Air Command bombing and navigation competition here for the first time.

SAC as a whole did about as well. The final scores in this "World Series of Airpower" indicated that the command's bombing accuracy had improved by 15% within the last year, while navigational ability had climbed an astonishing 40%. An Air Force officer connected with the meet said results indicated that SAC would be 90% effective during actual combat.

A pleased Gen. Curtis E. LeMay, the SAC commander, commented: "Each year we do a more professional job, a more accurate job."

Combat crews from 23 B-47 wings and 10 B-36 wings competed in the week-long test of bombing and navigational ability. Winner of the Fairchild Trophy for the highest combined bombing and navigation scores was the 320th Bomb Wing from March AFB, flying B-47s.

The 320th scored 1,630 points out of a possible 2,000. Second with 1,619 points was the 92nd Bomb Wing from Fairchild AFB, a B-36 unit.

Points were based on a table which converted circular errors in navigation and bombing into point values. Actual distances were classified.

Top honors for an individual crew also went to a B-47 outfit with Maj. Horace C. Traylor of the 93rd Bomb Wing, Castle AFB, scoring 853 points out of a possible 1,000. Observer in his team was Maj. Jose L. Holguin and the co-pilot, Maj. Martin A. Speiser.

When Gen. LeMay handed the trophies to the crew from the 93rd, he also pinned spot promotions to lieutenant colonel on all three men.

The fact that jet bomber crews won the competition for the first time was regarded as particularly significant, marking the arrival of the jet age for the Strategic Air Command. In the last six years of competition, B-36 crews were unbeaten.

"Remember a few years ago when we got B-47s there was a lot of yacking that you couldn't bomb accurately and navigate accurately from a B-47," Gen. LeMay said. This year's competition, he added, proved otherwise.

The giant eight-jet B-52 Stratofortresses now being phased into SAC were not entered in the meet. Project officer Col. E. A. Perry explained that they were not included in order to avoid interruption of the training effort. The new intercontinental bombers probably will compete next year, he said.

Each wing in the competition entered two crews and provided its own maintenance team. More than 2,000 SAC officers and men took part, with B-47 wings staging out of March AFB and B-36 wings flying out of Fairchild AFB in Washington.

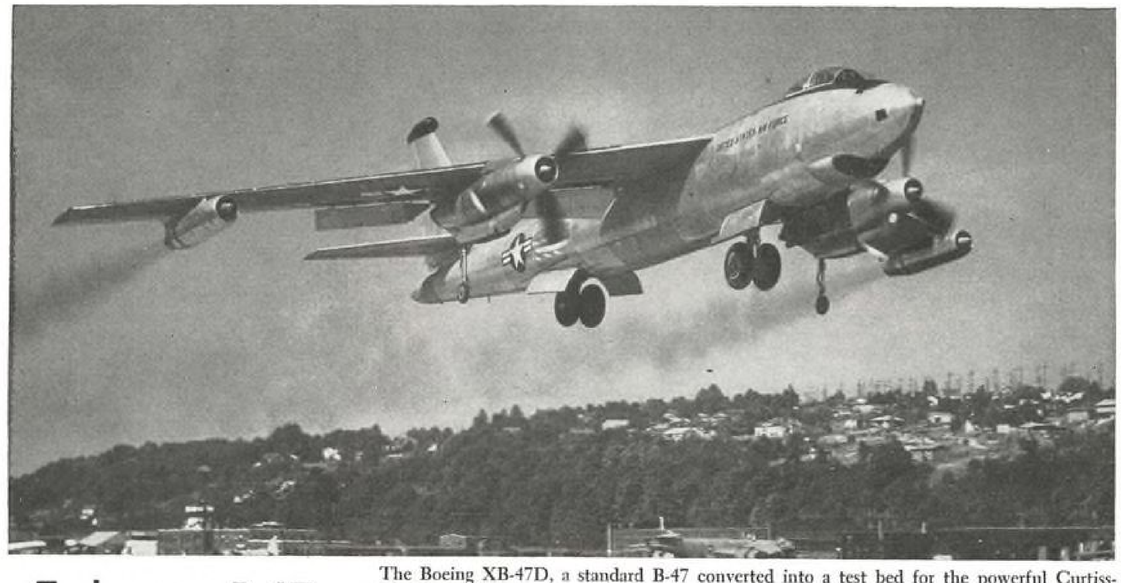
Each crew was required to fly three 3,000 mile missions, bombing theoretical targets in Sacramento, Spokane and Los Angeles and flying celestial navigation legs for competitive scores. Each night during the meet a bomber stream of 36 aircraft rained theoretical mass destruction on the three cities from altitudes above 40,000 feet.

Taking off at 10 minute intervals, the crews were required to meet their arrival time over the targets within two minutes of their scheduled ETA.

Ground radar stations, recording signals sent out by each aircraft to indicate the exact moment of the theoretical hydrogen bomb drops were able to gage within 150 ft. where the bombs would have struck. Crews were allowed to bomb one of the targets visually but were required to bomb targets in two cities by radar only.

Navigational ability was judged solely upon celestial navigation without the help of radio aids or radar.

Col. Perry said the competition indicated that SAC would be 90% effective if it were required to put its capability to use in actual combat at this time.



Turboprop B-47 On Maiden Flight

The Boeing XB-47D, a standard B-47 converted into a test bed for the powerful Curtiss-Wright T49 turboprop engine, is shown taking off from Boeing Field, Seattle, on its maiden flight. Two T49 engines, rated as the most powerful turboprops ever to fly, are mounted at the inboard pod positions. The two outboard General Electric J47 turbojets of the conventional B-47 have been retained on the converted Stratojet.

British Military Planes Termed 'Obsolete' by Hoover Task Force

In a report from one of its task forces, the Hoover Commission has been told that British military planes being purchased with U. S. funds have had production troubles and may be obsolete by the time they are operational.

The task force told the commission:

• **The Gloster Javelin all weather fighter** has not been evaluated and approved by USAF.

• **The Vickers-Armstrongs Swift fighter** lacks stability and may be cancelled.

• **The English Electric Canberra** bomber, which recently set a round-trip trans-Atlantic record, is nearly obsolescent.

• **The Hawker Hunter fighter** has deficiencies and further delays are expected in deliveries.

The task force says its information was up-to-date as of Jan. 11, 1955. As of June, it says, the Hawker Hunter was expected to be a better aircraft than the North American F-86 but "certainly inferior to the F-100 and other types of supersonic U. S. and Russian fighters."

For the Foreign Operations Administration, the task force raised three questions:

• **What will be done** with $200 millions of funds appropriated but not obligated for the aircraft program?

• **What's being done** to review a 1953 contract for the Hunter that "cannot be met with acceptable planes?"

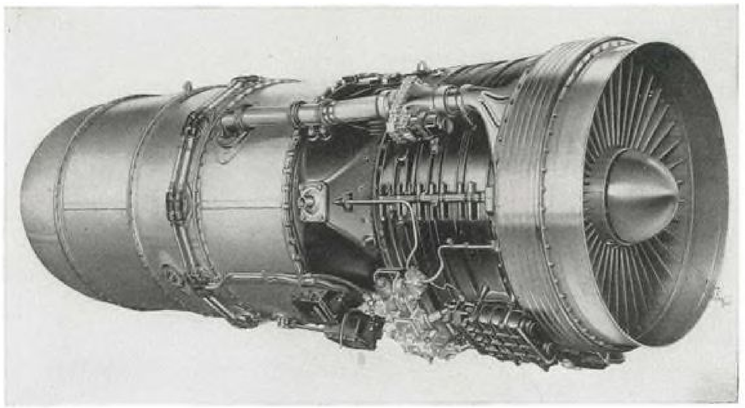
• **If the Hunter** contract is cancelled, how will FOA use the released funds?

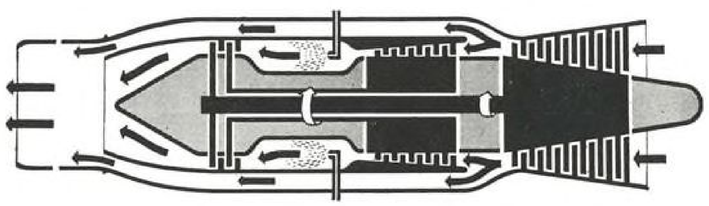
The task force cites articles in British newspapers in support of its criticism of the aircraft.

The investigating group was composed of Stokeley W. Morgan, Homer S. Fox and Bernard S. Van Rensselaer. Van Rensselaer prepared a report several months ago that carried similar criticisms of the FOA aircraft program.

Harold Stassen, then FOA administrator, called the report at that time the "most inaccurate . . . I have ever seen."

In discussing the Canberra bomber for the Hoover Commission, the task force says that the Martin B-57 version of this aircraft is a "marked improvement." It adds that if Martin had been given the order that went to English Electric Co., "It would have meant jobs for between 12,000 and 15,000 workers at the Glenn Martin plant for one or two years."





Jet Engine With 13,000-Lb. Thrust

The Conway by-pass engine, developed by Rolls-Royce Limited for the British government, has been type-tested at 13,000 lb. thrust and has, its manufacturer reports, the lowest specific fuel consumption of any type-tested jet engine. The Conway will power the V. 1000 military transport. Noise level of the engine is reduced by lower jet speed and special jet nozzle. Diagram shows schematic of by-pass engine.

Gyron in Test

London—De Havilland's Gyron is completing its 150 hr. type test at 15,000 lb. static thrust. Results near the end of the trial indicate that the company might be able to announce the successful completion of the type test during the Farnborough show this week. DH expects Gyron eventually will exceed the 20,000 lb. thrust mark. Although not type tested, recent models have been run at considerably in excess of 15,000 lb.

Commission Scoring Raises British Hackles

London—British reaction to the Hoover Commission charge was official silence, unofficially, "This isn't cricket."

One undercurrent of opinion was that the U.S. report was timed to discredit British Aviation on the eve of the Society of British Aircraft Constructor's Aircraft Show and Flying Display that begins this week at Farnborough.

Generally, however, there was a reluctant admission that Britain has had trouble with its postwar aircraft but has done the best it could. However, the British claim some design principles are actually far advanced.

Aircraft by aircraft, this is their rebuttal:

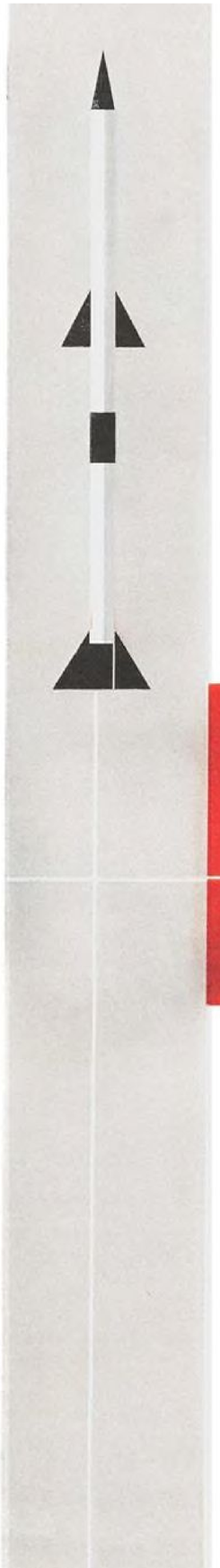
• **Javelin** orders for earlier Marks have been cut, but orders for advanced models have been increased. The government and Glosters claim it will be in service by the year's end. Gloster further says USAF has not officially evaluated the Javelin.

• **Swift.** Vickers asks, "Why beat a dead horse? Orders have been cancelled and everyone knows it."

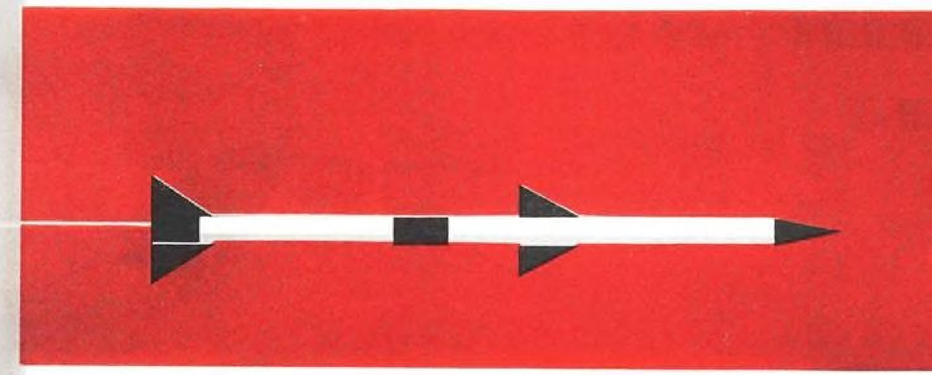
• **Canberra.** English Electric claims its Mark 8 is comparable in all respects to the U. S.-made B-57B, and that the later PR-9 photo-reconnaissance version is superior to both in altitude performance. It admits early Marks obviously are obsolescent.

• **Hunter.** Air Ministry has complete confidence in the Hunter. It claims answers to all "bugs" are known and are being incorporated into normal maintenance schedules. Several hundred are in service in Britain and on the continent. Hawker proudly quotes recent U.S. Defense Department statements to the effect that Hunter is the best interceptor in Europe.

Guiding or intercepting



Research, development, production of electronic computers for defense



Today our Armed Services are making valuable use of Burroughs Corporation applied research for analysis and study of original defense concepts; of our expert engineering for development and testing of prototypes; and of our mass-precision manufacturing facilities for final production of defense appliances.

Burroughs' defense accomplishment embraces the fields of instrumentation, control systems, communications, magnetic and electronic components and electronic computers. It is marked by achievements like the A-4 Gun Sight, the Skysweeper "brain," ground guidance computers for high-priority systems and other classified projects. Address inquiries to Burroughs Corporation, Detroit 32, Michigan.

Burroughs

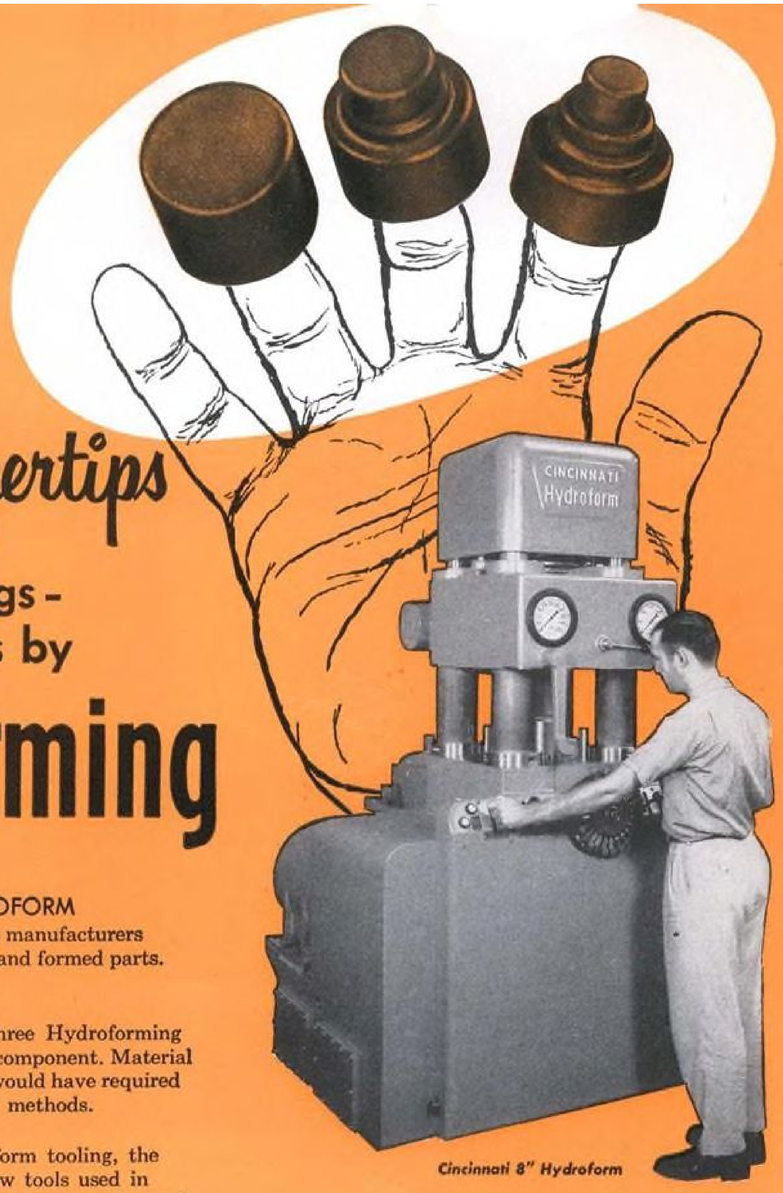
BURROUGHS INTEGRATED DEFENSE FACILITIES INCLUDE:
Burroughs Corporation plants in Detroit and Plymouth, Michigan
Burroughs Electronic Instruments Division, Philadelphia, Pa.
Haydu Brothers of New Jersey, Plainfield, New Jersey
Control Instrument Company, Brooklyn, New York
Burroughs Research Center, Paoli, Pa.

THE MACHINE TOOL SHOW
CHICAGO, ILL.
SEPT. 6-17, 1955
INTERNATIONAL AMPHITHEATER
Booth 1205

At your fingertips

and at real savings -
small drawn parts by

Hydroforming

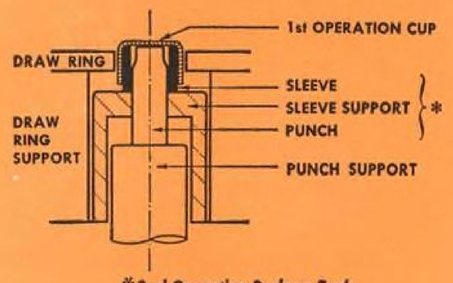


Cincinnati 8" Hydroform

THE NEW CINCINNATI 8" HYDROFORM
brings decided time and cost savings to manufacturers required to produce small, deep drawn and formed parts. Illustrated above is a typical example.

The photo shows, in sequence, the three Hydroforming operations to produce an electron tube component. Material is 0.020" O. F. H. C. copper. This part would have required five or six operations by conventional methods.

To illustrate the simplicity of Hydroform tooling, the diagram below, right, shows the redraw tools used in the second operation. The sleeve, sleeve support and punch were made of ordinary steel, turned on a lathe. The 1½" dia. x 1¼" deep 1st operation cup was simply placed on the sleeve and redrawn. Redraw tools for the final operation were similar and equally inexpensive.



*2nd Operation Redraw Tools

Parts from sheet materials up to ¼" steel, from blanks up to 8" in diameter, can be drawn on the 8" Hydroform. Maximum draw depth is 5". For larger work, Hydroform machines of 12", 19", 23", 26" and 32" capacities are available. Let a Cincinnati Milling field engineer give you detailed information on how you can profitably apply Hydroforming to your work. For a description of the process and specifications of the six machine sizes, write for Bulletin M-1759-3.

CINCINNATI Hydroform
PROCESS MACHINERY DIVISION
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U. S. A.

U.S. Aircraft Exports Lead World

U. S. aircraft industry exports led the world in 1954 with a total of $618.9 million, nearly four times the total aircraft exports of $156 million by Britain, principle competing country.

John H. Payne, director of export services, Aircraft Industries Association, said the $618.9 million was $260 million under the all-time high set in 1953. It remains the second highest export volume the industry has had in a peacetime year.

Payne noted that the bulk of the 1954 sales, $497 million worth, represented classified items distributed through military channels. These included all military, cargo and used transport aircraft, engines of 400 hp. and over, propellers, instruments, all accessories, spare parts and ground handling equipment. The remaining 20% of the industry's total dollar volume production, was sold to civil interests in 79 countries and gained 33% over the amount exported in 1953.

The breakdown of foreign sales of U.S. aircraft and parts in 1954 shows: commercial transports, $96 million; new utility, personal and liaison planes, $4.5 million; rotary wing aircraft, $4 million; used aircraft, $16.2 million.

Commercial air transports sold to overseas buyers in 1954 totalled 112 with the dollar value up $16.7 million over the preceding year. Canada was the largest foreign buyer of commercial airliners with nine transports purchased for a total value of $15.4 million. Canada also spent $1.8 million with U.S. manufacturers for 191 smaller aircraft of various types.

While most of the rotary wing aircraft exported in 1954 were of military type, there were 74 helicopters shipped to civil users in 17 different countries.

The number of smaller engines (less than 400 hp.) exported in 1954 was more than double the number sold the year before with a total of 728 compared to 347. Value of the smaller U.S. aircraft engines shipped overseas totalled $1.5 million.

In his report, Payne stressed there are few industries that ship a greater portion of their products to foreign countries than does the U.S. aircraft industry. In the calendar year 1953, he said, goods manufactured and sent abroad by the American aircraft industry represented 4.1% of all merchandise sold overseas by American businesses.

New Flying Boom for KC-135

A new, high-speed Flying Boom (shown above) for inflight refueling has been developed for, and installed on, Boeing's KC-135 jet tanker prototype. The jet tankers, now in production for the USAF at Boeing's Renton, Wash., plant, will be used in refueling B-52 Stratofortress jet bombers and late-model jet fighters. For in-flight refueling pictures of B-52 by earlier boom and tanker plane, see next page.

CPA, Trans-Canada Trade Airline Routes

Toronto—Trans-Canada Airlines has traded its Toronto-Mexico City route to Canadian Pacific Airlines in exchange for two domestic routes with the approval of the Canadian Air Transport Board.

Announcement of the trade said Trans-Canada received former Canadian Pacific routes between Montreal, Quebec City and Seven Islands and Montreal, Rouyn, Noranda and Toronto. In addition, CPA is turning over its service from Quebec City to Baie Comeau and Forestville to Quebecair Ltd.

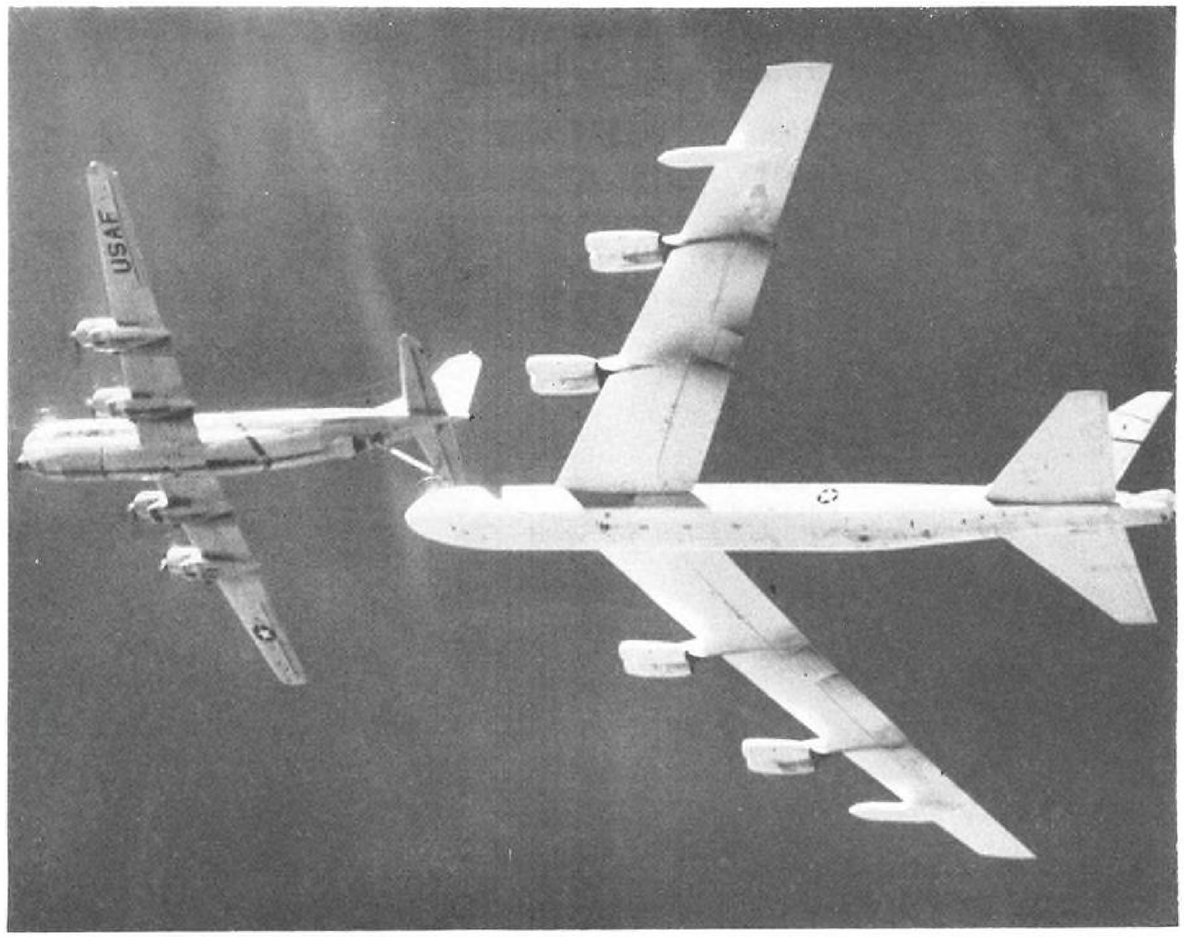
The Montreal-Seven Islands route received by Trans-Canada skirts along the northern shore of the St. Lawrence River, tapping pulp and paper towns and the iron ore port of Seven Islands, from which ore from the Laborador mining area is shipped to U.S. and Canadian steel mills. The Montreal-Rouyn-Noranda-Toronto route pushes into the copper and gold mining area of northwestern Quebec province.

CPA's Toronto-Mexico City non-stop route will complement its Vancouver-Mexico City non-stop route. The new route will be the only CPA route in eastern Canada.

TCA in the exchange gets a section of the transcontinental Canadian route which will likely be extended from Seven Islands to St. John's, Newfoundland, to tie in with its trans-Atlantic services. TCA will continue to operate its Toronto-Tampa non-stop route and its services into the Caribbean area.

Malton to Expand

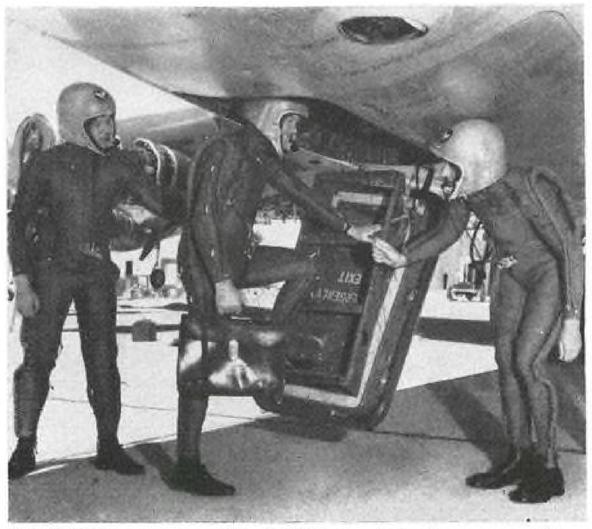
Toronto airport developments costing $28 million are in the works. Of this, $25 million will go for Malton Airport, including a $10 million terminal and two runways to be extended to 10,000 ft. and 7,200 ft. Toronto Island airport will get improvements costing $3 million.



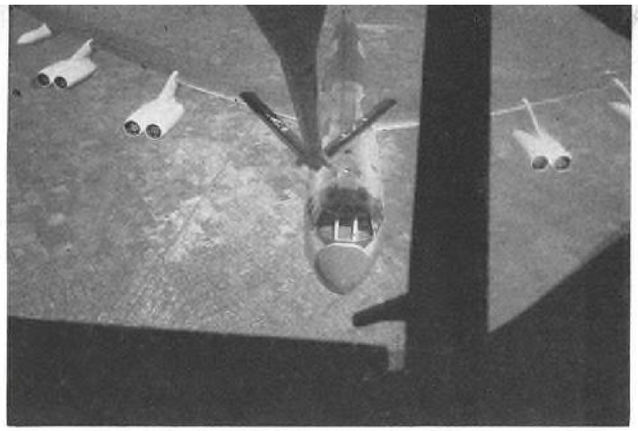
STRATOFORTRESS of USAF's first B-52 wing dwarfs KC-97 tanker as it slides gingerly into position for refueling exercise.

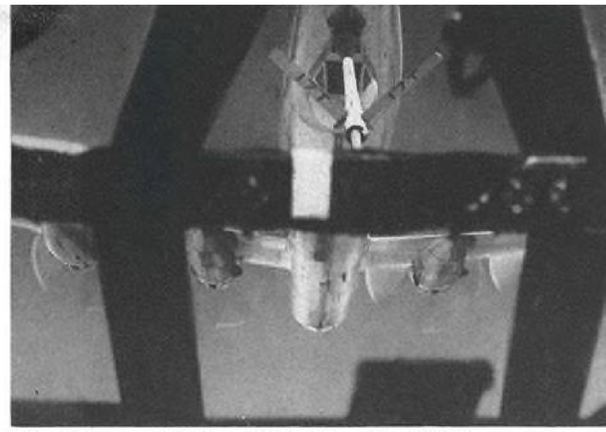
A Behemoth Joins the Air Force

93rd BOMB WING ground crew check jets for refueling test.

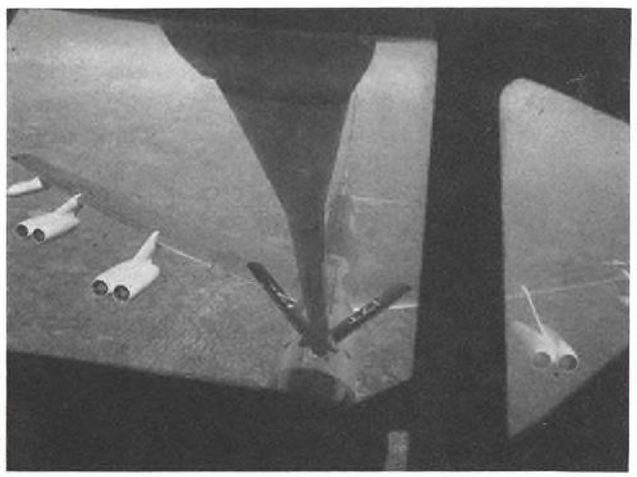


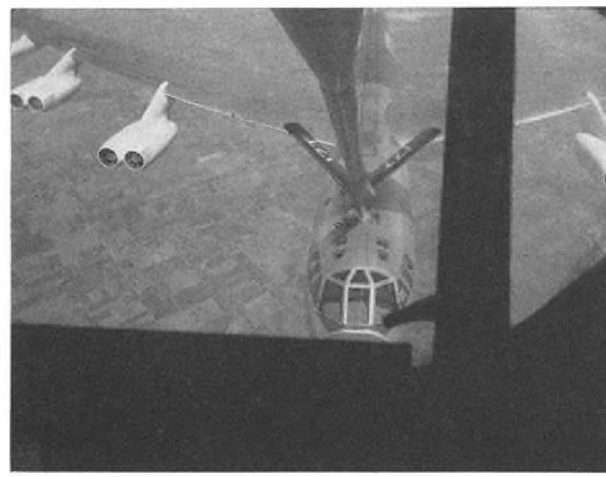
THE FLIGHT crew comes aboard. Note new helmets, pressure suits.





AIRBORNE, the B-52 closes in on tanker (left) as crew watch Boeing Flying Boom suspended from KC-97 ride overhead (right).



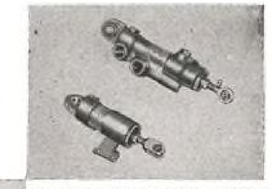


FROM TANKER, operator flies his boom to point just above B-52 refueling socket behind cockpit, then on into locking position.

EXERCISE completed, Stratofortress returns to Merced, Calif., base. Notice unusual shape of new radome for tail turret.

LOUD...

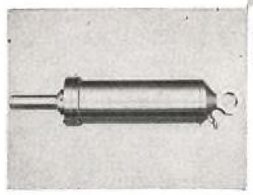
primary source of actuating cylinders on the West Coast



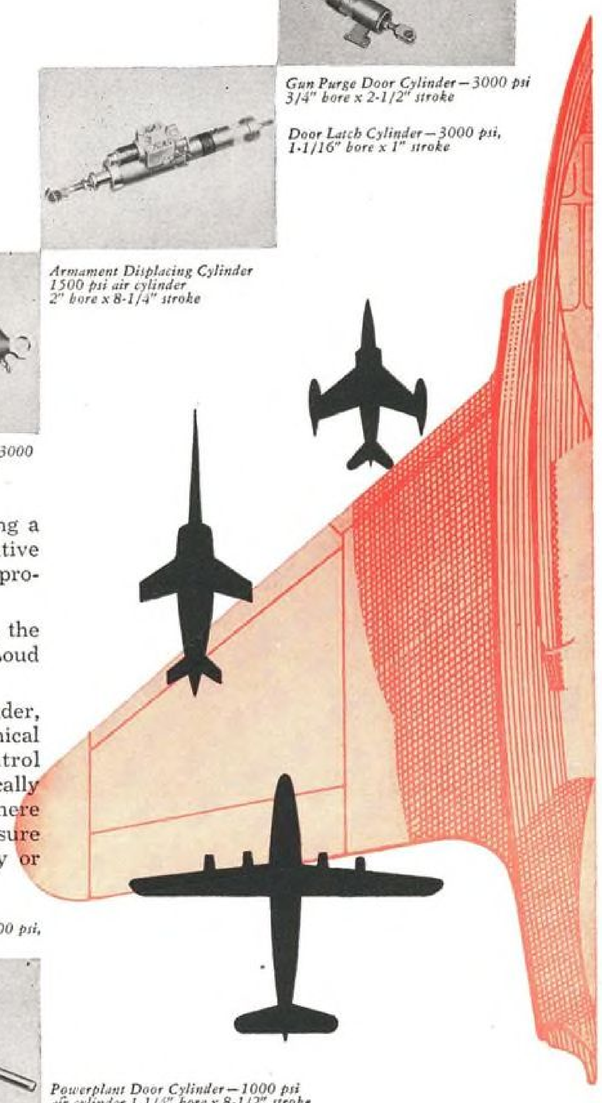
Gun Purge Door Cylinder—3000 psi 3/4" bore x 2-1/2" stroke

Door Latch Cylinder—3000 psi, 1-1/16" bore x 1" stroke

Armament Displacing Cylinder 1500 psi air cylinder 2" bore x 8-1/4" stroke



M.L.G. Actuating Cylinder—3000 psi, 6" bore x 17-1/2" stroke

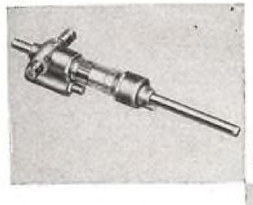


When a manufacturer gains the reputation of being a primary source for any product, it is usually indicative that they have the "know how" and facilities to produce at competitive prices.

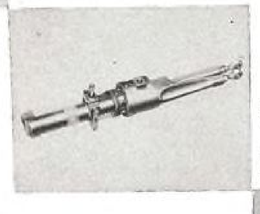
The ability to produce the smallest to the largest, the simplest to the most complex cylinders has made Loud top source for high quality—low priced units.

In addition to making the ordinary actuating cylinder, Loud produces units containing integral mechanical locking devices, snubbing cylinders, power control booster cylinders, as well as a patented mechanically locking cylinder adaptable to many applications where the load is required to be firmly held without pressure and yet easily unlatched and moved hydraulically or pneumatically.

Aileron Booster Cylinder—1500 psi, 1-9/16" bore x 6-1/8" stroke



Powerplant Door Cylinder—1000 psi air cylinder 1-1/4" bore x 8-1/2" stroke w/mech. locks at both ends of stroke



Nose Gear Door Cylinder—3000 psi, 1-3/16" bore x 7" stroke

Nose Wheel Steering Cylinder—3000 psi, 1-1/4" bore x 6-3/4" stroke

Engineering and design development by
Haskel Engineering Associates
Glendale, California

National Sales and Service by
Haskel-Loud Aircraft Service Corp.
Glendale, California

Resident Sales Engineers located in
Seattle, Wash.
Kansas City (Independence), Mo.
Baltimore, Md.

H.W.

"PRODUCING TODAY...TOMORROW'S AIRCRAFT REQUIREMENTS"

H. W. LOUD MACHINE WORKS, INC.

969 EAST SECOND STREET, DEPT. 10 POMONA, CALIFORNIA

CAB Asks Equal Pay On Some Latin Routes

Civil Aeronautics Board has proposed final service mail rates for Latin American operations of four U.S. airlines which equalize rates for carriers with common routes.

The new rates apply to Pan American-Grace Airways and Latin American services of Pan American World Airways, Braniff Airways and Delta-C&S Air Lines. The service rates set the price the Post Office Department will pay the carriers for hauling mail and do not include subsidy paid by CAB.

Under the proposed rates, Panagra gets 65.3 cents per ton-mile over its entire system. Braniff gets 65.3 cents per ton-mile for its system south of the Canal Zone, which roughly corresponds to Panagra's route structure. Delta gets the 65.3 cent rate for all its Latin American operations.

Between the Canal Zone and Miami, Braniff is assigned a 55.1 cent rate. Pan American gets the same rate for its entire system with the exception of two routes. PAA's New York-San Juan rate is 34.31 cents and the Miami-San Juan rate is 36.54 cents, both equal to Eastern Air Lines' rate for similar services.

The rates proposed by CAB are all lower than previous permanent and temporary rates received by the four carriers for carrying mail to Latin America.

The rates for Latin American operations were determined through a cost ratio formula based on the new multi-element rate recently set for domestic trunk airlines. Revenue ton-mile costs of the U.S. flag airlines are applied to the average of similar costs for the Big Four trunklines. The resulting ratio is applied to the Big Four's mail cost to produce the rate for Latin American operations.

In a separate order, CAB deferred the effective date of the new trunkline rate to Oct. 1 to allow the Post Office Department added time to straighten out the bookkeeping involved. Postponement of the effectiveness of the rate from Sept. 1 to Oct. 1 won't effect mail pay to the carriers since they are now receiving compensation based on the estimated average yield under the new formula.

Two Florida Nonskeds Reinstated by CAA

Aero Finance Corp. and Peninsular Air Transport, two Florida-based nonscheduled carriers, under emergency suspension by Civil Aeronautics Administration on charges of safety irregularities, have been reinstated.

CAA Administrator Fred B. Lee stated that the action did not affect the continued prosecution of safety enforcement proceedings now pending before the Civil Aeronautics Board (AW Aug. 22, p. 100). At the same time CAA filed an additional 15 charges of safety violations against Peninsular. Operation of aircraft in overloaded conditions was included in the charges.

The emergency suspension of Aero Finance was terminated by CAA subject to compliance with a set of conditions which included limiting operations to the two aircraft owned by the company. CAA reinstated Peninsular five days later.

Aviation Lobbyists Show Low Expenses

Few aviation representatives reported legislative activities for the second quarter of this year under the lobbying act.

Aircraft Industries Assn. reported receipts for lobbying activities during the quarter of $5,504.66, and expenditures of the same amount. Separately listed as representatives for AIA were: Harold Mosier, with receipts of $3,750 and expenditures of $706.05; D. C. Ramsey, no receipts or expenditures; Spence & Hotchkiss, no receipts or

4 out of 5

helicopters under 400 hp. produced this year will have power by

Franklin
FINE AIRCRAFT ENGINES

AIRCOOLED MOTORS, INC.
SYRACUSE, N. Y.

Smith, Kirkpatrick & Co., Inc.
46 Trinity Place, New York 6, N. Y.
Export Distributors of "Aircooled" Products

TITANIUM

for the full range of mill products call Mallory-Sharon

DOUBLE-MELTED TITANIUM AND TITANIUM ALLOYS

ALL Mallory-Sharon titanium is produced by "Method S" vacuum double melting, resulting in good machineability and forming characteristics. This process eliminates alloy segregation and enables carbon and gaseous contaminants to be held within very low limits. Likewise, Mallory-Sharon's patented rolling method and other technical advances assure you of the highest quality and uniformity.

Call us for the full range of titanium and titanium alloy mill products: rod, bar, sheet, strip, plate, etc. Our technical service group is equipped to give you the latest recommendations on forming, welding, and machining. For complete information write Mallory-Sharon Titanium Corporation, Dept. B-9, Niles, Ohio.

MST GRADE III—This material is commercially pure titanium. It is essentially all alpha titanium and is therefore not hardenable by heat treatment. It is more ductile than any commercial titanium alloy and is weldable. MST Grade III is available as 50,000 psi, 65,000 psi, or 80,000 psi yield strength material.

MST 6Al-4V—A heat-treatable alpha-beta bar and sheet alloy. The Al-V system is of the beta isomorphous type, showing no eutectoid decomposition. This alloy has excellent elevated temperature properties up to approximately 750°F. MST 6Al-4V is relatively insensitive to notches and is weldable.

MST 3Al-5Cr—A heat-treatable alpha-beta bar and forging alloy which is primarily used in the annealed condition. MST 3Al-5Cr has good elevated temperature properties.

MST 4Al-4Mn—A heat-treatable alpha-beta bar and forging alloy which is primarily used in the annealed condition. It has good elevated temperature properties. Eutectoid decomposition is so sluggish that it never occurs in commercial applications.

MST 8 Mn—An alpha-beta sheet alloy used primarily in the annealed condition. It has good formability and may be used at moderately elevated temperatures in the annealed condition. Eutectoid decomposition is so sluggish that it does not occur in commercial applications.

TYPICAL MECHANICAL PROPERTIES

	Form	Ultimate Tensile Strength, psi	Yield Strength, psi	Elongation % in 2"
MST Grade III (Unalloyed) . .	Sheet, Bar	70,000	50,000	25
(3 different strength levels) .	Sheet, Bar	85,000	65,000	23
	Sheet, Bar	100,000	80,000	20
MST 6Al-4V (1)*	Bar	149,000	137,000	13
(2)	Bar	164,000	153,000	18
(3)	Bar	198,000	180,000	9
(4)	Sheet	155,000	135,000	12
MST 3Al-5Cr	Bar	155,000	145,000	13
MST 4Al-4Mn	Bar	150,000	140,000	14
MST 8 Mn	Sheet	137,000	125,000	16

* (1) 1500—½—AC (3) 1700—½—WQ, 900-2-AC
(2) 1400—½—WQ, 1100-8-AC (4) 1450— 2—FC to 1100-AC

Ti MALLORY-SHARON TITANIUM CORPORATION
NILES, OHIO

expenditures. Avery McBee was listed as a representative of Hill & Knowlton, Inc.

Other reports, with receipts and expenditures for the quarter:

Stanley Gewirtz, Air Transport Assn.: no receipts; expenditures, $80.75.

Edward Rodgers, Air Transport Assn., receipts, $1,250; expenditures, $611.81.

Laurance Henderson, North American Airlines: Receipts, $1,950; expenditures, $487.

Charles Parker, National Aviation Trades Assn.: Receipts: $1,183.34; expenditures, $1,102.41.

Wayne Weishaar, Aeronautical Training Society: receipts, $3,300; expenditures, $4.50.

Larry Cates, Air Line Pilots Assn.: receipts, $2,661.30; no expenditures.

Dwight Taylor, American Airlines: receipts, $2,350; expenditures, $590.

John C. Cone, Pan American World Airways: no receipts or expenditures.

John Floberg, Conference of Local Service Airlines: no receipts or expenditures.

Safety Men Shifted

Civil Aeronautics Administration has reassigned several officials in the Office of Aviation Safety as part of a program of widening technical experience in aviation matters.

First change involved the appointment of Burleigh Putnam as acting chief of the General Safety Division.

Other changes include the transfer of L. W. Ashwell to Los Angeles as chief of the Air Carrier Safety Division in CAA's IV region. Ward Masden succeeds Ashwell as deputy chief of the Air Carrier Safety Division, Washington, D. C. E. L. Yuravich, chief of the Region IV Air Carrier Safety Division, is assigned to Washington where he will be an area supervisor in the safety division of CAA's International Region.

SALA Gives Up Stock

San Jose—The Costa Rican Government has announced its acquisition of 10% interest in the commercial aviation repair and maintenance facilities of SALA under a financing program. The government is scheduled to own 25% of the company stock within the next three years.

SALA, which is moving its entire repair facilities from old La Sabana Airport to the new Coco International Airport is the only privately owned and operated repair and maintenance organization in Latin America with CAA certification for commercial work.

SALA recently signed a contract for all repair and maintenance on aircraft, including helicopters, operating for the U. S. Army in the area.

French End Gas Tax

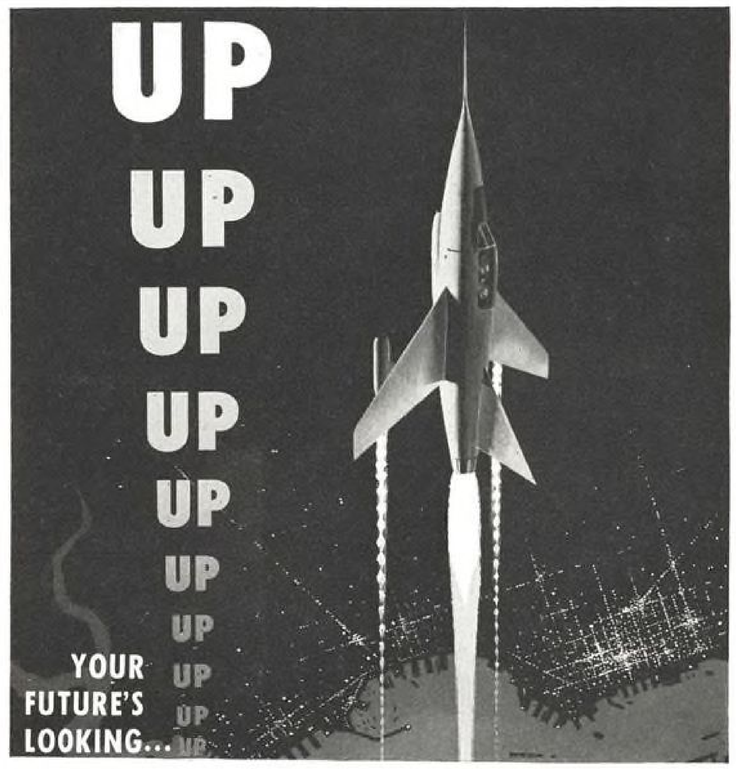
Paris—The French government has decided to remove the tax on aviation gasoline following favorable cabinet action on a proposal submitted by the Ministry of Public Works and Transport. The price of regular aviation fuel will drop from 76 francs to 39 francs per liter (82.2 cents to 42.2 cents per gallon).

Apart from the obvious importance to private flying in France (the tax has not applied to fuel required for international airline operations), two important economic benefits are expected to result from the decision.

First, commercial aviation within France should be given a needed boost—internal airline operations in France today are almost non-existent with airline companies laying much of the blame on high fuel costs.

Second, engine-check and repair work is expected to receive a boost—much of this work is now done in foreign shops due to the high cost of fuel.

A by-product of the move should be a renewed interest in private flying clubs. While such clubs have in the past received a rebate on part of their gasoline taxes, the high operating cost of private planes has discouraged many from learning to fly.



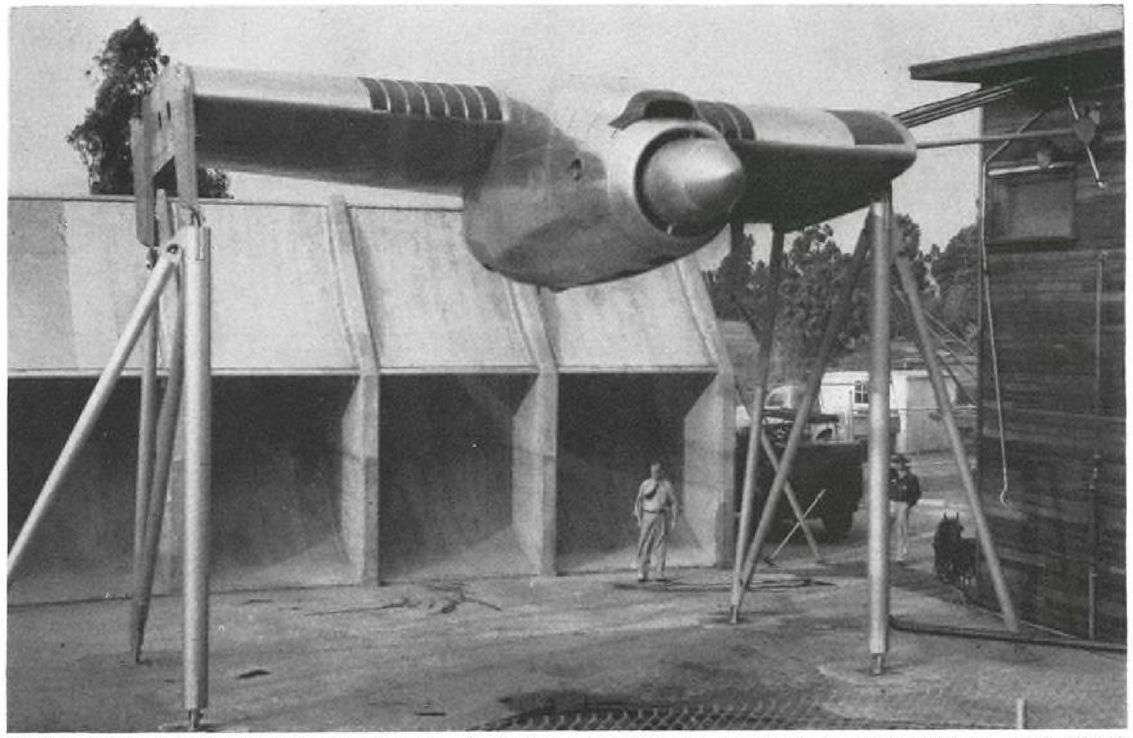
...when you apply for an engineering job at Marquardt, one of the leaders in the field of supersonic jet propulsion. Set your sights sky-high! At Marquardt, you'll be a creative part of the team that is accomplishing Speeds... Altitudes... Acceleration... never before dreamed of! Look up... with Marquardt!

For information regarding employment, write:

marquardt AIRCRAFT CO.

INDUSTRIAL RELATIONS DEPARTMENT
ATTENTION: PROFESSIONAL PERSONNEL
16551 SATICOY STREET • VAN NUYS, CALIFORNIA

THE WEST'S LARGEST JET ENGINE RESEARCH AND DEVELOPMENT CENTER



OUTDOOR TEST STAND at new Douglas laboratory with Pratt & Whitney T34 turboprop engine housed in right-hand nacelle of C-133.

Ground Tests Spur C-133, B-66 Production

By Irving Stone

Long Beach, Calif.—When the first turboprop-powered C-133 rolls off Douglas Aircraft's assembly line in November, many of the cargo plane's systems and components will have been ground tested and proved out in order to shorten the actual flight test time.

This ground-testing—pacing the assembly of the plane—is being done in a new $6-million engineering test laboratory at the company's Long Beach Division.

Systems and components of Douglas' B-66 bomber series also are being tested and refined in the new laboratory.

The lab is expected to be fully functional within the next few months—about 95% of equipment checkout is now complete. It is an Air Force facility, in which Douglas has borne part of the cost.

About 150 test engineers are on tap to design and originate test setups. Approximately 300 other technicians are available to set up the tests and operate the equipment under instructions of the facility's test engineers.

The laboratory does considerable development work in connection with problems encountered in test evaluations and emphasizes the growing importance of more extensive ground testing of systems and components of today's high-speed planes.

How the Lab Pays Off

Douglas engineers point out that the expense of test-flying a modern-design aircraft is so high that it is considerably more economical to conduct tests on the ground whenever possible.

This ground testing, they say, effectively simulates the service conditions required to prove system and component adequacy, indicates where and how design improvement may be directed and leaves only a minimum of proving to be done by actual flight test.

This is important, Douglas engineers say, because frequently the density of the modern plane will not permit complete instrumentation of the various systems.

Also, in flight testing it is difficult to find the wide range of environmental conditions which can be simulated with relative ease in the lab.

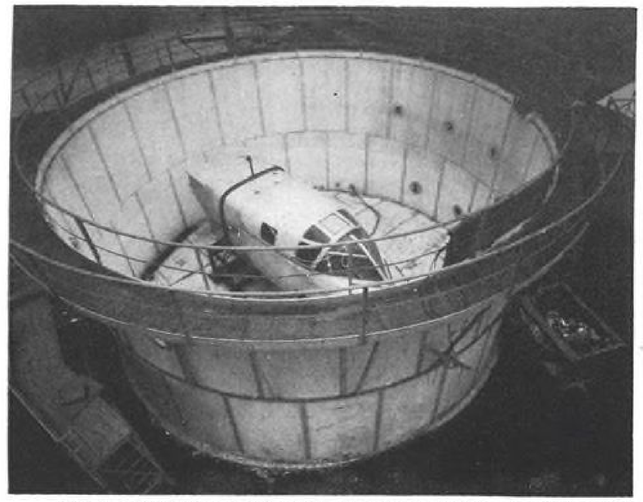
Safety, too, can more easily be controlled in the lab than in the flight plane. With modern systems becoming increasingly complex, this safety factor takes on increasing importance. Thus, in flight test an operational condition may show up which cannot be completely analyzed because of its intermittent nature or the danger involved in extending flight time.

Ground-Test Activities

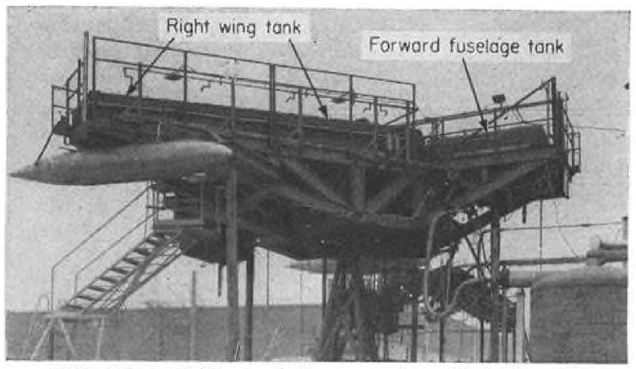
In the laboratory, the operational condition usually can be simulated with enough accuracy for effective trouble shooting, and the answers can be obtained with safety.

Highlights of the lab's activities indicate how Douglas engineers check out systems and components:

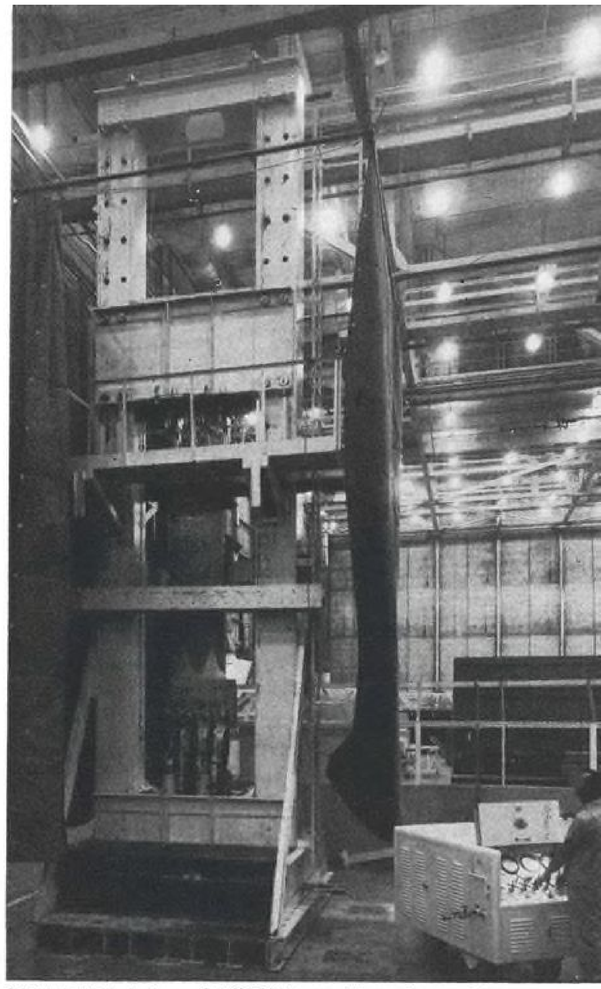
The environmental section of the engineering laboratory is of top importance. One of its studies is a vibration evaluation of a complete control system —after its components have been



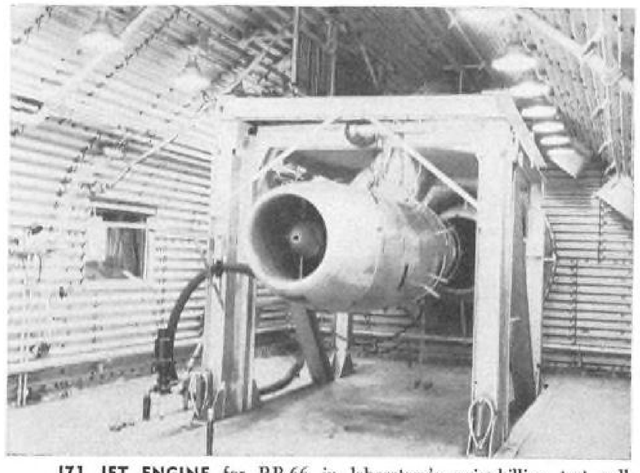
RB-66 PRESSURE cockpit section in water test tank. For test, sealed cockpit section is filled with water having greater pressure than surrounding tank water to simulate pressure differential.



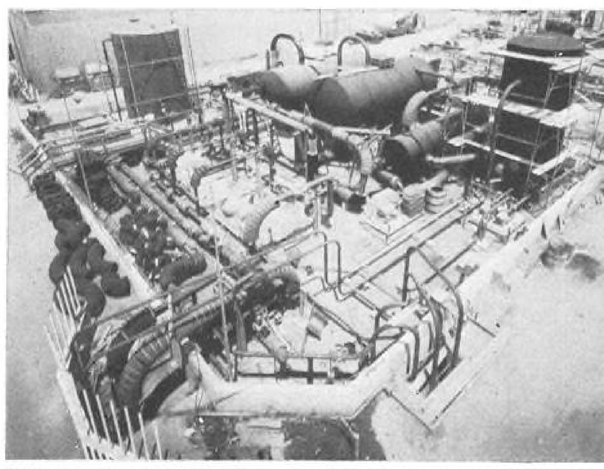
TEST RIG for B-66 series fuel-system testing with fuselage and wing tanks supported on superstructure. (Aft tank and left wing tank are not visible in picture.) The underslung tip tanks are supported (under wing tip) as they would be on B-66.



SKIN PANEL in huge 2,400,000-lb. tensile testing machine of Douglas' new engineering test laboratory. In actual operation, curtain on left is shrouded around the machine to prevent any chance of injury to the operator.



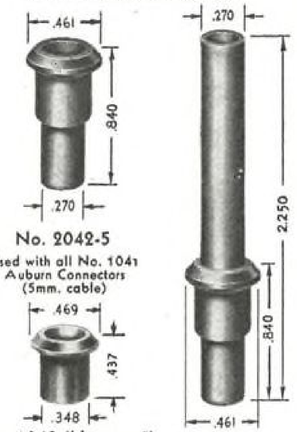
J71 JET ENGINE for RB-66 in laboratory's noise-killing test cell. Electrical junction board suspended from ceiling facilitates the interchange of J71 configurations with minimum time loss.



FUEL CONDITIONING SITE (pictured during construction) shows various tanks for fuel storage at ambient, low and elevated temperatures.

Auburn
IGNITION ACCESSORIES

Terminal Collars (Seals)
Ozone Resistant Hypreen*



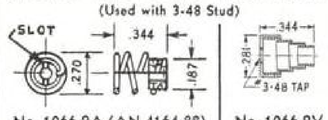
No. 2042-5
Used with all No. 1041 Auburn Connectors (5mm. cable)

No. 1042 (Hypreen*)
No. 1043 (Silicone)
Used with all No. 1041 Auburn Connectors (7mm. cable)

No. 1042-5
Used with all No. 1041 Auburn Connectors (5mm. cable)

*Auburn Synthetic Rubber

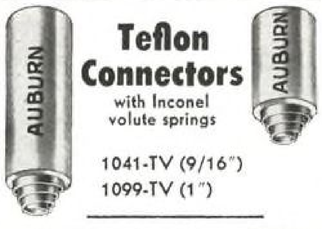
SPRING AND EYELET ASSEMBLIES
(Used with 3-48 Stud)



No. 1066-9A (AN 4164-22) with stainless steel coil springs

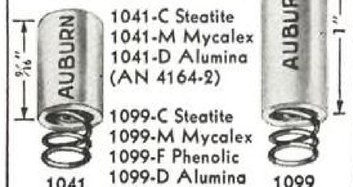
No. 1066-9V with Inconel volute springs

Teflon Connectors
with Inconel volute springs



1041-TV (9/16")
1099-TV (1")

Connectors with stainless steel coil springs

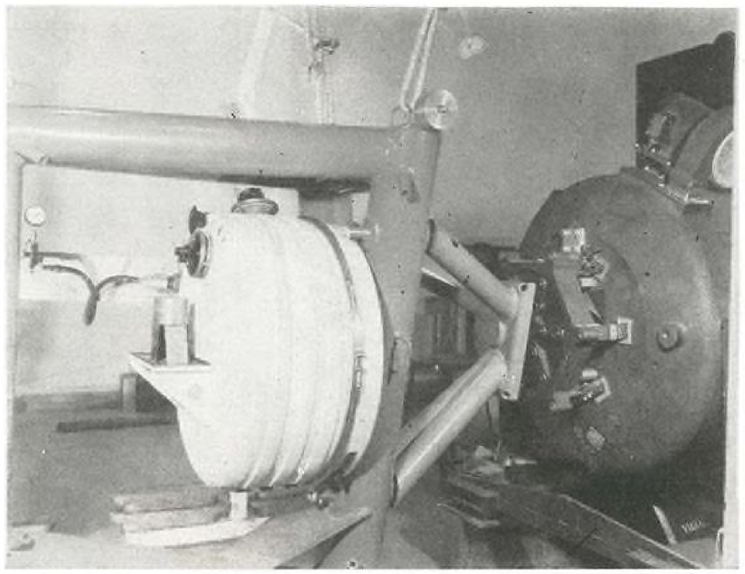


1041-C Steatite
1041-M Mycalex
1041-D Alumina
(AN 4164-2)

1099-C Steatite
1099-M Mycalex
1099-F Phenolic
1099-D Alumina
(AN 4164-1)

1041 1099

AUBURN SPARK PLUG
Co. Inc., Auburn, N.Y.



PRESSURE PACKAGE (right) connected to 2,500-lb. vibrator for avionics' testing.

checked out under environmental conditions.

This type of dynamic study of an overall system has been invaluable in solving stability problems encountered in recent aircraft designs, Douglas test engineers say.

The control system is built up full scale in the lab, including the hydraulic actuators, valves, associated mechanical linkages, cables and pulleys. The system is duplicated right out to the hinge line of the control surfaces. In place of the latter, springs are incorporated to simulate air loads at a given Mach number.

For one evaluation, the control system is excited at the surface end, for another it is excited at the pilot's input. Results present a picture of the dynamic characteristics of the system.

The amount of environmental preproving that the components of such a control system get before they are hooked up for an overall system check varies for the different units.

Environmental Tests

Electrical-mechanical actuators get the most thorough qualification tests—for operation under temperature extremes, sand, dust and humidity conditions, fungus-resistance, altitude operation, fatigue vibration resistance and explosion-contribution characteristics.

For these checks, the lab can produce temperature extremes of −100F to 500F.

The cold box for the −100F temperature is 50 ft. long, 18 ft. wide, 15 ft. high. Another box drops to −65F in the fast time of 3½ min.

Altitudes of 100,000 ft. can be simulated. One chamber capable of an 85,000-ft. condition is 40 ft. long and 12 ft. in diameter.

Aridity conditions not exceeding 5% humidity and sand and dust velocities of 2,300 fpm. can be produced.

Frequencies as high as 2,000 cps. can be duplicated—the highest value which can be measured accurately with existing instrumentation, Douglas test engineers say.

The complete fuel system is another installation which is tested under simulated service conditions in the environmental section of the lab.

The system components—tanks, plumbing, valves, etc.—are set up in a test rig to simulate the layout in the actual aircraft. Fuel cells are insulated with cork to maintain the fuel's temperature.

The system check includes rates of flow and pressure drops in the temperature range from −65F to 130F. This is done by conditioning fuel in a special facility which heats or cools as required before pumping to the fuel system in the test rig.

Altitude checks are conducted by introducing vacuum to the fuel cells to determine availability of fuel to the engines and evaporation rates.

In the same test rig, fuel flow under extreme attitudes of roll, climb and dive can be checked by rocking or tilting the fuel system.

Powerplant Section

Basic function of the laboratory's powerplant section is to test the powerplant installation for design capabilities under conditions of ground running or handling. Phases investigated include

Aviation Week Buyers' Guide

An Annual Publishing Service of Industry-Wide Usefulness

PUBLISHING DATE **NOVEMBER 28, 1955**

- **INDUSTRY-DEEP** Penetration Through Aviation Publishing's Largest Circulation
- **KEY** to the Major Buying Influences in the Multi-Billion Dollar Aviation Market

November 28, 1955, an all-important, needed publishing service will be available to the aviation industry . . . AVIATION WEEK's Annual BUYERS' GUIDE. The dramatic development of aviation into today's multi-billion dollar giant—reaching into all phases of manufacturing—demanding a constant flow of products and materials from tens of thousands of separate suppliers—has made a comprehensive, complete source book of suppliers and manufacturers a must for all segments of the Industry. AVIATION WEEK's BUYERS' GUIDE answers this intelligence need with an information service of year-'round usefulness, placed directly into the hands of some *57,000 key aviation engineers, management men, design and purchasing personnel—men who make up aviation's real buying influences . . . in the industry itself, in the Air Force, and throughout the Government.

The latest developments in military procurement will be covered in a special report. Included in the detailed information to be presented will be: Air Material Command—Air Research and Development Command buying practices, personnel listings—by name, procurement centers, etc.; All-inclusive listings of manufacturers of aeronautical and allied products, sectionalized for maximum utility under six major headings: **Aircraft;** Airframe and components, Armament, Fixed Equipment, Landing Gear, Powerplant. **Missiles;** Airframe and components, Equipment, including ground-handling, Powerplant. **Avionics;** Communications systems and equipment, Radar-fire control systems and equipment, Instrumentation and controls, Navigation systems and equipment, Components and devices, Test equipment, Computers and data processing equipment in airborne, ground-based or shipboard applications. **Supporting Groups;** Data systems, Electrical, Ground equipment, Hardware, Hydraulics, Instrumentation, Materials—including fuels, plastics, and chemicals, Tooling. **Nuclear Power Systems;** Accessories and components, Design services, Reactor fabrication. **Airlines and Airports;** Scheduled carriers, Non-scheduled carriers, Cargo carriers, Ground equipment, Lighting.

Indexing is set up to provide quick, easily referred-to locators for all products. In addition, advertisements and product listings will be keyed to each other for ready reference. AVIATION WEEK's BUYERS' GUIDE also will carry Trade Name and Distributor listings—making this publication **the most complete single source of buying information available to the aviation industry today.**

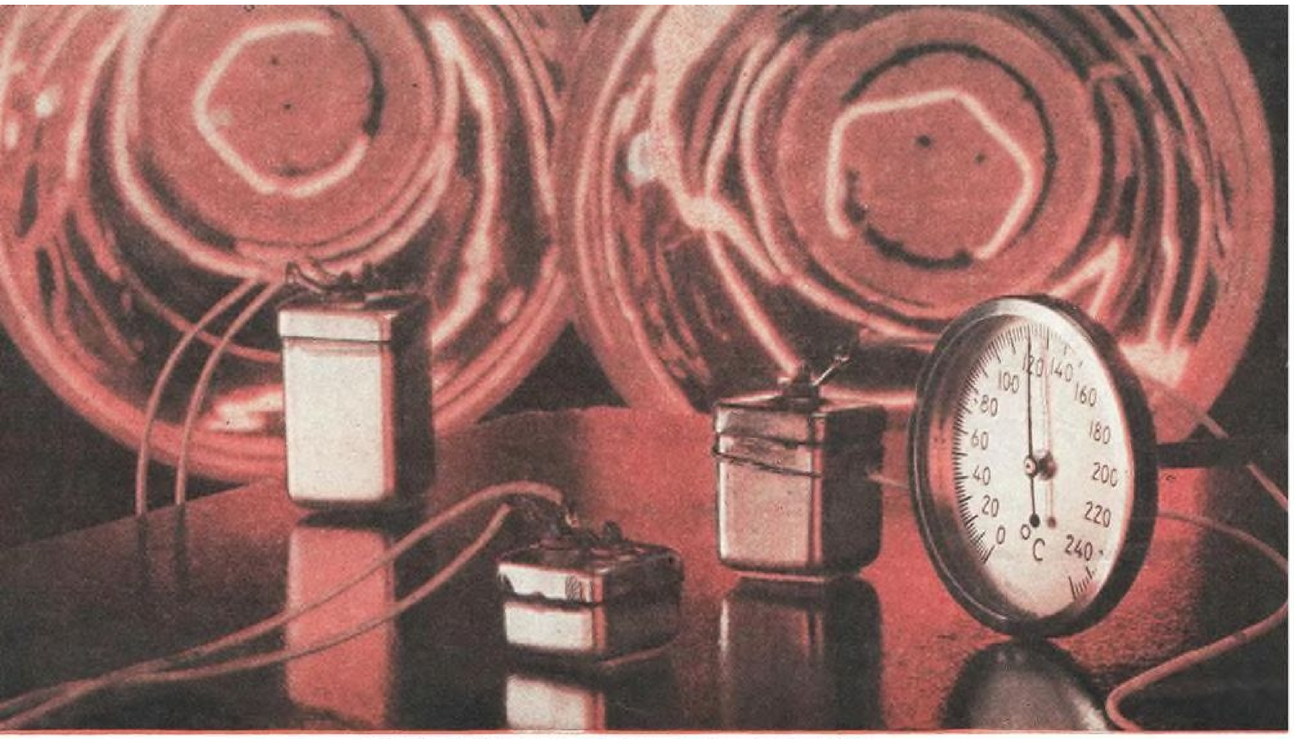
Every AVIATION WEEK subscriber will receive the BUYERS' GUIDE. That's a market of some *57,000 key aviation people . . . plus substantial bonus circulation through the sale of extra copies of the BUYERS' GUIDE to aviation companies and government agencies (Price for additional copies is $3.00 each). AVIATION WEEK's BUYERS' GUIDE will be read, referred to, and depended upon constantly wherever aviation business is transacted.

Be sure your complete line of products and services is listed in this basic book of buying information. Special discounts are offered for multipage and catalog-type advertisements. Your AVIATION WEEK representative will gladly help you plan your advertising to make the most economical and resultful use of the GUIDE. Call him today.

* Average net paid circulation, 51,893 (June, 1955 ABC Statement). Paid circulation of current weekly issues more than 53,000. Current weekly print order exceeds 57,000.

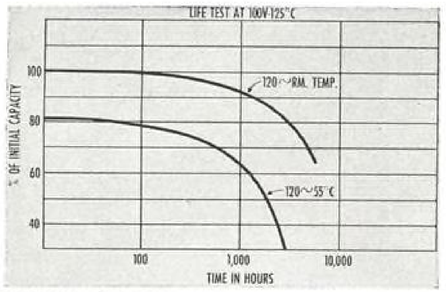
AVIATION WEEK

ABP A McGRAW-HILL PUBLICATION ABC

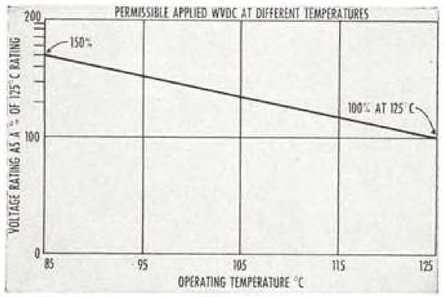


INFRA-RED LAMPS RAISE AMBIENT TEMPERATURE TO +125 C.

NEW G-E TANTALYTIC* CAPACITORS OPERATE AT +125°C AMBIENT



LONG LIFE of G-E high temperature Tantalytic capacitors is shown by this graph of life vs loss of capacitance for typical 100 volt d-c unit.



HIGHER VOLTAGES than 100 VDC can be applied . . . with no loss of life . . . at ambient temperatures below rated +125 C as shown above.

Available in ratings from 36 uf at 100 VDC to 180 uf at 30 VDC

Designed to operate at +125 C for 1000 hours with not more than 20% loss in initial +25 C capacitance, General Electric's new high-temperature Tantalytic capacitors meet the tough requirements of miniaturized military equipment.

FOIL CONSTRUCTION assures the same long life, high quality, and stable operating characteristics provided by +85 C Tantalytics. Unlike other types of Tantalytic capacitors, the foil construction also offers:

- **Both polar and nonpolar construction.**
- **Chemically neutral electrolyte . . . minimizes corrosion danger.**
- **Excellent mechanical stability . . . freedom from electrical noise under shock and vibration.**
- **Excellent reliability at rated temperatures . . . extended life at temperatures below +125 C.**

AVAILABILITY: G-E high-temperature Tantalytic capacitors can be obtained now in sample quantities for evaluation and prototype use. Production lots will be available by September in the following standard ratings:

Voltage	uf Case 1 ¾" x ¾" x 1 ⅛"	uf Case 2 ¾" x ¾" x ⅞"	uf Case 3 ¾" x ¾" x ½"
30	180	110	55
50	100	60	30
75	60	36	18
100	36	24	12

For more information, see your G-E Apparatus Sales Representative or write for Bulletin GEA-6258, General Electric Company, Section 442-27, Schenectady 5, New York.

*Reg. trade-mark of General Electric Co.

Progress Is Our Most Important Product

GENERAL ELECTRIC

tests to determine if the structure (nacelle skin, mount fittings, nacelle-to-strut fittings and exhaust pipe) is sufficiently strong, whether accessibility is adequate for maintenance of powerplant components and if sufficient cooling is provided. Fuel and oil systems and controls, both for propellers (in turboprops) and engines, also are checked.

Cooling studies are getting close attention on both the Allison J71 engine in the RB-66 and the Pratt & Whitney T34 for the C-133. Aim of the studies is to maintain a cool installation within established limits with a minimum loss of engine power.

In their cooling studies, Douglas test engineers are investigating various configurations of aluminum alloy nacelles, as distinguished from the stainless steel units preferred by some other airframe builders.

The aluminum alloy installation requires considerably more cooling than the stainless steel. However, Douglas test engineers feel that the drag loss caused by this internal cooling air flow is less than the effective drag of the heavier stainless steel nacelle with less cooling.

Cooling is induced into the nacelle through flush ducts in the skin by aspirating effect of the engine exhaust.

Testing is done on a duplicated airplane powerplant installation including a portion of the wing, the strut, nacelle, engine and associated systems.

Powerplant installation tests for the RB-66's J71 are being conducted in a jet test cell capable of accommodating engines with up to 20,000-lb. thrust. The cell is constructed to contain engine noise, so the control room is not insulated against sound.

The T34 turboprop engine for the C-133 is mounted on a test stand located in the open because of the propeller slipstream air requirements and the lower noise levels. The control room for the setup is insulated.

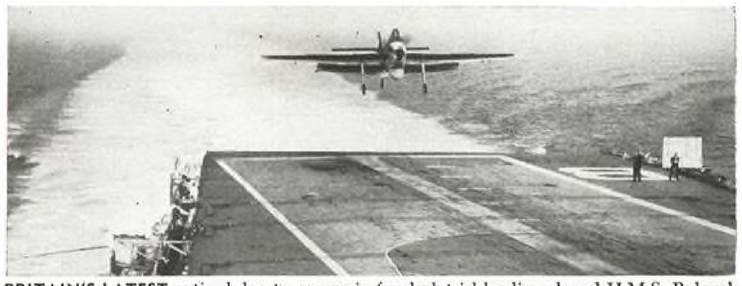
Extensive development work also is being conducted in the powerplant test section on airborne pneumatic starting systems for jet and turboprop engines. This phase of work has been given increasing attention, Douglas says, because starter power availability has not kept pace with engine starting power requirements.

Electrical Section

The laboratory's electrical test section has a big hand in the C-133 project.

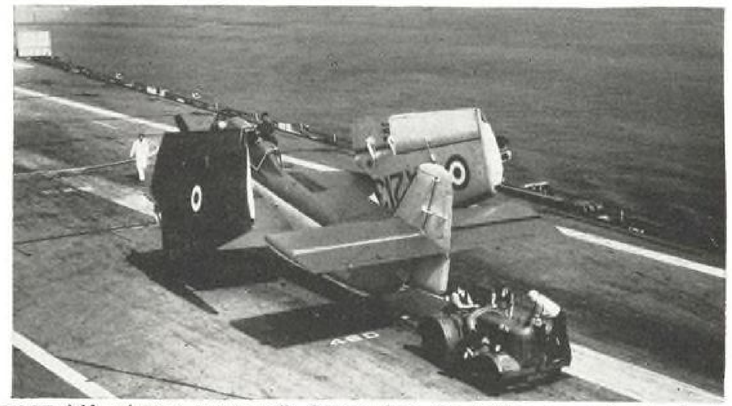
It uses more than 1,000 strain gages on the fuselage, wing and other structural components to measure stress concentration patterns. This involves an elaborate wiring and read-out system, developed and built at Douglas, con-

British Seamew Makes First Carrier Flight

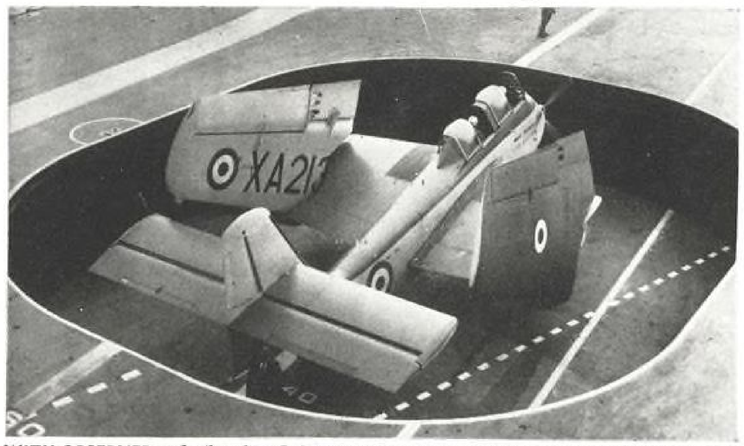


BRITAIN'S LATEST anti-sub hunter comes in for deck-trial landing aboard H.M.S. Bulwark.

SLOWED by large wing flaps in landing, the Seamew is stopped by carrier's arresting gear.



PILOT folds wings as tractor pulls Seamew from the landing area and onto elevator.



WITH OBSERVER and pilot aboard, Seamew disappears on elevator en route to hangar deck.

sisting of large 100-channel balance panels which automatically plot curves of stress versus percent load.

Big job was in waterproofing these strain gages for underwater pressure tests of the C-133 fuselage. Unusual solution was to use simple "hot patches" to cover strain gage and wiring connections. Douglas test engineers believe this is the first time this technique has been used in the aircraft industry to waterproof strain gages.

Application of the hot patch takes no more than a minute. Moreover it is relatively inexpensive in bulk quantities when compared to other methods —which, incidentally, have not been completely successful, Douglas says.

The mockup built for the B66 electrical system was an extensive job. This involved considerable development work in fault-clearing characteristics of the system and much effort in finding suitable circuit breakers and fuses to handle large electrical overloads.

The work led to new circuit breaker designs, which were built to Douglas specifications. The new units have very fast response to insure that there will be no burnout and a resultant system failure.

Transducers for high-temperature service are getting a close look in the electrical test section in connection with jet and turboprop engine motion studies to determine growth in engine length and to investigate engine vibration characteristics. The transducers must be located in the high-temperature areas for good pickup points.

The general aim of this investigation, a Douglas engineering test spokesman said, is the development of new transducer types with accuracy and reliability not now available.

Pressurization Tests

The C-133 fuselage will be checked in a new underwater pressurization test tank now under construction at the engineering test laboratory.

Measuring 170 ft. in length, 30 ft. wide and 24 ft. high, the tank will easily accommodate the 150-ft. length and 16⅔-ft. diameter of the C-133 fuselage. The first underwater pressurization check of the fuselage is scheduled for early fall.

Both fuselage and tank will be filled with water. The greater pressure of the water in the sealed fuselage will simulate the pressure differential and create a flow pattern at points of leakage. Detection of these leak points will be facilitated by the use of a filtration plant to keep the water clean and free from mistiness.

Viewing ports along the side of the tank will permit observation during tests.

Inside the tank there will be strong

Rolls-Royce built the first propeller turbine aero engine to fly.

★

A Rolls-Royce propeller turbine engine was the first to be officially approved for civil aviation.

★

The only propeller turbine engined airliners in service in the world are powered by Rolls-Royce.

★

Eighteen airlines have ordered Rolls-Royce propeller turbine aero engines.

★

Capital Airlines have bought Rolls-Royce propeller turbine aero engines.

★

ROLLS-ROYCE

AERO ENGINES LEAD THE WORLD

points to support the fuselage and apply loads to it.

A future projection for the tank includes an arrangement similar to that used by the British for water-testing the Comet. The wings will be attached to the fuselage and carried through the tank walls, with sealing at the areas of contact. With this arrangement, the wing panel can be deflected hydraulically to simulate flight-imposed and other loads.

In addition to the water pressure testing of the overall C-133 fuselage in the new tank, a separate cockpit section will be pressure-fatigue tested in a circular tank 37 ft. in diameter and 20 ft. deep. The walk platform around the top of the tank and viewing ports installed in the tank side will be used by observers during the pressure cycle run.

Red Star Takes Look At American VTOLs

Red Star, official organ of the Soviet Ministry of Defense, has shown a keen interest recently in Western—particularly American—progress in the development of vertical take-off fighters and convertiplanes. The Russian military newspaper noted the need for VTOLs and convertiplanes and then described American efforts:

"One of these (VTOLs) powered by a 5,850 hp. engine, completes a vertical take-off in 17 sec. and changes to a horizontal position at a height of 60 meters (slightly under 200 ft.). An experimental model helicopter-plane powered by a 450 hp. engine, develops a top speed of 280 kilometers per hour (about 175 mph.)" Presumably, the Russian paper was referring to the Convair Pogo and the Bell XV-3 respectively.

Survival in Atomic War Chicago Forum Topic

Business survival in the face of atomic attack will be discussed in a Nov. 17 conference sponsored by the Armour Research Foundation at the Illinois Institute of Technology, Chicago.

Industry, government and research experts will address the conference in an effort to establish priorities for the protection of selected operations within the individual companies as well as among industrial areas in the event of attack.

The conference will air such related problems as protection possibilities of underground construction, industry operation under emergency conditions, continuity of management and the location and preservation of vital records.

The Chance-Vought Regulus takes to the air. Precision actuating assemblies for this and other guided missiles are part of Ex-Cell-O's production.

Four typical actuating assemblies precision-built by Ex-Cell-O for planes and guided missiles.

You Can Be Confident of Precision
With Ex-Cell-O Parts or Assemblies

Almost every plane you see streaking across American skies, flies with Ex-Cell-O precision parts or assemblies—precision-built to fulfill ever more rigid design specifications.

From design to final inspection skilled personnel, working with the most complete manufacturing facilities available, build precision into every part and assembly. That's why the aircraft industry has placed confidence in Ex-Cell-O for over 30 years.

For parts or assemblies that meet your most rigid specifications—that meet your delivery schedules—send your print or sketch to:

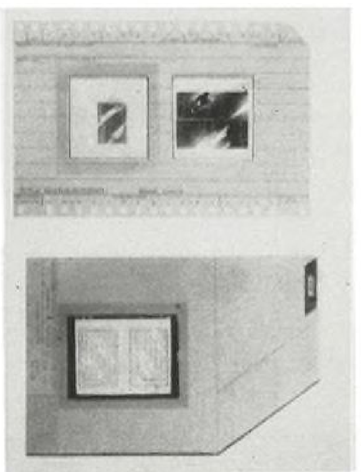
55-42

XLO
EX-CELL-O for PRECISION
EX-CELL-O CORPORATION • DETROIT 32, MICHIGAN
MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

FILMSORT SURVEYOR projects film to 24x36-in. size. Other projectors are on market.

Handling of Drawings Streamlined

FILMSORT MOUNTER shown here can attach as many as 350 microfilm frames to punch cards within an hour.



SAMPLE CARDS with mounted microfilm. Punch card, top; visual card, below.

The combination of two common techniques—microfilms and punch cards—gives promise of great savings in the handling of engineering drawings.

It now costs one of the military services $15 to find, reproduce and refile a single engineering drawing, according to standards and methods specialists who studied the problem for the service. The new procedures, now in the pilot production stage, will bring the cost down to a few cents for an estimated annual saving of $10 million and numberless manhours. In most cases, it will be more economical to destroy the reproduction after each reference than to refile it.

Microfilmed copies of drawings or documents are mounted mechanically or manually on an "aperture" card developed by the Filmsort Division of the Dexter Folder Co., Pearl River, N. Y. The aperture card is either a standard type of punch card or a visual reference card with a cutout for the microfilm. Information pertinent to the drawings is punched, typed or written on the card.

If punch cards are used, they are run through a sorting machine when a particular drawing is desired. Visual-type cards are treated like any other hand-filed material. The cards take either 16 or 35-mm microfilm.

According to the Filmsort company, one of the military services will shortly amend its procedures to permit bidders to submit microfilmed copies of drawings with their proposals.

Many companies already have facilities for microfilming, photo-copying and punch-tabulating. For those that don't, most large cities have organizations which supply these services, Filmsort said.

Willys Gives Kaiser Control Over Avionics

Kaiser Aircraft and Electronic Corp., a wholly owned subsidiary of Willys Motors Inc., acquired the aircraft and electronic business conducted by the parent firm effective Sept. 1.

The following plants and operations are involved:

- **Richmond, Calif.** Machining of structural parts for the Boeing B-52 jet bomber and the KC-135 jet tanker at former Shipyard No. 2, now known as Richmond Machining Division, and industrial machining at former Shipyard No. 3.
- **San Leandro, Calif.** Manufacture of components for the Lockheed P2V patrol bomber at the Oakland Aircraft Division and marketing of the Kaiser Nest-A-Bin, an aluminum bulk materials container.
- **Palo Alto, Calif.** Laboratory research and development of cathode ray tubes and related electronic equipment.
- **Toledo, Ohio.** Engineering and manufacturing of electronic equipment in the guided missile and broadcasting fields.
- **Kaiser Aircraft and Electronics,** formerly Chase Aircraft Co., Inc., will continue to operate as suppliers to commercial and military customers.

Management and personnel at the five plants remain unchanged.

Small Businesses Get More Defense Awards

Small business received $315 million in Defense Department contract awards in May 1955.

The awards were above the average for the previous ten months, Thomas I. Pike, Assistant Secretary of Defense for Supply and Logistics, said. They amounted to 39.1% of the total net defense awards for the month and 26.8% of the new business awarded.

Pike warned that the May figures should not be taken as typical. He said the average share to small firms for the first five months of 1955 was 25.5%.

Certificate of Necessity For United Aircraft

United Aircraft Corp., East Hartford, Conn., has been granted a $954,000 certificate of necessity for aircraft engines and parts by the Office of Defense Mobilization with 55% of the amount allowed for rapid tax amortization.

Other recent certificates include:

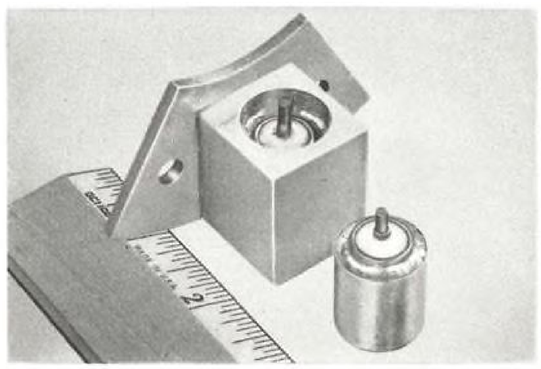
Kearfott Co., Inc., Little Falls, N. J., military aircraft instruments, $119,152 certified 65% allowed.

Ex-Cell-O Corp., Lima, Ohio, military en-

This is A. L. Paquette, manager of aircraft equipment field sales

Mr. Paquette supervises those engineers specifically assigned to aircraft electrical systems, system components and accessories. On his team are *The Men With The Facts*. Contact him or one of the men working with him by writing to Westinghouse Electric Corporation, Aircraft Equipment Department, Lima, Ohio. They can tell you why Westinghouse can offer you:

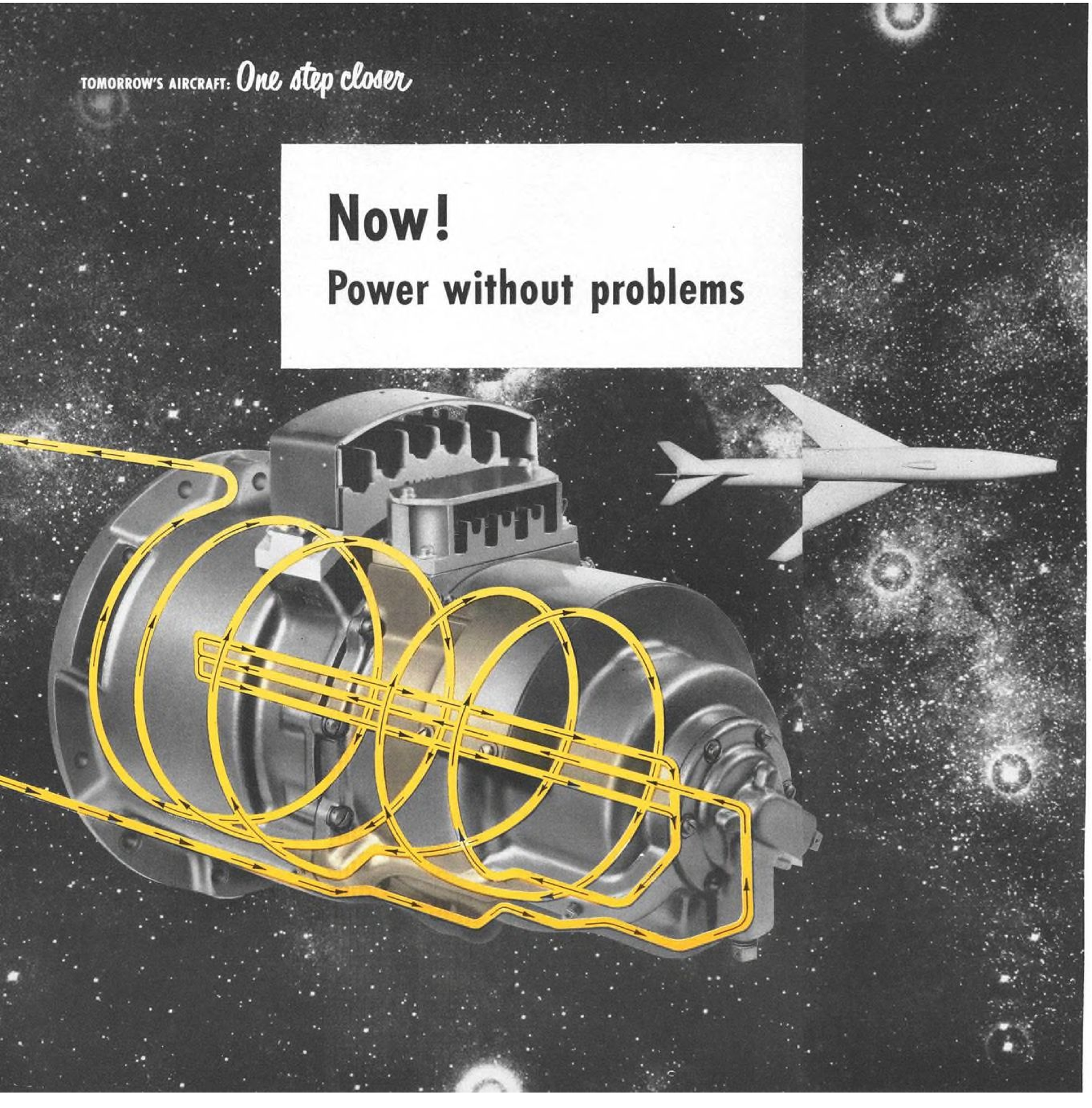
Now! Power without problems



Shown here is a high-temperature diode, the Westinghouse development that made possible the design of a high-performance generator that doesn't use commutators, slip rings, carbon brushes or grease-lubricated bearings. J-91024-A

For more information on this revolutionary a-c generator . . . turn the page →

YOU CAN BE SURE...IF IT'S
Westinghouse



This revolutionary a-c generator is cooled and lubricated by engine oil . . . has no brushes, slip rings, commutator or grease-lubricated bearings . . . gives superior performance.

Westinghouse research in the field of semiconductors produced the high-temperature silicon diodes that are the key to the operation of this new generator. A-c power generated in the exciter armature is fed into the silicon rectifiers mounted on the generator shaft. The resulting d-c output supplies the main rotating d-c field.

Without brushes, aviation gas turbine engine oil can cool and lubricate the generator. Oil is pumped through the generator shaft, through tubes in the frame casting, and is used in the hydraulic constant-speed drive. All heat picked up by the oil is dissipated in the engine oil cooler. The generator operates safely with engine oil at temperatures up to 300 degrees Fahrenheit. All the usual generator trouble spots are eliminated—no brushes or commutating parts to wear, bearing lubricant is continuously replaced.

This is the first generator that is completely integrated with its drive, with the engine oil cooling system and with the balance of the electrical system. It is completely enclosed; there are no air tubes or ducts to occupy space and clutter up the airframe; all external oil seals are static and there is no overboard drainage of oil. No additional plumbing is required because the extension of the engine oil lubricating system is all internal. Now—aircraft altitude and speed will no longer be limited by the electrical system—a big step toward helping you bring tomorrow's aircraft . . . one step closer. J-91024-B

THE WESTINGHOUSE AVIATION FAMILY

Jet Propulsion • Airborne Systems Components • Wind Tunnels
Airborne Electronics • Airport Lighting • Ground Electronics
Aircraft Electrical Systems and Motors

YOU CAN BE SURE... IF IT'S
Westinghouse

Developed under basic Link patents, the F-102 Jet Flight Simulator duplicates exact flight conditions of the famous Convair Delta-Winged Interceptor.

Link invites applications from qualified engineers and draftsmen.

Manufacturers of world-famous Link trainers and simulators (such as F3D, B-47, F-89, F2H-2, F2H-3) • simulated aircraft instruments specialized computers • servo mechanisms • computer components gear boxes • friction over-drive clutches • precision potentiometers ratio voltmeters • phase angle meters • and other electronic devices

An arsenal on wings, the USAF's newest jet fighter, the F-102, flies through space at supersonic speeds and packs the fighting punch of a thousand bolts of lightning!

But, new developments in aircraft make new demands on men. And, to help train the pilots who will fly this delta-winged jet in the defense of America, Link has developed the first F-102 jet flight simulator.

Months of research were necessary, but now, USAF pilots train on the ground in conditions precisely duplicating those of the plane's air performance. Electronically, the Link simulator re-creates all the actual flight characteristics of the F-102. Airmen will pilot a familiar craft when they first "hit the air" in this vital air-defense weapon.

As man shrinks horizons, Link keeps pace with progress. Wherever men are planning today to conquer tomorrow's skies, you'll find Link.

LINK AVIATION, INC.
BINGHAMTON, N. Y.
A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

gine parts, $129,160 certified with 40% allowed.

Temco Aircraft Corp., Garland, Tex., military aircraft assemblies, $550,000 certified with 45% allowed.

Pheoll Manufacturing Co., Chicago, Ill., titanium aircraft rivets, $129,640 certified with 65% allowed.

Beech Aircraft Corp., Wichita, Kan., military aircraft, $123,326 certified with 65% allowed.

PRODUCTION BRIEFING

► **Air Cruisers Div.** of the Garrett Corp., Belmar, N. J., has been appointed by B. F. Goodrich Co. to fabricate Vulcafilm products. Vulcafilm is a new rubber product designed for simple fabrication of large rubber articles requiring oil-proof, high-strength construction.

► **Nuclear Development Associates, Inc.** has changed its name to Nuclear Development Corp. of America and is moving its offices to 5 New St., White Plains, N. Y.

► **First commercial production** and stocking of nylon web assemblies for jet overrun barriers has been undertaken by the Boyt Co., Des Moines, Iowa. Barriers consist of horizontal nylon web strap with 10,000-lb. tensile strength standing 39 in. above and 134 ft. across a 150 ft. wide runway.

► **Cowan Aircraft Associates,** 241 Clay St., San Francisco, has been appointed exclusive export distributor in Japan for synthetic rubber O-ring seals, manufactured by Parker Appliance Co., Cleveland.

► **An electronic fuel measurement system,** used on B-66s, B-47s, C-130s and other aircraft, has been named to the Military Qualified Products List as acceptable to the Air Force for use on combat planes. It was developed and produced by the Aeronautical Div. of Minneapolis-Honeywell Regulator Co.

► **Mallory-Sharon Titanium Corp.,** Niles, Ohio, recently shipped 15,000 lb. of the new titanium alloy MST-6A1-4V in 6½-in. billets. Shipment contained sufficient titanium to produce compressor disk forgings for 50 jet engines of a type which will utilize more titanium than any engine in use today.

The new alloy (6% aluminum, 4% vanadium, balance titanium) can be used at temperatures of up to 750F with minimum creep or change of properties.

► **The Society of Licensed Aircraft Engineers** moved its offices to 1 High St., Maidenhead, Berks., England.

► **Marquardt Aircraft Co.,** Van Nuys, Calif., is expanding its ceramic and

KAISER
FLEETWINGS

Subassembly of B-57 wing designed and fabricated for The Glenn L. Martin Company

WE WANT INTRICATE FABRICATIONS

We like the tough jobs. The ones that require design and development, engineering know-how and ingenuity, production capacity and experience. We're prepared to go all the way with you—from design to mass production—in a wide range of alloys, sizes and shapes.

On the mainline of the PRR, midway between Trenton, N.J., and Philadelphia, Pa.

FLEETWINGS DIVISION
KAISER METAL PRODUCTS, INC.
BRISTOL, PA.
IN THE HEART OF THE DELAWARE VALLEY

MOOG

For the design, engineering and manufacture of electro-hydraulic servo valves and actuators.

MOOG

VALVE CO., INC.

PRONER AIRPORT

EAST AURORA, N. Y.

cermet research to find materials that can withstand the high temperatures of sustained supersonic flight. Alan Levy, supervisor of materials and process section, is in charge of the new program.

► **Electro Tec Corp.**, S. Hackensack, N. J., is constructing a 15,000-sq. ft. plant in Ormond Beach, Fla., for the manufacture of precision slip ring assemblies.

► **Menasco Manufacturing Co.**, Burbank, Calif., has received orders from Lockheed Aircraft Corp. for the main landing gear of the 1649 Super Constellation.

► **Acme Aluminum Alloys, Inc.**, Dayton, is undertaking a $500,000 expansion and renovation program designed to change its foundry to machine operations. Consolidation in one building is also planned.

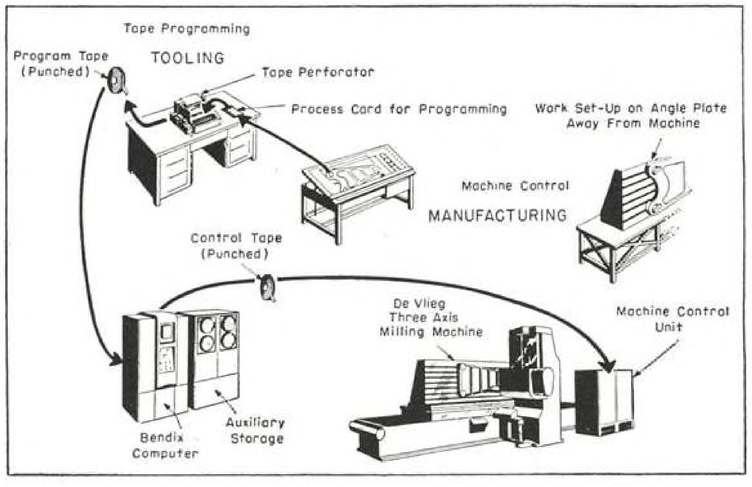
► **Carrier Corp.** has established divisional status for its aircraft plant at Monrovia, Calif. The move was coincident with receipt of sub-contracts extending into 1957 for components of the North American F-86 Sabre and the Boeing KC-135 jet tanker.

► **McDonnell Aircraft Corp.**, St. Louis, has awarded contracts amounting to more than $775,000 to Beech Aircraft Corp., Wichita, for auxiliary fuel tanks to be used on Navy's McDonnell F3H Demon jet fighter.

► **Piasecki Helicopter Corp.** has leased approximately 9,000 sq. ft. of office space for its engineering division on Baltimore Pike, Springfield, Pa. The corporation also has acquired about 12,500 sq. ft. of additional parking area for its Ardmore plant.

► **Hexcel Products Inc.**, formerly California Reinforced Plastics Co., manufacturers of structural honeycomb core materials used in aircraft and missile construction, has established an Eastern Division at 238 N. Franklingtown Rd., Baltimore 23, Md.

► **M. J. Johnson Aircraft Engineering Co.**, Morris Plains, N. J., designers and manufacturers of aircraft controls and instruments, has purchased Borden Engineering Co., New Providence, N. J.

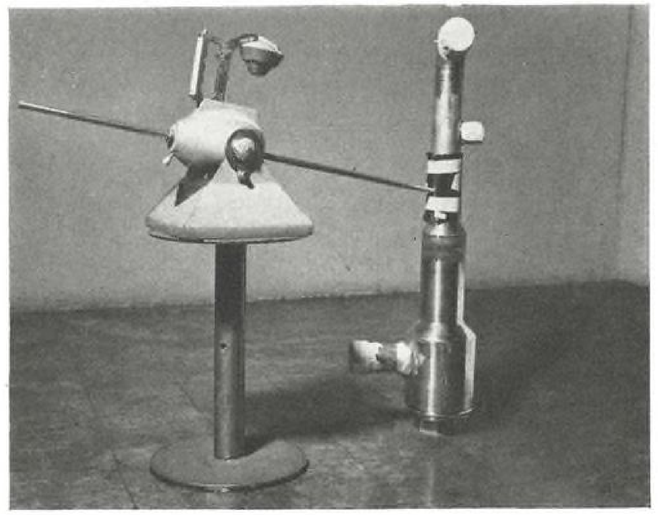


Martin Automates Precision Miller

Glenn L. Martin Co. is the latest aircraft manufacturer to announce automation of a production machine, with award of a contract to Bendix Aviation Research Laboratory, Detroit, for an electronic control system. The machine to be automated is a precision DeVlieg horizontal miller.

The project, sponsored by the USAF, is a production adaptation of the Numerical Control System developed at Massachusetts Institute of Technology.

This is how the automation setup will work: Tool engineers program machine operation on a tape perforator; program tape is fed into computer which converts information into control data punched on a machine control tape; data for cutting standard arcs and other routine movements are stored on magnetic tape in auxiliary storage unit, from which they are drawn by the director computer as needed; finally, the machine control tape guides movements of the milling machine cutter, through a machine control unit, to produce the part.

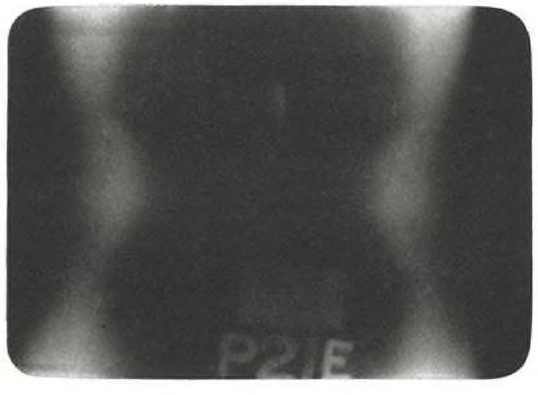


Welded pipe joint being radiographed with isotope camera using iridium 192.

It's piping with problems—

so every joint is welded—and

RADIOGRAPHED



THIS UNIT of a piping system is headed for duty never faced by piping before. High pressure? Yes. High temperature? Yes.

Critical work like this calls for welding—with radiography proving every weld sound.

Welding has a staunch friend in radiography.

In high-pressure piping, in the manufacture of pressure vessels, and in structural applications, radiography continues to open up new opportunities for welding.

Radiography can help you build business, and earn a reputation for highly satisfactory work.

If you would like to know more about what it can do for you, talk to your x-ray dealer.

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

Radiography...

another important example of Photography at Work

Kodak
TRADE-MARK

USAF Contracts

Following is a list of unclassified contracts for $25,000 and over as released by Air Force Contracting Offices:

ROME AIR FORCE DEPOT, N. Y.

Freeman Elec. Construction Co., Inc., 1409 E. Dominick St., Rome, N. Y., electrical alterations and additions to various bldgs. at Verona test Site, Verona, N. Y. and Griffiss AFB, Rome, N. Y., (IFB-30-635-55-155), job, $26,078.

Daystrom Electric Corp., 753 Main St., Poughkeepsie, N. Y., telegraph repeater unit, (IFB-30-635-55-4022), 30 ea., $138,317.

I-T-E Circuit Breaker Co., Special Products Division, 601 E. Erie Ave., Philadelphia 34, Pa., radar set group OA-703/CPN-18, (IFB RFP-30-635-55-4021), 81 ea., $262,180.

Eastman Kodak Co., 343 State St., Rochester 4, N. Y., film, 9½" X 370', type 1B, class N, (IFB RFP-30-635-55-4185), 4,360 rolls, $283,269.

General Aniline & Film Corp., Ansco Div., Binghamton, N. Y., film, 24", 30", ortho, vinyl base, 2,400 pkg.; film, 30" X 40", ortho, vinyl, base, 70 pkg., film, 40" X 52", ortho, vinyl base, (IFB RFP-30-635-55-4182), $122,642.

Di-Noc Co., 1700 London Rd., Cleveland, Ohio, film, 24" X 30", ortho, vinyl base, 3,600 pkg., film, 30" X 40", ortho, vinyl base; film, 40" X 52", ortho, vinyl base, (IFB RFP-30-635-55-4182), $166,626.

General Aniline & Film Corp., Ansco Div., Binghamton, N. Y., film 30" X 100', photographic, 800 rolls; film, 24" X 30", photographic, 260 pkg., paper, 20" X 24", 100 pkg., (IFB RFP-30-635-55-4188), $50,689.

Eastman Kodak Co. 343 State St., Rochester, N. Y., film, 9½ X 370', photographic, (IFB RFP-30-635-55-4187), 1,794 rolls, $11,891; film, 9½" X 370', type 1B, class N, 1,386 rolls; film 18½" X 46', type 1B, class N, 1,100 rolls, (IFB RFP-30-635-55-4176), $150,768.

Hyde Windlass Co., Bath, Me., turntable, radar set, MT-1173/FPN, (IFB RFP-30-635-55-5655), 45 ea. $647,460.

Parkchester Machine Corp., 204 Lafayette St., New York 12, N. Y., jumper cable, AB-3, 80 ea., jumper cable, ABI-24, 8 ea., jumper cable, AB-30, 80 ea. (IFB RFP-30-635-55-5049), $29,057.

Orradio Industries, T-120 Merrick Rd., Opelika, Ala., rolls of tape, 16,580 ea., empty reels, 3,252 ea., (IFB RFP-30-635-55-4010), $217,552.

Bendix Radio Div., Bendix Aviation Corp., Baltimore 4, Md., crystal oscillator calibrator, 85 ea., stalo checker, 2 ea., low voltage dummy load, 6 ea., (IFB RFP-30-635-55-5535), $52,846.

Consolidated Diesel Electric Corp., Stamford, Conn. power package for AN/FSP-14, (IFB RFP-30-635-55-5542), 200 ea., $2,504,-839.

Grant Photo Products, Inc., 18915 Detroit Ave., Cleveland, Ohio, paper, 10" X 10", type IE, contrast 2,300 pkg., paper 10" X 20", type IE, contrast 3, 400 pkg., paper, 10" X 10", type IIE, contrast 2, 300 pkg., (IFB RFP-30-635-55-5174), $45,072.

Harvey Wells Electronics, Inc., North St., Southbridge, Mass., sound ranging set, AN/UNS-1, (IFB RFP-30-635-55-4020), 5,500 ea. $910,280.

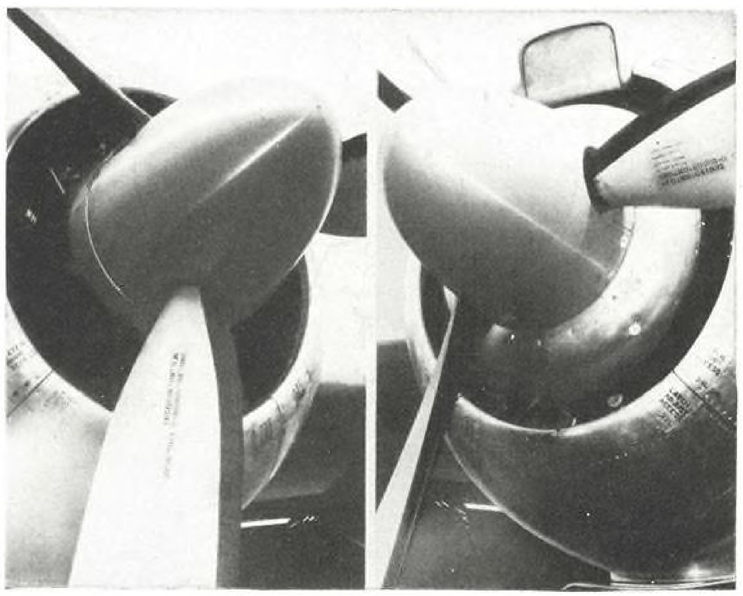
General Cable Corp., Railroad St., Rome, N. Y., cable-power, elec 4 cond., (IFB 30-635-55-81), 53,000 ft., $49,782.

Gilfillan Bros. Inc., 1815 Venice Blvd., Los Angeles 6, Calif., rack indicator, 13 ea., rack, 17 ea., (IFB RFP-30-635-55-5656), $185,305.

Stewart R. Browne Mfg. Co., Inc., 258 Broadway, New York 7, N. Y., flashlights, (IFB-30-635-55-164), 15,198 ea., $35,411.

Chatham Electronics, 630 E. Mt. Pleasant Ave., Livingston, N. J., tube, hydrogen, type 1257, (IFB-30-635-55-142), 24 ea., $34,560.

Tower Construction Co. 2700 Hawkeye Dr., Sioux City, Iowa, antenna AS-778/FRC, high power, low frequency, 300 ft., (IFB RFP-30-635-55-4019), 9 ea., $156,022.



New Nacelle for Super Connies

Redesigned Nacelle (picture on right) for Lockheed Super Constellation includes new air scoops and propeller afterbodies or "dishpans." (The original nacelle is shown at left.) Air scoop at top of Nacelle in righthand photo adds almost 1,000 ft. of critical altitude at maximum cruise power settings by eliminating more complicated air channel previously used. The afterbodies are now standard equipment on model 1049G Super Constellations and have been retrofitted on a number of 1049C and 1049E models. They increase cruise speeds by 2 mph. by reducing air flow separation and consequent drag.

DAYTON AIR FORCE DEPOT, Ohio.

Testa Manufacturing Co., 10130 East Rush St., El Monte, Calif., collimator, vertical, 17 ea., $28,446.

Westinghouse Electric Corp., 32 North Main St., Dayton, Ohio, reproducible copy for handbook of operation and service instructions and reproducible copies for illustrated parts breakdown covering test sets, 1JD661-G1, 1JD662-G1, 1JD6663-G1, 1JD-658-G1, 1JD660-F1, 1JD655-F1, 1JD664-G1, 1JD665-G1 1JD666-G1, 1JD667-G1, 1JD-668-G1, T31775 1 ea., (IFB PR 204352), $77,890.

Commercial Research Laboratories, Inc., 20 Bartlett Ave., Detroit, 3, Mich., electronic counter adapter kit, 23 ea., (IFB RFP 33-604-55-3833) $35,105.

General Electric Co., One River Road, Schenectady 5, N. Y. tube, electron, transmitting, triode, general purpose, JAN type 3C22, (IFB RFP 33-604-55-1507), 1,814 ea., $339,218.

Control Products Inc., 306 Sussex St., Harrison, N. J., switch, thermostatic, 6,000 ea., (IFB PR 561914), switch, thermostatic, 12,680 ea., (IFB PR 561970), $192,964.

Phaostron Co., 151 Pasadena Ave., South Pasadena, Calif., mutimeter TS-352A/U, 565 ea., maintenance spare parts, (IFB RFP 33-604-55-3696), $42,117.

Radio Condenser Co., Davis and Capewood Sts., Camden 7, N. J., capacitor, variable, air dielectric, 300 ea., (IFB PR 588808), $26,771.

Raytheon Manufacturing Co., 100 River St., Waltham, Mass., transformer, power, 40 ea., 100 ea., 80 ea., 100 ea., transformer pulse, 100 ea., (IFB RFP 33-604-55-3462), $26,724.

Tektronix, Inc., Portland, Ore., oscilloscope, contractor's model 315D, (IFB PR 410638), 85 ea., $61,523.

Testa Manufacturing Co., 10130 East Rush St., El Monte, Calif. sextant mount, collimator, contractor's P/N D-2218 with floor-type stand, (IFB PR 659562), 18 ea., $25,051.

Trad Electronics Corp., 1001 First Ave., Asbury Park, N. J., signal generator AN/GRM-4, 198 ea., (IFB RFP 33-604-55-2918) $169,297.

Western Electric Co., Inc., 120 Broadway, New York 5, N. Y., reproducible copy for handbook of operation, service and repair instructions on electronic test equipment, 4 ea., 6 ea., 6 ea., 10 ea., (IFB PR 560992 and amend. no. 1) $721,290.

WARNER ROBINS AIR MATERIEL AREA, Ga.

Sheridan-Pumaro Co., P. O. Box 1333, Macon, Ga., modification of bulk supply warehouse, (IFB-87-—local purchase), job, $223,136.

N. M. Bentley, 613 Carmen Place, Macon, Ga., painting exterior and interior of buildings, (IFB-88—local purchase) job, $138,-853.

Smith Electric Co., P. O. Box 134, Opelika, Ala., alterations for expansion of grinding and machine shop bldg., (IFB-96—local purchase), job, $32,420.

Electronic Tube Corp., 1200 E. Mermaid Lane, Philadelphia 18, Pa., cathode ray electron tube, type 5 FP14A, 2,200 ea., (RFP 1238), $28,600.

Packaging Industries Ltd., Inc., 50 Church St., Montclair, N. J., heat sealing machines, (RFP-1337, bench type, size 12, type 2, 99 ea., bench and/or portable type size 12, type 3, 80 ea.), export packed, $164,305.

Cleveland Lathe and Machine Co., 5400 Brookpart Rd., Cleveland 29, Ohio, heat sealing machines, (RFP-1337, portable type, size 6, type 1 157 ea.), export packed, $69,912.

Heyer Products Co., Inc., 471 Cortlandt St., Belleville 9, N. J., metallic rectifier, portable, trainer power supply, direct current, type F-1, export packed, 364 ea., (AFP-1349), $93,318.

Barrett Equipment Co., 2101 Cass Ave., St. Louis 6, Mo., grinding machine for brake shoe lining, portable, heavy duty, size 2, 115 ea., (RFP-1320), $46,359.

Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio, tube flaring and beading machine, mechanical type, bench mounted,

To Produce Jet Engine Blades of Superior Quality—Eaton Developed its famous ROLL-FORM Process

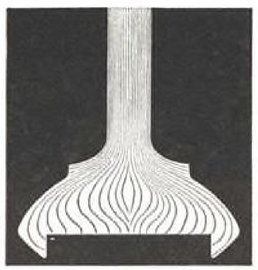


Illustration of section through root of an Eaton Roll-Form titanium blade, showing the excellent flow lines characteristic of this process.

In the Eaton Roll-Form process of producing jet engine blades—a process originated and perfected by the Eaton Manufacturing Company—the complex curves of the blade surfaces are formed by simple rolling operations, in which the grain structure of the metal is rolled to conform to the blade contour. The Eaton Roll-Form blade thus produced combines high fatigue strength and required tolerances—and is made with the most economical utilization of costly raw material.

The development of the Roll-Form process is typical of the many Eaton engineering achievements which have earned Eaton a reputation as a progressive and dependable source of supply to the aircraft industry for more than a quarter century.

EATON AIRCRAFT DIVISION MANUFACTURING COMPANY
BATTLE CREEK, MICHIGAN

IFF

(identification, friend or foe)

the Electronic Sentinel THAT MUST NOT FAIL

A "blip" on the radar screen . . . and IFF goes into action. IFF sends out interrogating signals which automatically trigger an identifying reply signal. That is why IFF dare not fail.

Admiral has been entrusted with the production of IFF equipment now in use on a major portion of all our military aircraft and anti-aircraft defense installations. Admiral production techniques assure unfailing reliability for the equipment, and Admiral advance research is helping to make IFF secure against enemy jamming.

Admiral offers exceptional facilities for research, development and production of electronic or electro-mechanical equipment. Address inquiries to:

Admiral CORPORATION

Government Laboratories Division · Chicago 47, Illinois

ENGINEERS! The wide scope of work in progress at Admiral creates challenging opportunities in the field of your choice. Write to Director of Engineering and Research, Admiral Corporation, Chicago 47, Illinois.

LOOK TO ***Admiral*** FOR
RESEARCH
DEVELOPMENT
PRODUCTION

in the fields of

COMMUNICATIONS, UHF and VHF airborne and ground.

MILITARY TELEVISION, receiving and transmitting, airborne and ground.

RADAR, airborne, ship and ground.

RADIAC

MISSILE GUIDANCE

TELEMETERING

CODERS and DECODERS

DISTANCE MEASURING

TEST EQUIPMENT

Send for Brochure

. . . complete digest of Admiral's experience, equipment and facilities.

Airports the world over

service with Buckeye EQUIPMENT and ACCESSORIES

These Buckeye products, like all Buckeye equipment for the oil and aircraft industries, are in world-wide use today. Send coupon for information about these and other aircraft servicing accessories.

NO. 4092 SINGLE POINT FUEL NOZZLE

A self-sealing coupling valve, No. 4092 is quickly and easily connected for refueling or defueling. Unusually low pressure drop. Self-adjusting; fits any qualified adapter. Couples, locks and controls flow in one motion. No auxiliary controls. Seals automatically when disconnected.

NO. 4083

Has aluminum elbow; qualified for military use.

Patented 2,665,925 2,665,926

NO. 4093 SELF-SEALING HYDRANT VALVE

Aside from stirrup handles, No. 4093 is like No. 4092 Fueling Nozzle. Used widely in hydrant systems for pipe lines with pits or above ground.

Patented 2,665,925 2,665,926

NO. 4096C HYDRANT ADAPTER

Sturdy brass construction, 2½" standard flange, generally installed in manhole or pit on apron. Used in conjunction with No. 4093, combination can be used for fueling or defueling.

NO. 4082 OIL SERVICING NOZZLE

Also designed and built to military specifications, this nozzle delivers lubricating oil to aircraft. Features positive shut-off, non-drip valve in end of tube. Easily removable 60-mesh brass wire strainer.

NO. 775M AIRCRAFT REFUELING NOZZLE (OVER-WING)

Has passed rigid tests under adverse conditions to qualify for satisfactory refueling of military airplanes. Widely used at commercial airports. Brass or aluminum.

BUCKEYE IRON & BRASS WORKS, Dept. AW
Box 883, Dayton 1, Ohio

Please send details on ☐ No. 4092, ☐ No. 4083, ☐ No. 4093, ☐ No. 4082, ☐ No. 775 M.

NAME_____

TITLE_____

ADDRESS_____

CITY_____ STATE_____

29 ea., export packed, (RFP-1419), $51,521.

Davey Compressor Co., Kent Ohio, air compressor, gasoline-engine driven, 15 cfm, 200 psi, type MC-2, 250 ea., export packed, (RFP-1159), $193,875.

Indianapolis Machinery and Supply Co., 1959 S. Meridian St., Indianapolis 6, Ind., shaper, metal cutting, 24 in. horizontal, type 1, size 4, 25 ea., (RFP-1348), $78,750.

McColpin-Christie Corp., 3410 E. 67th St., Los Angeles 43, Calif., metallic rectifier, portable, type B-9, 46 ea., export packed, (RFP-1426), $33,534.

AIR RESEARCH & DEVELOPMENT COMMAND, BALTIMORE, Md.

A. O. Smith Corp., P. O. Box 584, Milwaukee 1, procurability study for aircraft designer's manual, (IFB AF(600)-1513), $85,201.35.

University of Pittsburgh, Pittsburgh, continuation of research studies on anti-ferromagnetic resonance, paramagnetic resonance in phosphors, foreign atoms in silver halides and nuclear resonance, (IFB AF 18(600)-892), $84,890.

Board of Trustees of the Leland Stanford Jr. University, Stanford, Calif., continuation of research on electron scattering and nuclear structures, (IFB AF 18(600)-646), $68,260.

Board of Trustees of the Leland Stanford Jr. University, Stanford, Calif., continuation of research on nuclear photo effects, meson fields, and electron scattering, (IFB AF 18(600)-545), $40,000.

Board of Trustees of the University of Illinois, Urbana, continuation of research on conducting thin film studies, (IFB AF 33-(038-21255), $38,055.

John Hopkins University, 34th and Charles Sts., Baltimore 18, research in boron hydride chemistry, (IFB AF 18(600)-1526), $50,139.

Loewy Construction Co., 350 Fifth Ave., New York 1, development of illustrated manual for plastic forming of aircraft components, (IFB AF(600-1510), $101,000.

Northrop Aircraft, Inc., Northrop Field, Hawthorne, Calif., analytical study to determine outcome of combat between various fighter and bomber aircraft, (IFB AF 18-(600)-1491), $110,504.59.

California Institute of Technology, Pasadena 4, Calif., research on "panel flutter," $25,873.

New York University, Graduate School of Arts & Science, Dept. of Physics, Washington Square, New York 3, investigation of persistent interior polarization, (IFB AF 18(600)-1004), $25,000.

Trustees of Columbia University in the City of New York, Box 6, Low Memorial Library, New York 27, continuation of research on the nature of fracture in metals, (IFB AF 18(600)-898), $25,000.

Board of Trustees of the University of Illinois, Urbana, research on electronics and ionic properties of non-metallic crystals, $58,211.

Trustees of Princeton University, Princeton, N. J., continuation of research on laminar and turbulent boundary layers and transition at supersonic speeds, (IFB AF 18(600)-498), $214,338.

WRIGHT-PATTERSON AIR FORCE BASE, Ohio

Avco Manufacturing Corp., Crosley Div., 2630 Glendale, Milford Road, Cincinnati, radio receivers, mountings, spare parts, special tools and data, (IFB PR GE-561414, GE-561434, PE-158655, PE-156745, MIPR R-55-2659-127-AER, $1,303,037.

Hallicrafter's Co., 5th and Kostner Ave., Chicago, transmitter, radio, T-465/ALT-7, 108 ea., power supply, PP-506/APT-6, 782 ea., (IFB PR GE-553550), $2,903,204.

Mitchell Camera Corp., 666 West Harvard St., Glendale 4, Calif., motion picture camera, 35-mm., Hi-speed, 26 ea., (IFB PR 569808, PR 599984), $195,848.

Sperry Gyroscope Co., Great Neck, Long Island, N. Y., amplifier, MA-4, 94 ea., installations, spare parts and data, (IFB PR-PE 177959), $388,677.

Cessna Aircraft Co., Wichita, aircraft, L-19A, 100 ea., spare parts, special tools, ground handling equipment, (IFB MIPR R-55-531-AVD-RP), $438,992.

Sperry Gyroscope Co., Great Neck, Long Island, controller, turn, remotely operated, type E-4, 69 ea., motor and drive assembly, servo, type A-1, 19 ea., (IFB PR MA-45754), $33,469.

Fairchild Camera and Instrument Corp., Robbins Lane, Syosset, Long Island, N. Y., lens bodies, LA 28, 6-inch cone, 12 ea., magazines, LA 30, 316 ea., carrying cases, type I, 1,256 ea., spare parts, (IFB MIPR R-55-959-152-Aer), $836,207.

Trad Television Corp., 1001 First Ave., Asbury Park, N. J., adapters, spare parts and data, (IFB PR GE-557624), $427,714.

Eastman Machine Co., Buffalo, N. Y., motor assemblies, 4289-BM517-2, 101 ea., (IFB PR SA-545853), $33,869.

Bevelite Corp., 1615 Cordova St., Los Angeles, aircraft model, plastic, badger, 1,812 ea., aircraft model, plastic, USAF RB-52B, 1,812 ea., aircraft model, plastic, USAF F-101A, 1,812 ea., mold, 1 ea., (IFB PR 00-497236, MIPR R-17-55-ONR), $67,-667.

General Motors Corp., AC Spark Plug Div., Flint 1, Mich., bombing system, 35 ea., spare components, spare parts, maintenance tools and test equipment, (IFB PR 177969), $3,984,787.

Lear, Inc., 110 Ionia Ave., N. W., Grand Rapids, Mich., power units, P/N 108AB3A, 369 ea., (IFB PR 545854), $84,061.

Forway Industries, Inc., 122 Green Ave., Woodbury, N. J., mounting bases, MT-236B/ARC-3, MT-237/ARM-3 and MT-238C/ARC-3, (IFB PR GE-580154), $41,-085.

Trad Television Corp., 1001 First Ave., Asbury Park, N. J., components of AN/ARN-12, spare parts and data, (IFB MIPR R-02-590169-SC-01-23), $52,543.

Federal Manufacturing and Engineering Corp., 211 Steuben St., Brooklyn 5, N. Y., projection set, 16-mm, motion picture, sound, 22 ea., (IFB MIPR R-55-565-1893/Bu Ships), $38,352.

Collins Radio Co., 835 Thirty-Fifth St., N. E., Cedar Rapids, Iowa, radio set, AN/ARN-14, (IFB PR GE-561435, GE-561420, PE 158653, PE-158741), $3,384,604.

General Electric Co., Specialty Heating Equipment Section, 2900 Campbell Ave., Schenectady, N. Y., camera covers, electrically heated, type B-13, 1152 ea., camera covers, electrically heated, type B-16, 76 ea., camera covers, electrically heated, type B17, 72 ea., camera covers, electrically heated, type B-19, 66 ea., (PR MO-570051 and MO-570027), $202,960.

ENGINEERING OPPORTUNITIES *for you!*

CONVAIR-Pomona is engaged in development, engineering and production of electronic equipment and complex weapons systems. The Convair-Pomona engineering facility is one of the newest and best equipped laboratories in the country. The work in progress, backed by Convair's outstanding record of achievement, offers excellent opportunities for recent graduates and experienced engineers in the following fields:

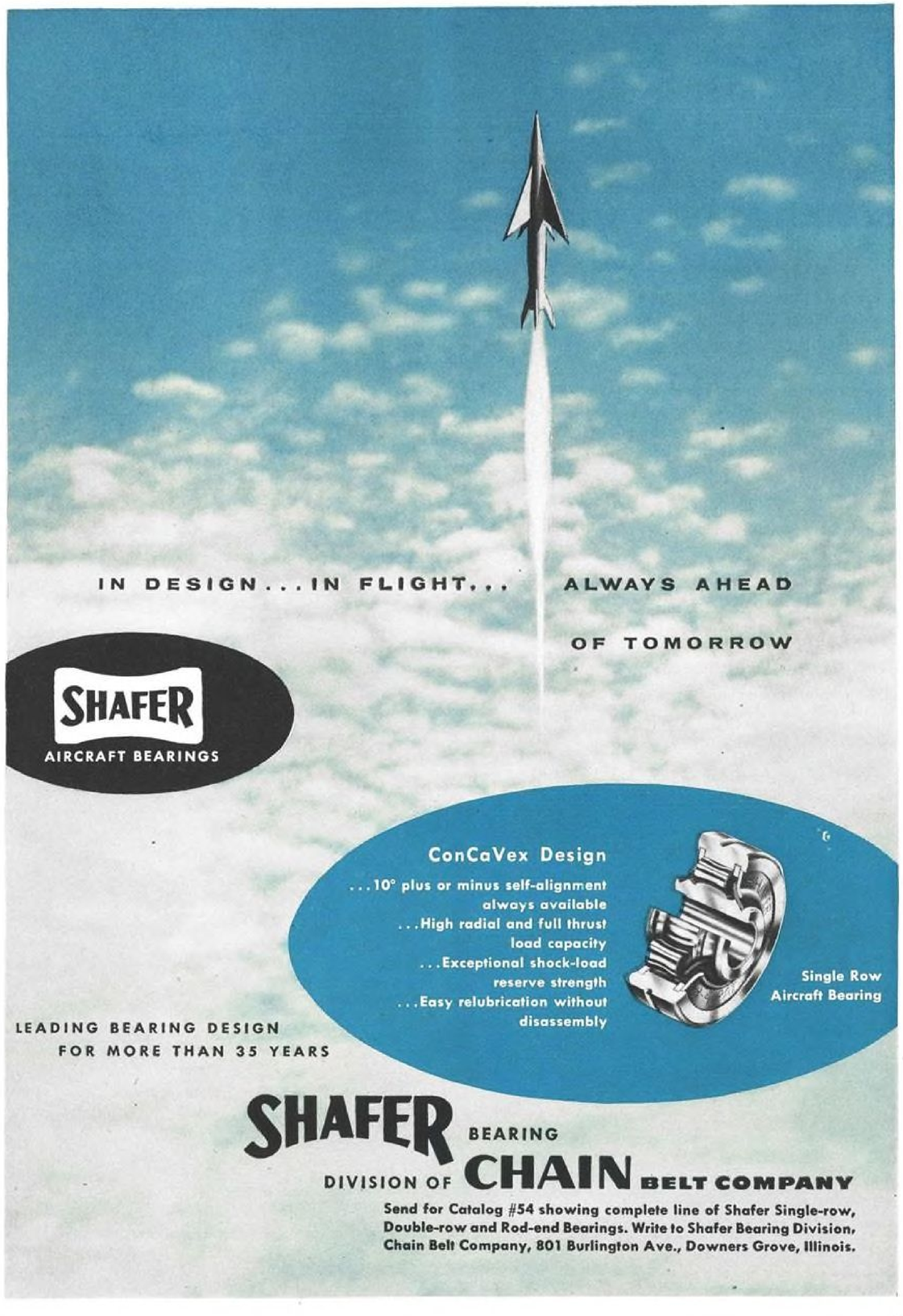
ELECTRONICS
DYNAMICS
AERODYNAMICS
THERMODYNAMICS
OPERATIONS RESEARCH
HYDRAULICS
MECHANICAL DESIGN
LABORATORY TEST ENGINEERING

Generous travel allowance to engineers who are accepted.

*For further information on Convair and its fields of interest, write at once, enclosing a complete resume to:
Employment
Department 3-F

*ENGINEERING BROCHURE TO QUALIFIED APPLICANTS

CONVAIR
A DIVISION OF GENERAL DYNAMICS CORPORATION
POMONA, CALIFORNIA



To Engineers WHO WANT TO GROW

You can grow with *Stratos*—now developing new air-conditioning systems, pneumatic power turbines, controls and other pneumatic accessories for aircraft and industry. Positions are now being filled for—

RESEARCH ENGINEERS

For investigations and studies in pneumatic refrigeration and very high speed power turbines.

PROJECT ENGINEERS

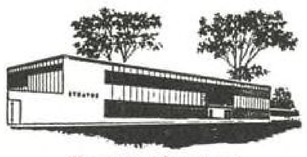
Several – Intermediate and Junior.

DESIGN ENGINEERS

Seniors and Juniors.

•

Write to R. T. Bartlett, outlining your qualifications for these interesting and challenging positions. Your correspondence will be kept in complete confidence, of course.



Excellent housing available in area. Convenient to New York City. Wonderful recreational facilities. Fine beaches – Fishing, Boating, Golfing.

STRATOS

A Division of Fairchild Engine & Airplane Corporation

•

BAY SHORE, L. I., N. Y.

Manufacturers of air-conditioning equipment and pneumatic accessories for high speed aircraft.

Army Contracts

Following is a list of unclassified contracts for $25,000 and over as released by Army Contracting Offices:

LOS ANGELES ORDNANCE DISTRICT, Pasadena 2, Calif. July 14.

Harvey Machine Co., Inc., 19200 South Western Ave., Torrance, Calif., redesign and development of fuze, rocket, BD, M404A1, project PA-5-2, job, $39,011.

Gilfillan Bros., Inc., 1815 Venice Blvd., Los Angeles 6, Calif., overrun of cost, job, $249,000.

G. O. Noville and Associates, Inc., 906 S. Robertson Blvd., Los Angeles 35, Calif., subcontracting, 15.3%, ammunition disposal systems for M48 tank, job, $28,312.

Courtland Labs, 1600 N. Bonnie Beach Place, Los Angeles 63, Calif., Nike I starting mixture, job, $46,804.

California Institute of Technology, 1201 E. California St., Pasadena, Calif., subcontracting 20%, engineering research and development, job, $163,341.

International Telemeter Corp., 2000 Stoner Ave., Los Angeles 25, Calif., subcontracting, 11%, magnetic memory device, job, $54,100.

Grand Central Rocket Co., P. O. Box 111, Redlands, Calif., loading of T225 rocket motors, job, $46,138.

Regents of the U. of Calif., Berkeley, Calif., research in numerical analysis, job, $30,000.

Douglas Aircraft Co., Inc., 3000 Ocean Park Blvd., Santa Monica, Calif., supplies and services relating to the Honest John Missile, job, $30,000.

California Institute of Technology, 1201 E. California St., Pasadena, Calif., subcontracting, 78%, engineering research and development, job, $940,000.

Harvey Machine Co., Inc., 19200 South Western Ave., Torrance, Calif., fin assembly, T12 for 81MM mortar, 2,000 units, $301,000.

Firestone Tire & Rubber Co., 2525 Firestone Blvd., Los Angeles 54, Calif., subcontracting, 17%, revision of JPL handbook, 5,000 ea., $36,065.

University of Utah, Salt Lake City 1, Utah, fundamental investigation of factors affecting air and ground shock propagation from large blasts over long distances, job, $35,000.

Harvey Machine Co., Inc., 19200 South Western Ave., Torrance, Calif., projectile, TP, T328, 30MM, 438,000 ea., $218,124.

Northrop Aircraft, Inc., 500 E. Orangethorpe Ave., Anaheim, Calif., subcontracting, 45%, repair and modification of T46E1 range finders, 250 ea., $265,627; subcontracting, 50%, repair and modification of T179 series telescope mounts, 555 ea., $532,860; subcontracting, 98%, counter assemblies in accord. with ordnance Dwg. No. F8295203, 80 ea., $40,469; subcontracting, 50%, maintenance test fixtures, 14 ea., $47,834; subcontracting, 25%, procurement of identical items now under contract, various, $106,952; subcontracting, 25%, spare parts, telescope T149E2, various, $342,641.

Navy Contracts

Following is a list of unclassified contracts of $25,000 and over as released by Navy Contracting Offices:

AVIATION SUPPLY OFFICE, PHILADELPHIA, July 12.

Benjamin Moore & Co., 511 Canal St., New York 13, N. Y., enamel, 15,000 gal., $35,850.

Bell & Howell Co., 7100 McCormick Rd., Chicago 45, Ill., camera sets, 22 ea., $36,632.

Turco Products, Inc., 95 Fairmount Ave., Philadelphia 23, Pa., compound, 35,100 gal., $48,069.

Eastman Kodak Co., Rochester 4, N. Y., film, various, $58,709.

Benjamin Franklin Paint & Varnish Co., 4820 Langdon St., Philadelphia 24, Pa., enamel, various, $81,300.

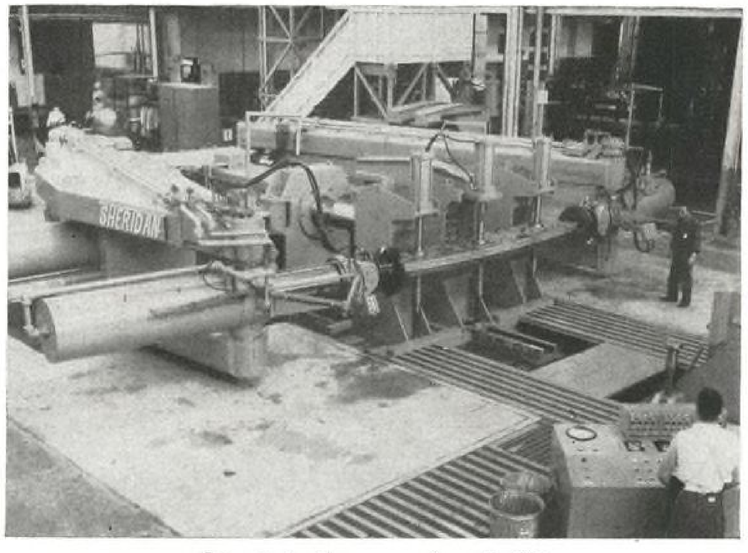
Red Bank Div., Bendix Aviation Corp., Eatontown, N. J., armature assy., 1,018 ea., $84,799.

Weston Gear Works, 2600 E. Imperial Highway, Lynwood, Calif., gear box, 257 ea., $143,817.

Goodyear Tire and Rubber Co., Inc., 1144 East Market St., Akron 16, Ohio, wheel assys., 555 ea., $38,589.

Westinghouse Electric Corp., 3001 Walnut St., Philadelphia, Pa., power units, various, $103,362.

Bendix Products Div., Bendix Aviation



Stretch-Former for B-52

Huge Sheridan stretch-forming machine in operation at Boeing's Wichita plant is used for contouring extrusions, sheet and rolled sections for the B-52 Stratofortress. It forms sheets up to 6 ft. wide by 24 ft. long, with a tension cylinder capacity of 300 tons. It will handle extrusions and rolled sections up to 24 ft. long. Machine has 600-ton bulldozer for reverse contouring, degree changing and joggling of parts.

VICKERS® "Instant Response"* HYDRAULIC MOTOR ... THE AIRCRAFT HANDY MAN

*Called "Instant Response" because it starts, stops or reverses almost instantaneously.

Vickers Constant Displacement Piston Type Hydraulic Motors are available in 24 sizes for 3000 psi.

Here Are a Few of the Jobs It Is Doing:

AERIAL REFUELING PUMP DRIVE

Fuel Transfer Pump built by Nash Engineering Co. for Boeing KC-97 Tanker. Powered by Vickers "Instant Response"* Hydraulic Motor.

CABIN SUPERCHARGING

Douglas DC-7 Cabin Supercharger is driven by Vickers "Instant response"* Hydraulic Motor.

HORIZONTAL STABILIZER ACTUATOR

Built for Grumman F9F6 by Cleveland Pneumatic Tool Co. Powered by Vickers "Instant Response"* Hydraulic Motor.

ALTERNATOR GENERATOR DRIVE

Alternator Generator Drive for Convair T-29 uses Vickers "Instant Response"* Hydraulic Motor.

TELESCOPING BOOM ACTUATOR

Built by Jack & Heintz to extend and retract boom for in-flight refueling. Driven by a Vickers "Instant Response"* Hydraulic Motor.

AIR COMPRESSOR DRIVE

Built by Walter Kidde & Company, Inc. and driven by Vickers "Instant Response"* Hydraulic Motor.

What Can It Do for You?

These light-weight, compact, highly efficient hydraulic motors provide high power in a very small package. Their overall efficiency exceeds 92% . . . their volumetric efficiency exceeds 96%.

Operating characteristics are remarkable. These motors will stop from maximum speed in from .116 to .167 of a revolution . . . will accelerate from standstill to maximum speed in from .00019 to .0051 sec (depending on size). They can be stalled indefinitely without damage.

Vickers Hydraulic Motors have many uses on aircraft . . . just a few of them are shown above. Wherever you need high torque, high efficiency and high horsepower-weight ratio . . . or where instantaneous and positive control are required, these motors are your best choice. Write for Bulletin A-5205.

7044

VICKERS INCORPORATED

DIVISION OF SPERRY RAND CORPORATION

1462 OAKMAN BLVD. • DETROIT 32, MICHIGAN

Application Engineering and Service Offices:
El Segundo, California, 2160 E. Imperial Highway
Arlington, Texas, P.O. Box 213
Detroit 32, Michigan, 1400 Oakman Blvd.

Additional Service Facilities at:
Miami Springs, Florida, 641 De Soto Drive

TELEPHONE: TOwnsend 8-5100 • TELETYPE: "TWX" DE89
TELEGRAMS: Vickers WUX Detroit • CABLE: Videt Detroit

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

UNITED AIR LINES

AMERICAN AIR LINES

CONTINENTAL AIR LINES

TRANS-WORLD AIR LINES

PAN AMERICAN WORLD AIRWAYS

These Leading Air Lines are installing RCA's New Weather Radar

Simplicity, light weight, efficiency and dependability are the reasons for this preference

More and more leading air lines are equipping their ships with RCA's new weather-mapping radar. Their choice has been based upon exhaustive comparisons.

RCA's AVQ-10 is the first airborne radar to use C-Band (5.6 cm) transmission, the wave length most suitable for "looking into" storms, yet having the least amount of scope clutter. It presents the pilot with an easily-interpreted display of storm conditions around him. In addition, it gives the pilot valuable ground-mapping information.

In terms of time saving and increased passenger comfort, the RCA AVQ-10 weather radar is more and more becoming a "must" among air lines. With it, pilots can "see" into storm areas many miles ahead and pick non-turbulent paths between them, often making long and costly detours unnecessary.

RCA is proud that these distinguished air lines have chosen the AVQ-10 to save time and increase passenger comfort. Every effort will be made to meet additional commitments occasioned by the great and growing demand for this equipment. To assure early installation, other air line and private operators are invited to write immediately for further particulars on the RCA AVQ-10. Overseas customers should get in touch with the RCA International Division, 30 Rockefeller Plaza, New York City, or any RCA International Distributor.

Dotted line shows how airplane passed between storm cells in its flight path.

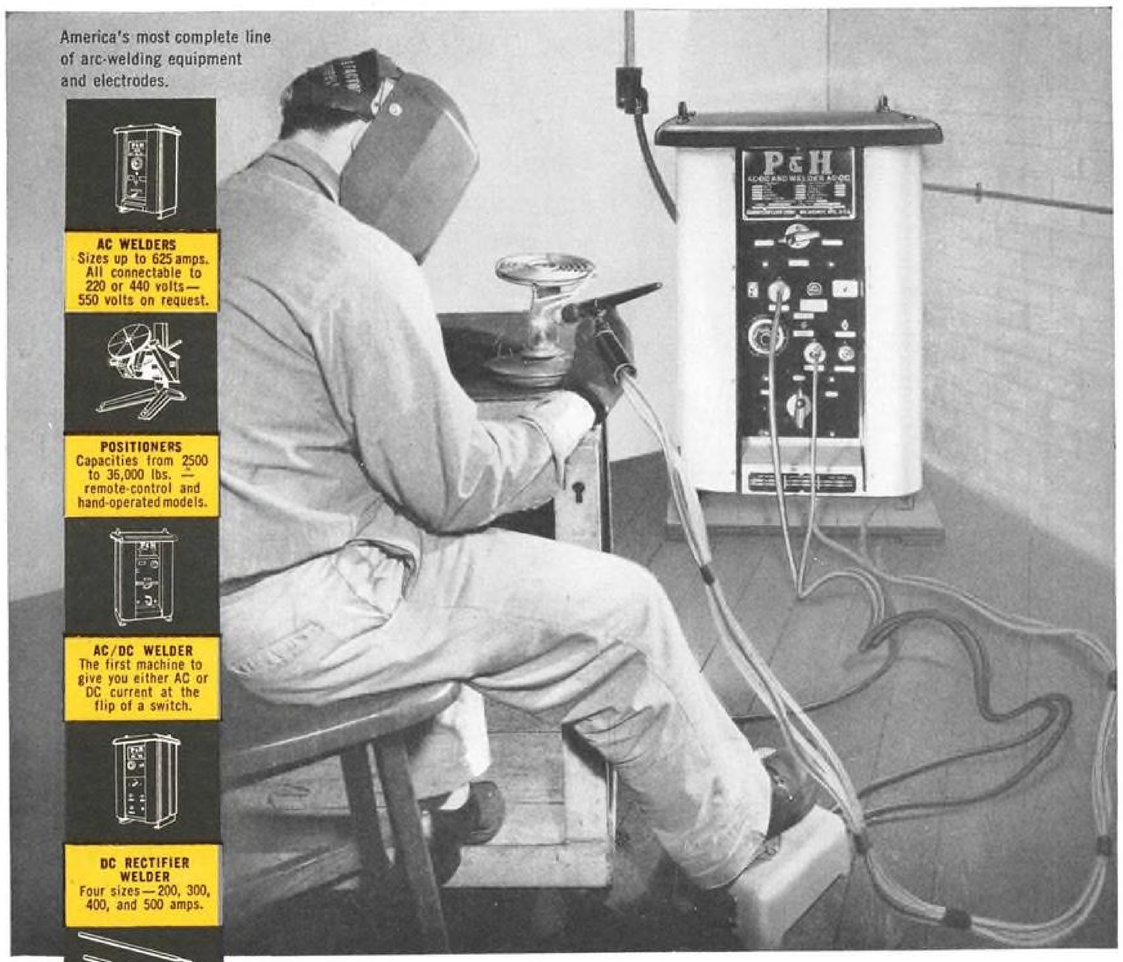
Minutes and miles are saved when a pilot is able to find a smooth path through turbulent areas.

AVQ-10 antenna mounted in nose of airplane scans the forward areas, enabling the pilot to evaluate storm conditions far ahead.

RCA

COMMERCIAL AVIATION SALES
RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DIVISION CAMDEN, N.J.

Tmks ®



Just think - 7 welders in 1

. . . save money on every job with this versatile AC/DC P&H Welder

"This new AC/DC P&H Welder beats anything we have ever used." That's what Lawrence Beggs of the Research Weld Co., Racine, Wisconsin, says.

"Ours is mostly precision work," Mr. Beggs continues, "involving Heliarc* welding of stainless, aluminum, and magnesium. We can switch from DC for welding stainless to AC for aluminum or magnesium, as easily as turning on a light. With its automatic high-frequency and instant response to control, this machine is wonderfully easy to use. We have had new men make acceptable welds with it after just a few minutes' instruction."

And you can't beat this new AC/DC machine for flexibility. You can use it for metallic arc welding, either AC or DC, straight or reverse. It can be used with Automatic Heliarc* AC or DC welding, or the Sigma Welding Process. It can even be adapted for use as an AC or DC Spot Welder.

Two models (200 and 300 amps) give you the range of capacity you need. Call your nearby P&H representative or distributor for an eye-opening demonstration of this remarkable new welder or write us for complete details — now. Welding Division, Harnischfeger Corporation, 4480 W. National Ave., Milwaukee 46, Wisconsin.

*T. M. Linde Air Products Co.

HARNISCHFEGER

the P&H Line

TRUCK CRANES · DIESEL ENGINES · POWER SHOVELS · PREFABRICATED HOMES · HOISTS · SOIL STABILIZERS · WELDING EQUIPMENT · OVERHEAD CRANES

P&H welding equipment is manufactured and sold in Canada by REGENT EQUIPMENT MANUFACTURING COMPANY LTD., 455 King Street West • Toronto, Ontario, Canada

Corp., South Bend, Ind., maintenance parts used on Bendix products, 24,388 ea., $105,907.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., adapters, 115 ea., $116,796.

New York Rubber Corp., 100 Park Ave., New York 17, N. Y., kits: pararaft, (IFB-383-997-55), 1,300 ea., $79,274.

New West Paint & Chemical Co., 1150 Revere Ave., San Francisco, Calif., paint, (IFB-383-853-55), various, $54,540.

Hub Paint & Varnish Co., Inc., 47-38 Fifth St., Long Island 1, N. Y., paint, (IFB-383-867-55), 40,000 gal., $53,560.

Atlas Paint & Varnish Co., 32-50 Buffington Ave., Irvington 11, N. J., paint, (IFB-383-867-55) 30,000 gal., $38,850.

Van Brode Milling Co., Inc., Clinton, Mass., distillation kits, (IFB-383-1057-55), 3,750 ea., $32,250.

General Electric Co., 1405 Locust St., Philadelphia 2, Pa., power supply units, (IFB-383-774-55), 16 ea., $28,635.

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn., overhaul of propeller blade assemblies, 171 ea., $155,008.

Airborne Accessories Corp., 1414 Chestnut Ave. Hillside, N. J., gear boxes and actuators, various, $156,255.

Piasecki Helicopter Corp., 100 Woodland Ave., Morton, Pa., maintenance parts used on HUP aircraft, various, $173,904.

Sigmund Eisner Co., 2-39 Bridge Ave., Red Bank, N. J., coveralls, various, $252,000.

Garrett Corp., 9851-9951 Sepulveda Blvd., Los Angeles 45, Calif., maintenance parts used on air turbine compressors, various, $328,380.

Aviators Clothing Co., Inc., 143 Main St., Beacon, New York, coveralls, various, $512,490.

Garrett Corp., 9851-9951 Sepulveda Blvd., Los Angeles 45, Calif., valve assys., various, $25,065.

General Electric Co., 1405 Locust St., Philadelphia 2, Pa., indicators, 34 ea., $35,382.

Lord Mfg. Co., 1635 West 12th St., Erie 6, Pa., isolators, various, $38,141.

Philco Corp., 18th & Courtland Sts., Philadelphia 40, Pa., rough drafts for various manuals, $51,925.

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn., services & materials to repair propeller blades, 127 ea., $83,549.

Grumman Aircraft Eng. Corp., Bethpage, Long Island, N. Y., maintenance parts for SA-16A aircraft, various, $84,577.

Garrett Corp., 9851-9951 Sepulveda Blvd., Los Angeles 45, Calif., maintenance parts used on gas turbine compressors, various, $130,753.

Sundstrand Aviation Div. Sundstrand Machine Tool Co., 2421 11th St., Rockford, Ill., maintenance parts used for transmission & governor assys., various, $146,696.

Garrett Corp., 9851-9951 Sepulveda Blvd., Los Angeles 45, Calif., maintenance parts used on compressors, various, $250,662.

Union Electric & Mfg. Co., 1057 Summit Ave., Jersey City 7, N. J., signal generators, 374 ea., $259,821.

Cox & Stevens Electronic Sales Div., 845 Colony Rd., Wallingford, Conn., scales, 21 ea., $47,040.

International Latex Corp., Playtex Park, Dover, Del., coveralls, various, $94,541.

John Addison Footwear, Inc., 84 Chestnut St., Marlboro, Mass., shoes: leather flight deck non-slip, (IFB-383-1029-55), 265 pr., $60,770.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., brake, wheel assys. and maintenance parts, various, $41,237.

Lear-Romec Div., Lear, Inc., Elyria, Ohio, pumps, 229 ea., $50,004.

Jowil Electronics, Inc., Belfield Ave. & Wister Sts., Philadelphia 44, Pa., test set, 88 ea., $133,425.

Scintilla Div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., maintenance parts, $79,062.

Bendix Products Div., Bendix Aviation Corp., 401 Bendix Dr. South Bend, Ind., maintenance parts, $76,997.

Grumman Aircraft Engineering Corp., Bethpage, Long Island, N. Y., strut, duct and radome assys., $45,281.

Engineering News from Bridgeport Thermostat

NOW A ¼" DIAMETER SEAMLESS METAL BELLOWS

Bridgeport Thermostat's broad experience in bellows engineering now makes available ¼" and 5/16" diameter bellows. Ideally suited to miniaturization, these tiny units are produced in a wide range of characteristics and metals. Bridgeport specializes in metal bellows and complete bellows assemblies of all types and sizes. Send for new bellows engineering data—use handy coupon below.

Mr. Controls

Robertshaw-Fulton CONTROLS COMPANY

BRIDGEPORT THERMOSTAT DIVISION • MILFORD, CONN.

Send me the Bridgeport bellows data checked below: (Dept. RA)

☐ Full details on new, small-diameter bellows

☐ Bellows Engineering Bulletin #125 (28 pages)

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

New Vought "Crusader"...

World's *Fastest* Navy Fighter

From Desert Testing Ground to Your New Air Navy...

From Chance Vought comes a significant advance in carrier-based fighter design — the new, faster-than-sound XF8U-1 *Crusader*.

Combining the requirements of carrier operations with flashing level flight supersonic speed, the U. S. Navy's *Crusader* gives America one of the fastest fighters in the world today.

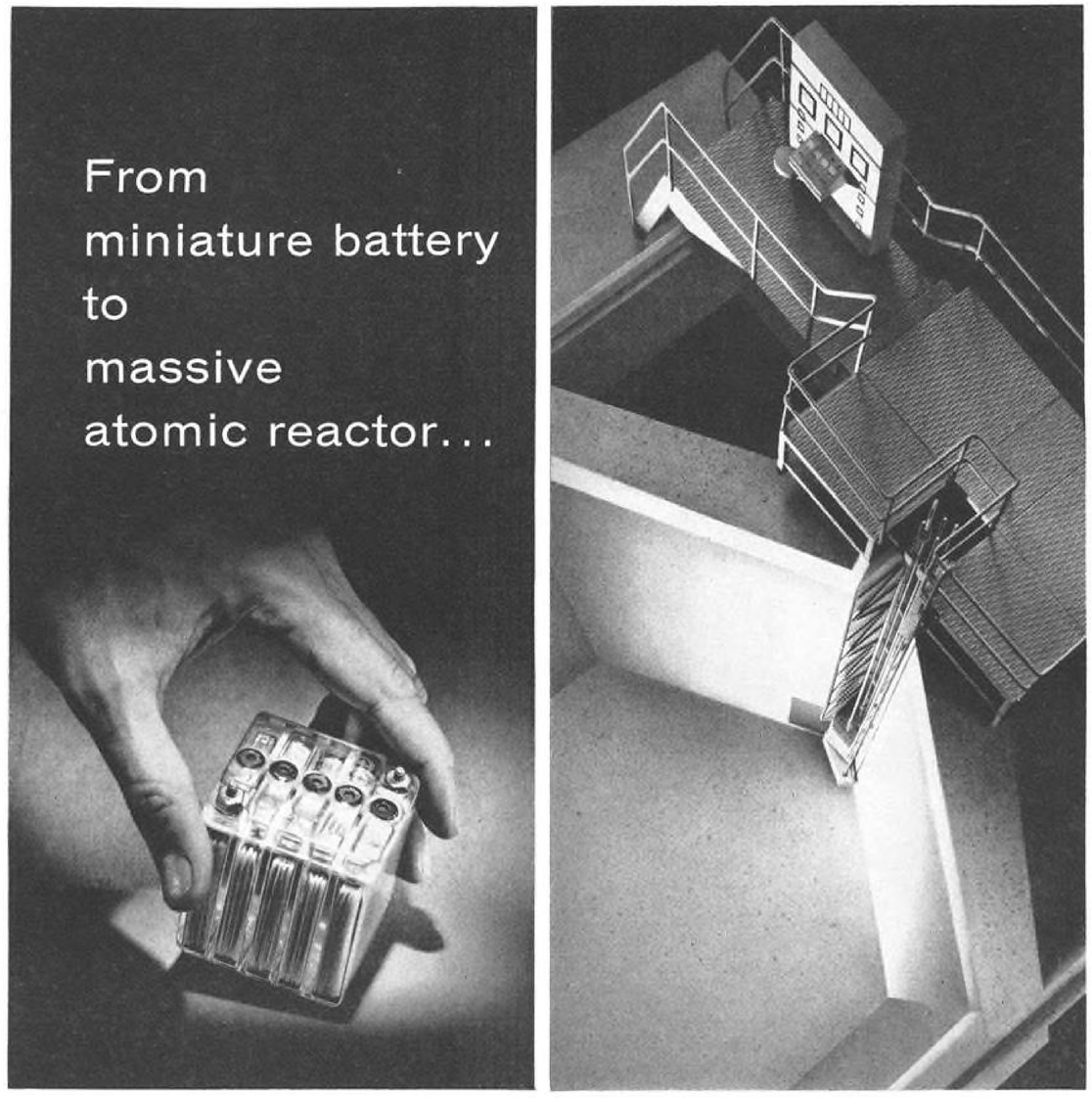
This clean, high-wing aircraft owes its blazing speed and excellent high altitude performance to its simple, uncluttered design and tremendous powerplant—an afterburner equipped Pratt & Whitney J57-P-4 turbo-jet engine.

Latest in a long line of Chance Vought aircraft, the *Crusader*—newest star on the Nation's Defense Team—is an important addition to Your New Air Navy. *Its mission: to help keep free the seas that cover 70% of the world.*

BE A NAVAL FLIER
Visit your nearest Naval Air Station
or write: NAVCAD,
Washington 25, D.C.

CHANCE VOUGHT AIRCRAFT
INCORPORATED · DALLAS, TEXAS

DESIGNER AND BUILDER OF HIGH PERFORMANCE MILITARY AIRCRAFT SINCE 1917



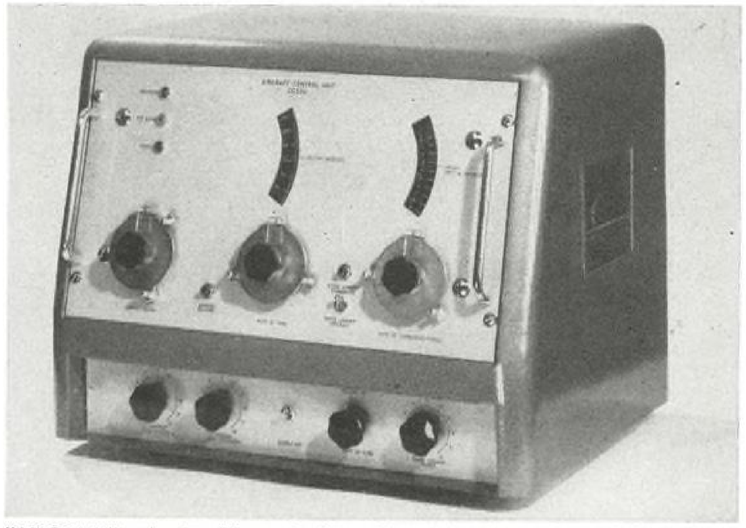
Storing electrical power in small packages, or helping to make atomic power practical . . . each demands advanced technology. And these are but two of the *hundreds* of complex tasks the AMF organization performs every day.

The highly specialized yet widely diversified activities of some 35 engineering and production facilities provide AMF with a wealth of experience that covers nearly every field of industry. And it is immediately available to *you*.

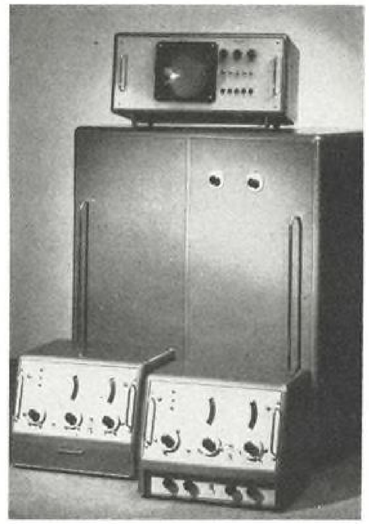
Call upon AMF with your problem. See for yourself why this all-around experience in answering the needs of government and industry alike has made AMF the "can do" company.

AMF HAS EXPERIENCE YOU CAN USE!

AMERICAN MACHINE & FOUNDRY COMPANY, Defense Products Group, 1101 N. Royal Street, Alexandria, Virginia
Executive Offices—AMF Building • 261 Madison Avenue, New York 16, N.Y.



"AIRCRAFT" unit of aerial war simulator. Up to 24 units may be used during games.



SIMULATOR computer and two "planes."

British Radar Simulator Produces Aerial 'Warfare' on Command

By Philip J. Klass

Realistic aerial war games, with the blips of as many as 24 combat planes speeding across radar screens, can now be waged almost at the touch of a button and without the use of a single aircraft.

The device which makes all this possible—effectively cutting costs in the training of pilots, tactical commanders and ground radar operators—is a newly-developed British radar simulator produced by the Solartron Electronic Group, Ltd. The blips the simulator produces can be divided between attacking and defending forces at any set ratio and made to take on the flight characteristics of any desired aircraft.

Combat Realism

To provide maximum combat realism, the flight path of each attacking and defending "aircraft" can be controlled individually from separate control panels through dials manipulated by human pilots and GCI operators.

Prior to the outbreak of this electronic warfare, the control panel for each aircraft has set into it the flight characteristics of the particular type aircraft it is to simulate—maximum speed, rate-of-climb, dive and turn. In some cases, the maximum turn rate will be determined by the number of Gs the pilot can stand rather than by airplane capability.

Once these values have been established, the attacking or defending pilot can maneuver his plane only within these limitations.

The size of an aircraft normally determines the strength of radar echo received from it. The trainer also permits the size of the simulated radar echo to be pre-set to correspond with the type of plane—fighter, medium bomber or heavy bomber.

Electronic Countermeasures Too

During synthetic warfare, enemy bombers are able to employ simulated electronic countermeasures at the discretion of the pilot operator. Two types of such countermeasures are available, both used during World War II. They are:

• **"Window,"** simulating the dropping of thousands of strips of metal foil which show up as a large target on the GCI radar scope and effectively obscure the attacking bomber. When the simulated "window" is "ejected" from the plane, its radar echo, like the real thing, will diffuse and drift with the wind, slowly sink and finally disappear.

• **Noise jammer,** which can be made to perform as if it were carried in the enemy bomber or as if it were ejected on a parachute. In the latter case, it will appear on the radar scope as though it is drifting with the wind, like "window."

The choice of operating mode is left to the individual pilot's discretion.

Solartron reports that it is developing a more sophisticated type of simulated jammer which will give multiple or delayed echo returns. Another development under way will enable GCI operators to simulate ground-based electronic countermeasure equipment capable of jamming airborne radar of the attacking bombers. This unit will have both adjustable power and direction of radiation.

Three-Dimensional Combat

Solartron has carried realism to the point of designing its equipment to permit attacking and friendly forces to operate in three dimensions. The ground GCI operator has two radar scopes which display target azimuth, height and range (simulating a surveillance radar and V-beam height-finder radar). The trainer permits the GCI operator to vary the scanning rate of his simulated ground radars, employ sector scanning or achieve displaced-center display, according to Solartron.

Operators representing the attacking forces can use identical displays, or more realistically, employ the equivalent of airborne surveillance or intercept radar displays.

A multiple-echo attachment is available which simulates aircraft flying in such tight formations that individual aircraft echos can not be resolved.

The Solartron tactical radar simulator appears to be an extension of radar simulators developed in the United States for air traffic control studies although the British device is considerably more sophisticated and complex.

NEW HIGH ALTITUDE MAGNETIC RECORDER

THE AIRBORNE AMPEX 800 records the broadest combination of data ever obtained concurrently on one magnetic tape —performs under all high altitude environmental conditions— and furnishes data compatible with the most widely used playback equipment.

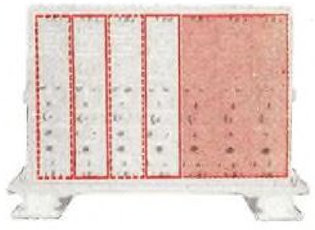
HANDLES ANY AIRBORNE DATA REQUIREMENT

The Ampex 800 can provide from 1 to 28 data channels. By interchangeable amplifier units, each one can be adapted to any one of three basic magnetic recording techniques:

Direct recording — 300 to 35,000-cycle response for a wide-band data or multiple recording of RDB subcarriers.

FM-carrier type recording — D.C. to 5000 cycles and high instantaneous accuracy suitable for shock and vibration data.

Pulse-width modulation recording — Up to 30 instrument readings commutated on to each tape track; frequency response 0 to 5 cycles/sec.



Combinations of these recording techniques can be provided to satisfy practically any flight test requirement by simple insertion of the proper plug-in amplifiers. Separate channels can be assigned to measurements requiring wide-band response or high transient accuracy. By using pulse-width techniques, many relatively steady instrument readings can be commutated on to a single channel. All will have a common time base.

WITHSTANDS THE RIGORS OF HIGH ALTITUDE FLIGHT

The Ampex 800 will perform within specifications under vibrational forces as high as 10G — operates over a temperature range from —65° F. to +130° F. — is unaffected by altitudes to 50,000 feet — and withstands a relative humidity of 100% up to 122° F. The Ampex 800 is light in weight. It operates on 27.5 volts D.C. and 115 volt, 400 cycle, A.C. All operating functions can be remotely controlled.

RETAINS WIDELY ESTABLISHED RECORDER STANDARDS

The majority of all magnetic recorders now in instrumentation use are Ampex machines. Their recording characteristics, tape speeds, track widths and other parameters have become a standard in aircraft and missile testing. The Ampex 800 retains these standards while greatly extending the environmental and mechanical conditions under which accurate test data can be gathered.

Performance specifications, descriptions and explanations have necessarily been limited by the space on this page. A full description and detailed specifications on the Ampex 800 are available by writing Dept. UU-2243

First in Magnetic Tape Instrumentation

BRANCH OFFICES: New York; Chicago; Atlanta; San Francisco; Dayton; College Park, Maryland (Washington D.C. area)

DISTRIBUTORS: Radio Shack, Boston; Bing Crosby Enterprises, Los Angeles; Southwestern Engineering & Equipment, Dallas and Houston; Canadian General Electric Company, Canada

AMPEX CORPORATION
934 CHARTER STREET
REDWOOD CITY, CALIFORNIA

Blind-Flight Instruments A Must If Army Copters to Fulfill Mission

Danbury, Conn.—New blind-flight instruments suited to military helicopter operations must be found if U.S. Army Aviation is to fulfill its mission of 24-hour all-weather support to the field forces, an Army officer responsible for studying the problem said here last week.

Investigation of the state of helicopter blind-flight instrumentation has been initiated by Brig. Gen. Carl I. Hutton, commander of the Army Aviation Center, Camp Rucker, Ala., and Col. Jules E. Gonseth, head of the Army Aviation School there. Maj. Hugh Gaddis, director of the Department of Rotary Wing Training, Army Aviation Center, and a veteran of some 750 medical copter missions in the Korean war, is heading the evaluation.

Gaddis told AVIATION WEEK that lack of proper copter instrumentation seriously affected the capability of rotary wing units operating in Korea.

The Army plans to inaugurate under-the-hood instrument helicopter training at Camp Rucker next spring, Maj. Gaddis said. Pilots in the field, as well as regular students, will be sent through the training program, Camp Rucker is now processing instructors in the blind-flight course in preparation for the program.

Team Study

The center also proposes to set up a pattern of navigational and radio aids as part of the student training program. The equipment would incorporate low-frequency radio range—VOR, ILS, GCA and ADF non-directional homer.

An Army Aviation team is working with other U.S. military services, the National Advisory Committee for Aeronautics, the aviation industry and helicopter airlines on the instrument evaluation. Several Army personnel are at Wright-Patterson AFB testing new equipment.

After the study is completed, Army Aviation will request that the Continental Army, in charge of all field forces training, purchase and install the recommended instrumentation. Particularly critical at the moment is a suitable helicopter attitude instrument, Maj. Gaddis said.

Nafli Demonstration

Doman Helicopters, Inc. here, working in cooperation with Lear, Inc., has fitted a Canadian-built LZ-5 copter with a new Nafli turn, bank and dive indicator for demonstration to Maj. Gaddis.

The helicopter manufacturer is working independently on its own evaluation of a suitable rotary-wing blind-flight panel, using available off-the-shelf equipment. This program is directed by Ward Davis, Doman customer relations chief.

The three-in-one Nafli, as hooked up to the LZ-5, depicts the attitude of either rotor tip path plane or of the cabin. The pilot can get either readily by flicking a switch. The system's directional gyro, vertical gyro, transistor amplifier, power supply and junction box have been fitted into the LZ-5's roof.

An autosyn, actuated by a mechanical connection to the hub, is sensitive to the pitch of the rotor tip path plane. Another autosyn is sensitive to the roll of the rotor tip path plane. These differential autosyns correct the signal coming from the gyros to indicate the rotor tip path plane pictorially on the instrument face.

The Canadian pilot who has flown the Nafli in the LZ-5 told AVIATION WEEK that this is the first time he has seen a copter attitude instrument that provides immediate presentation of information with no need to evaluate the equipment's indication.

Also installed is a vertical speed indicator that is stated to sense as little as 100-fpm. change in rate of altitude immediately. The equipment is made by Specialties, Inc., Syosset, N. Y., which has worked with Doman on the LZ-5 installation.

Doman also plans to demonstrate these instruments to Canadian officials at Ottawa in the next few weeks.

Long-Lived Midget

The midget battery above, employing new electrode materials and construction methods, reportedly delivers near-constant voltage for two years. The new "micro-cell," developed by Elgin National Watch Co., delivers 1.15 volts (compared to 1.37 for other miniature cells) but output can be stepped up to 1.37 by using another cathode material, Elgin says. The device, which could find use in tiny portable transistorized equipment, does not leak, swell or gas, Elgin says.

CAA Airways Program Expands 1956 Services

A revised program for operation of the federal airways during fiscal year 1956 has been announced by Civil Aeronautics Administrator Fred B. Lee. Changes were made necessary following congressional revision of the agency's operating budget, which specifically precluded the discontinuance of any CAA services.

Lee noted that the new airways program provides for the continuance of all major facilities presently in operation. In addition, he said, it provides for the commissioning of 22 very high frequency omnidirectional radio ranges (VOR), assuming the cost of three airport traffic control towers and three airport surveillance radar (ASR). Increased funds in the amount of $600,000 are also available for additional personnel to handle the expanding volume of traffic.

The additions to the federal airways system, limited by the funds available for their operation, include the following:

Twenty-two new VOR stations at Adamsville, Tex.; Benton Harbor, Mich.; Cherry Cheek, Colo.; Gainesville, Fla.; Glenview, Ill.; Harrellsville, N. C.; Huntington, W. Va.; Los Abos, Calif.; Oceanside, Calif.; Peoria, Ill.; Perry, Ohio; Point Mugu, Calif.; Pottstown, Pa.; Salem, N. J.; San Diego, Calif.; Sayre, Okla.; Stillwater, N. J.; Stroudsburg, Pa.; Walla Walla, Wash.; Webb, Tex.; Westminister, Md., and White Cloud, Mich.

The airport towers over which CAA will assume the cost of operation are Hutchinson, Kan., Moline, Ill., and Casper, Wyo. The three ASR installations will be at O'Hare Airport Chicago, Ill.; Denver, Colo., and Burbank, Calif.

R-W Eyes Expansion

Ramo-Wooldridge Corp. is looking for small companies it might acquire to expand its already rapid rate of growth but has not found any serious prospects to date. An R-W spokesman says the company is looking for firms whose systems activities dovetail with its own in the avionics, computers and automation fields but is not particularly interested in component manufacturers.

UNHEARD-OF STRENGTH IN STEEL PARTS...

with a heat treatment developed by Cleveland Pneumatic

NOW YOU CAN DESIGN highly stressed steel parts that will weigh less than you ever thought possible...

At Cleveland Pneumatic, we have developed ways to give steel parts far greater strength and durability than have ever been considered possible... tensile strengths of 260,000 psi in alloys that only a few years ago were limited to 180,000 psi. Years of intensive research in our plant have developed the necessary precise controls... in designing, heat treating, machining and plating and in the important intermediate processing.

Right now, this combination of Cleveland Pneumatic's heat treatment and machining is doing almost unbelievable things for the strength-to-weight ratios of highly stressed steel parts in aircraft. Weights are being reduced without reducing strength... or strength can be increased without "beefing-up" the size and weight of parts.

Wouldn't you like to have your designers and engineers talk with us about using Cleveland Pneumatic high-heat-treat-and machining methods in *your* assemblies? Write to:

Cleveland Pneumatic
Tool Company CLEVELAND 5, OHIO
Department C-955

BALL-SCREW MECHANISMS • AIR-OIL IMPACT ABSORBERS • World's Largest Manufacturer of Aircraft Landing Gears

Picket Blimps Get GE High-Power Radar

The most powerful airborne search radar units yet developed are going into the Navy's new Goodyear ZPG-2W aircraft early warning picket blimps, according to General Electric.

Supplied by GE's Military Electronic Equipment Dept., these AN/APS-20E units have approximately the same power as heavy, land-based search radars. The same type is used in Navy's WV-2 and USAF's RC-121 Super Constellation picket planes. Printed wiring is used extensively in the radar to reduce weight.

Airborne radar units can detect low-flying planes at as much as twice the distance as ground or ship radars, GE says.

FILTER CENTER

► **New JAN Tube Shield**—A new version of International Electronic Research Corp.'s miniature tube shield for lowering bulb temperature can be substituted directly for JAN-type shields in existing avionic equipment without requiring equipment modification. Original model (AW Dec. 14, 1953, p. 62) needed a special base, thus limiting shield to use in new equipments under development. Preliminary tests by sponsor, United Air Lines, indicate that the new IERC shield lowers bulb temperature by nearly 40%, UAL may substitute it for existing JAN-type shields throughout its fleet. IERC's address: 177 West Magnolia, Barbank, Calif.

► **Transistor Sealing Problems**—Tests by a major West Coast avionics firm indicate that transistor manufacturers have not yet successfully solved the problem of hermetically sealing transistors to keep out moisture, which shortens transistor life. Test results reportedly have spurred several semi-conductor manufacturers to seek improved sealing techniques.

► **Flat Tube Details**—A detailed explanation of the operation of the Willys-Aiken flat cathode ray tube (AW Jan. 17, p. 17) will be made during Wescon (Aug. 24-26). William R. Aiken, the flat tube's inventor, will present one paper; R. Madey will deliver another describing beam focusing and deflection principles.

► **Where Engineers Come From**—In the course of recent interviews with officials of three West Coast avionics firms active in the digital computer field, AVIATION WEEK asked whether they were having trouble finding good computer engineers. The official for Company "A" reported he had gotten a number from Company "B"—"because several of their programs have folded up." The official for Company "B" reported picking up a number of engineers from Company "C," for the same reason, while the official for Company "C" reported a windfall of engineering talent obtained from Company "A"—because their former employer had "lost several important programs."

► **Salary Spiral**—Salaries being offered by Ramo-Wooldridge and Lockheed's Missile division, to build up their scientific staffs, are causing some alarm among West Coast avionics firms. One complaint comes from an official of a major avionics producer which itself was subject to such criticism not so long ago.

► **Coming Soon**—A new diffused-junction silicon rectifier, rated 200 amp. at temperatures up to 80C, will be in production soon at National Semi-Conductor Products, a subsidiary of Hoffman Electronics Corp. First units available will be rated for 60-v. operation, with production of 175-v. and 350-v. units following shortly afterward. Company's address: 930 Pitner Ave., Evanston, Ill.

Aero Supply Mgf. Co. Inc. of Corry, Pa., announces a series of general engineering data bulletins of a non-advertising nature prepared by Aero Supply's Research and Development Center recently established in Cleveland, Ohio. The bulletins consist mainly of technical data with charts, graphs and other valuable information related to the design of aircraft, rocket and missile fuel systems.

The first Bulletin shows viscosity vs. temperature data for approximately 120 different fluids and has been prepared for availability on or about September 5, 1955. Subsequent bulletins will appear at approximately one month intervals.

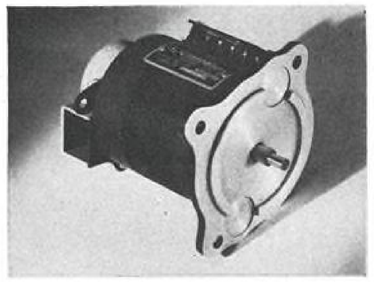
For over 39 years Aero Supply Mfg. Co. Inc. has been a leading designer and manufacturer of fuel system components, cockpit controls and related articles for all flight applications. Qualified representatives and engineers are readily available upon request to offer assistance on specific engineering and application problems.

Address Request to

Aero Supply Mfg. Co. Inc.,

Research and Development Center,

P. O. Box 402, Corry, Pa.



American Electric Model 313

COMBINATION DRIVE MOTOR AND BLOWER BUILT TO USAF SPECIFICATION 32590

This rugged, totally enclosed miniature combination drive motor and blower develops ⅛ hp at 7200 rpm, continuous duty. It operates on 3 phase, 400 cycle current at 200 volts. Teflon insulated for ambient temperature range from −65° C to 112° C. Weighs only 4.2 oz. Approx. overall length 5". Flange dia. 3½".

Many Other Models Fully Developed

American Electric Miniatures are available for operation on 60, 400, 1600, or 2000 c.p.s. or on variable frequencies from 320 to 1200 c.p.s.

TWO TYPES:

INDUCTION—Output torque range from ½ in. oz. to 120 in. oz.

SYNCHRONOUS (Hysteresis or Reluctance Models) Output torque range from .01 in. oz. to 16 in. oz.

Ask for quotations on special requirements!

MODEL 182DA AXIAL FAN MOTOR—Totally enclosed, panel mount, screened intake, high temp. operation 20 CFM N.A.F.M. at free air. O.D. 1.45", 115 V., single phase, 400 cycle, or variable frequency models.

MODEL 430 AIRCRAFT DRIVE MOTOR—1/12 h.p. 11,000 r.p.m. Teflon insulation. −65° F. to +160° F. Completely qualified to MIL 7969 specs.

MODEL 323 ELEVON ACTUATOR—Develops ½ h.p. at 11,200 rpm. 200 V. line-to-line, 3 phase, 4 wire, 400 cycles. Teflon insulated for −65°F. to +160°F. operation. Meets MIL M 7969 specifications.

MODEL 201D HYSTERESIS SYNCHRONOUS MOTOR—For Reference Timing Applications 12,000 r.p.m., 5 to 25 gm. cm. torque. Plain or geared shaft extensions.

FIELD ENGINEERING OFFICES in all major industrial areas in the United States and Canada.

American Electric Motors, Inc.
Miniature Components Division of
AMERICAN ELECTRONICS INC.
4811 Telegraph Road, Los Angeles 22, California

"Flight-Leader" in Dependability...

Federal's "Advance-Engineered" Aircraft Cables...

MODERN AVIATION is advancing with tremendous strides. When specifying cable *today*, aircraft designers *must* plan for *tomorrow's* performance demands!

To this urgent need for "Advance-Engineered" cables, Federal's vast development and production resources have been effectively geared.

Whatever the application . . transmission lines, interconnecting cables, antennas, audio lines, navigation systems . . . Federal cables keep you in step with new and unexpected requirements . . by utilizing the latest improvements in dielectric materials, manufacturing techniques and quality control.

Federal's constant testing assures peak efficiency of physical and electrical properties under the most rugged conditions of commercial and military applications.

Whatever your requirements for "Flight-Leader" dependability, Federal has the cable type you need . . . or can help you design it. Why not get in touch with Federal today about your aircraft cable problems?

Call NUtley 2-3600 or write Dept. D-7110.

Federal's Aircraft Cables and Principal Applications:

RG-8/U, RG-8A/U – 50-ohm general purpose coaxial cables for use as interconnecting cable and transmission line with airborne radio.

RG-9A/U, RG-9B/U – 50-ohm coaxial cables for use with airborne radio at UHF and higher frequencies.

RG-17/U, 18/U, 19/U, 20/U – 50-ohm coaxial cables used with ground equipment as low-loss antenna and transmission lines.

RG-11/U, 59/U – 73- and 75-ohm coaxial cables used chiefly in ground equipment such as ILS and GCA as transmission lines and interconnecting cables.

RG-55/U, 58/U, 58A/U – 53.5 ohms; RG-62/U, 71/U – 93 ohms; Federal's K-38, KT-107 – 72 ohms: coaxial cables with a wide range of aircraft applications, including audio lines for interphone.

Federal's K-1201 – Static Precipitation Aircraft Antenna, accepted by the major aircraft manufacturers.

RG-87A/U, 141/U – 50 ohms; RG-140/U – 73 ohms: solid-core "Teflon" coaxial cables for higher-temperature applications.

Federal's K-256, 257 and 258 (50, 70 and 93 ohms): miniature coaxial cables with "Teflon" dielectric . . . meeting the rigid requirements of the aircraft industry where smaller and lighter coaxial cables are required.

"America leading manufacturer of solid dielectric coaxial cables"

Federal

A DIVISION OF IT&T

Federal Telephone and Radio Company

A Division of INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

COMPONENTS DIVISION • 100 KINGSLAND ROAD • CLIFTON, N. J.

In Canada: Standard Telephones and Cables Mfg. Co. (Canada) Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., New York

LETTERS

Fixed-Base Plea

On what basis does the Civil Aeronautics Board allow a subsidy-supported airline to enter into competition with unsubsidized small, private, fixed-base operators?

Capital and National Airlines are now in the business of leasing aircraft to corporations and of running their executive operations for them, furnishing crews, maintenance, financing and other associated services.

Pan American, Piedmont, Eastern, and other airlines now install equipment, overhaul engines, instruments and radio, sell fuel, perform maintenance, inspection, engineering, modifications, conversions or other services for business-operated aircraft, although there is little economic or practical similarity between airline and executive operations.

'Paperwork Pressure'

Many fixed business operators receive their entire, unsubsidized livelihood from furnishing these services to this new segment of aviation that they built themselves. Now that it appears profitable, the airlines, with the comfortable backing of their subsidies, are moving to cash in on a market whose development they once opposed. Similarly, the nonskeds displayed enough imagination to initiate coach, tourist and other much needed public services in the face of airline opposition only to have the airlines take it over (when it showed profit) under cover of heavy CAB paperwork pressure.

We ourselves held a Letter of Registration as a Large Irregular Air Carrier for several years and used it solely to furnish standby aircraft for companies whose own planes were down for maintenance, or auxiliary aircraft for customers whose planes were too small for some particular purpose. We voluntarily withdrew it because our use of it did not justify the required amount of time, paperwork and quibbling over commas, methods of printing tariffs, whether reports or tariffs could or could not legally arrive at the CAB on a legal holiday, etc., ad infinitum.

We have a voluminous file of correspondence with the CAB which makes pretty hilarious reading, now that it's in retrospect and since we don't make our living at it.

Also, our Letter wasn't worth the establishment of an entire department for the sole function of following the hyperlegalistic maneuverings and oppositions of airlines with whom we did not compete by any stretch of imagination. If we used our Letter, we competed with the airlines and opposed us. If we didn't use it enough, there was no "necessity in the public interest," and they opposed us anyway.

We had no interest in the creation of a whole new profession of airline-CAB liaison interpreters, lawyers and consultants and preferred to turn our energies and investment to the development of private business aviation, trusting that the airlines could be satisfied with their subsidies, guarantees of economic welfare and CAB protection from

Aviation Week welcomes the opinion of its readers on the issues raised in the magazine's ed'torial columns. Address letters to the Editor, Aviation Week, 330 W. 42 St., New York 36, N. Y. Try to keep letters under 500 words and give a genuine identification. We will not print anonymous letters, but names of writers will be withheld on request.

"nonskeds," "irregulars," "low cost flights," "tourist fares," "coaches," other naughty words, new airlines or other competition.

As a result, we can take pride in the fact that we have added over 100 executive DC-3s to the American business aircraft fleet.

Airline Raid!

However, it seems that business aviation has now grown big enough, thanks to the efforts of fixed-base operators, to attract brokers, opportunists and the airlines, since, like the aircoach, somebody else has furnished the idea, initiative, investment and the trouble to pioneer.

This will be an excellent chance for the CAB to demonstrate whether it is interested more in development of aviation, as originally intended in its founding, or in development of airline "economic security," as it has acted.

Will it now impartially protect the "economic welfare" of the rest of aviation against the competition of airlines as assiduously as it has protected the welfare of the airlines against the rest of aviation?

W. F. REMMERT
President
Remmert-Werner, Inc.
Lambert Field
St. Louis 21, Mo.

Anti Alcohol

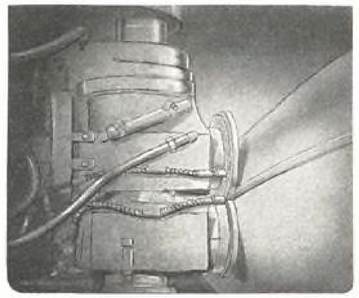
In the July 4 issue of Aviation Week you printed my letter "Airplanes and Alcohol." The reaction was fast and furious. I started getting letters from airline pilots and others connected with the aviation industry. So far everyone agrees 100%—airplanes and alcohol don't mix.

See what some of them have to say: "You hit the nail on the head. I know you could have said more against this terrible situation (alcohol served on planes) which is ridiculous and can and will cause trouble.

"I have had personal experience with 'big shot' drunks already aboard airplanes or attempting to board airplanes and they can be stinkers in both smell and action."

Another letter states: "Just recently I had occasion to write to Northwest Orient about a poor souse to whom the steward served no less than 12 'bourbon and waters' (beginning in N.Y.C.) until the guy had to be carried off the plane at Detroit." He must have been a charming traveling companion and a lot of fun for the steward. Did the other passengers get any attention on this trip?

Probably the most serious incidents brought to my attention are those contained



AIR FORCE CERTIFIED SEAM WELDING

SKYLINE

PRECISION SHEET METAL & MACHINE PARTS
COMPLETE ENGINEERING SERVICE
A.F. CERTIFIED SPOT WELDING & OTHER WELDING PHASES
ELECTRONIC PARTS AND EQUIPMENT
AIRCRAFT FABRIC COVERING
GALLEYS AND COMMISSARY EQUIPMENT
GROUND SERVICING EQUIPMENT

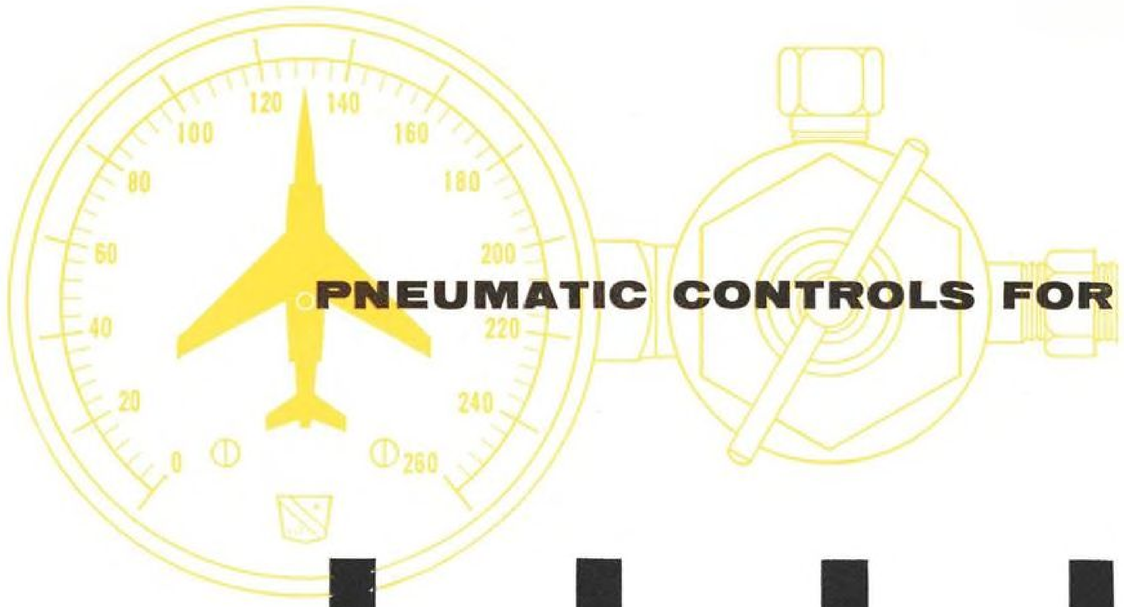
SKYLINE PRODUCTS INC.

GRAND BOULEVARD, DEER PARK, NEW YORK

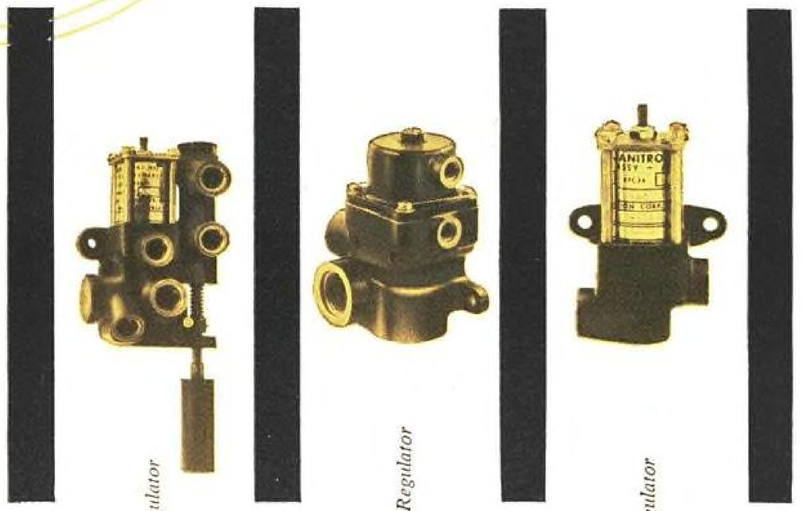
Opportunity for the holder of a production-item patent!

A large manufacturing plant equipped with precision machinery will finance and manufacture, on royalty basis, patented production items.
If you have such a patent, and are interested, write:

PATENT PRODUCTION DEPT.
3300 W. TEMPLE STREET
LOS ANGELES 26, CALIF.



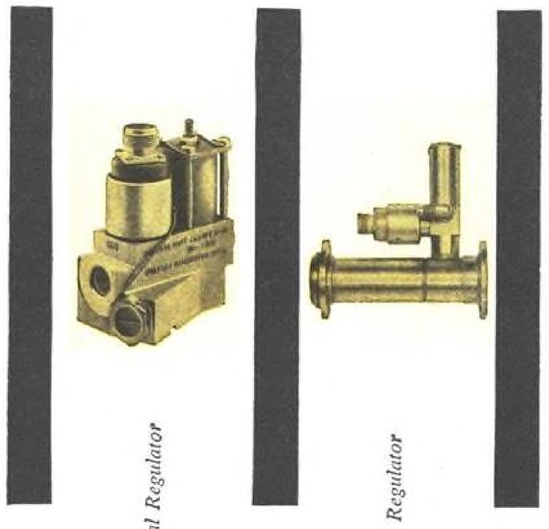
PNEUMATIC CONTROLS FOR JET AIRCRAFT



1. *Canopy Seal Regulator*

2. *Pylon Tank Regulator*

3. *General Purpose Regulator*



4. *Canopy Seal Regulator*

5. *High Pressure Regulator*

Take air, bled off a jet compressor at extreme conditions of 260 psi and 740°F, reduce to required pressures and deliver it to a canopy seal, a fuel tank, a pneumatic mechanism or an anti-icing system . . .

Solutions to assignments like these call for air pressure controls built with the finest of engineering skills. Janitrol has developed just such skills backed by extensive production facilities in becoming a recognized leader in "harnessing" aircraft combustion and associated equipment. During 50 years of experience in combustion engineering, Janitrol has charted many new regions in related engineering fields including air pressure controls for aircraft.

Here are five, for example, which Janitrol has developed for individual manufacturers of military aircraft:

1—A canopy seal regulator which is mechanically actuated by canopy movement. An auxiliary port is also provided for other uses.

2—Pylon tank regulator with relief valve—maintains constant pressures for fuel transfer.

3—General purpose regulator for canopy seal or is applicable to other uses. Operates with separate solenoid valve for shut-off.

4—Canopy seal regulator with built-in solenoid and relief valve.

5—High pressure regulator used in connection with thermal anti-icing systems where high air flows are required.

We invite you to consult your nearest Janitrol district engineering representative concerning *your* air control problems.

50 years experience in combustion engineering

Janitrol®

AIRCRAFT-AUTOMOTIVE DIVISION
SURFACE COMBUSTION CORPORATION
Columbus 16, Ohio

District Engineering Offices: New York, 225 Broadway; Washington, D. C., 4650 East-West Highway; Philadelphia, Penna., 401 No. Broad St.; Kansas City, Mo., 2201 Grand Ave.; Fort Worth, 2509 Berry St.; Hollywood, Calif., 7046 Hollywood Blvd.; Columbus, Ohio, 400 Dublin Ave.

in a letter written by an airline pilot (12 years as a captain) who said in part: " . . . I had two cases last fall when I had to order an obviously intoxicated passenger from the cockpit at night during final approach! . . . I heard of an incident on one of the airlines two years ago when an intoxicated passenger came forward, gained access to the cockpit and took a hefty swing at the captain."

These true experiences hardly need comment. They are summed up by a pilot on one of the major airlines who wrote: ". . . Drastic steps should be taken to change this picture."

Civil Air Regulations state: "A pilot shall not permit any person to be carried in the aircraft who is obviously under the influence of intoxicating liquor or drugs, etc." Unless the law has been repealed all pilots who permit liquor to be served are breaking the law. Ironically enough, it seems to be the pilots who are against serving liquor but the airlines put them on the spot. How do the airlines get away with it?

I have seen correspondence between an airline passenger and the chairman of the Civil Aeronautics Administration in which this same question was asked. The reply from the CAA was a masterpiece of evasion.

If it's legal why don't they say so? If it's illegal why don't they do something about it?

My only connection with the aviation industry is that of a passenger. However, as an ex-Navy pilot and one who still gets a good deal of pleasure out of private flying, I feel that I have a slight understanding of some of the problems a flight crew is up against under normal conditions. A drunk passenger doesn't help these problems one bit.

As a passenger I feel much more comfortable and relaxed when some loud mouth isn't charging up and down the aisle.

It would be interesting to hear what some of the airlines and the CAA have to say on the subject. So far they haven't been heard from. Something bothering them?

DANIEL B. SCULLY
1535 Sheridan Road
Highland Park, Ill.

Technical Help Needed

The Air Force Armament Center at Eglin Air Force Base, Florida, is at present continuing a rapid rate of expansion. The need for qualified technicians in the various fields listed below is one vital to the interests of the country.

Your magazine is known to reach readers who can fill the vacancies here at the Armament Center. Inasmuch as we are prohibited by regulation from placing paid advertising in order to inform those who would be interested in these opportunities, we hope that your magazine will publish this information so that these men may realize the need for their services.

Our openings lie mainly for those qualified for Civil Service grades between and including GS-9 through GS-14. The technicians most urgently needed are physicists, mechanical engineers, mathematicians, aeronautical engineers, ballisticians, and especi-

When Bell Aircraft Corporation developed its new HSL-1 helicopter for Navy anti-submarine detection and rescue work, it selected Western Gear to design and manufacture the airborne hoist aboard the unique twin rotor aircraft. This Western Gear hoist lifts 800 lbs. at 50′ per minute. The hoist shown in inset above, weighing 28 lbs. and similar in design to that selected by Bell, can lift 400 lbs. at 100′ per minute, spooling more than 100′ of 3/16″ cable. By modifying the gear train it can lift up to 1600 lbs. at 25′ per minute. A level wind assures accurate spooling and the motor is equipped with radio noise filter to comply with AN specifications.

Western Gear's more than 40 years of experience supplying important components for aircraft of practically every description was a major factor in its selection by Bell to design and manufacture this vital hoist for airborne use. Knowledge obtained since 1888 enables Western Gear to provide a speedy, economical solution to any problem involving the mechanical transmission of motion or torque. Why not avail yourself of this experience to solve your problem? Western Gear engineers will be glad to offer their help and recommendations from your blueprints or specifications. Address General Offices, Western Gear, P.O. Box 182, Lynwood, California.

"The difference is reliability" ⋆ Since 1888

5576

Plants at Lynwood, Pasadena, Belmont, San Francisco (Calif.)
Seattle and Houston — Representatives in principal cities

WESTERN GEAR
ENGINEERS AND MANUFACTURERS

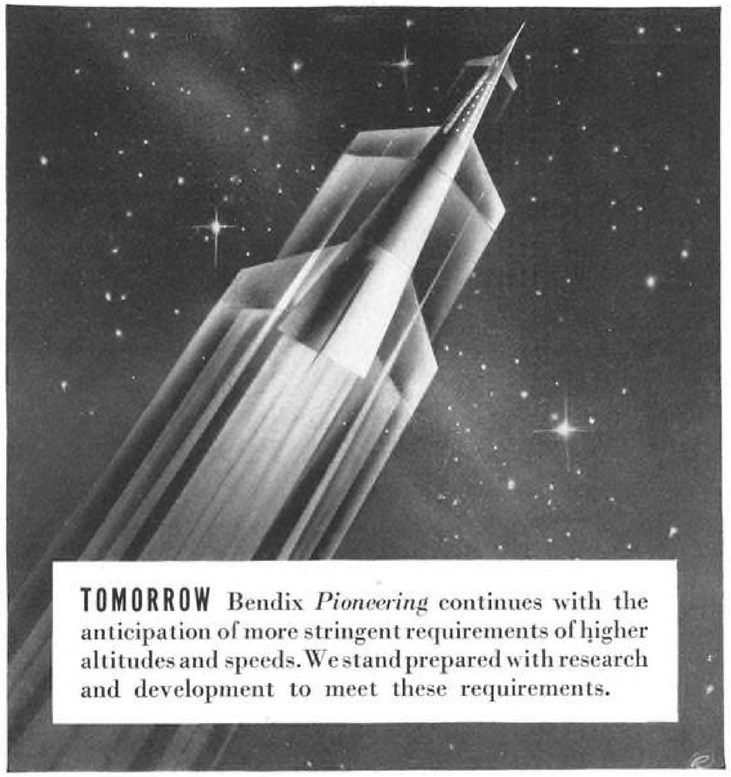
PIONEERING is our business

YESTERDAY

Pioneered by Bendix, the first liquid oxygen converters delivered to the Government more than met then existing requirements. In 1945 they were marvels of efficiency. In fact, one of these units is still operational today.

TODAY

Continued *Pioneering* and development have enabled us to offer the most efficient, most complete line of liquid oxygen equipment and systems in the world. Converter systems from the 2.5- to 25-liter capacity provide for the physiological requirements of modern high-altitude flight.



TOMORROW Bendix *Pioneering* continues with the anticipation of more stringent requirements of higher altitudes and speeds. We stand prepared with research and development to meet these requirements.

The Best in LIQUID OXYGEN CONVERTERS from Bendix

Whether you're interested in components or complete systems, specify *Bendix*. For full details, write PIONEER-CENTRAL DIVISION, BENDIX AVIATION CORPORATION, DAVENPORT, IOWA.

West Coast Office: 117 E. Providencia, Burbank, Calif.
Export Sales and Service: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.

Pioneer-Central DIVISION | Bendix AVIATION CORPORATION

ally electronics engineers. Applicants chosen in these grades may expect to receive between $5,440 and $10,320 annually.

Any readers interested in applying for jobs at the Armament Center should submit a Standard Form 57, Application for Federal Employment, available at any first class post office, to the Civilian Personnel Office, 3201st Air Base Wing, Eglin Air Force Base, Florida, for any information they may desire.

Needs for various technicians will continue at the Armament Center during the foreseeable future. Therefore, if any reader should doubt his qualifications he is urged to contact the above office as to the current needs.

Your assistance in solving this vital problem will be most sincerely appreciated.

HARRY R. BEAMER
Colonel, USAF
Air Force Armament Center
Air Research and Development Command
Eglin Air Force Base, Florida

More on Slopeline

The continued discussion over the relative merits of the centerline and slopeline approach light systems seems to be bogged down for lack of adequate criteria.

One criterion which ought to be applied to any guidance system of this nature is the requirement that fragmentary parts of the system's presentation must still yield useful bits of positive information.

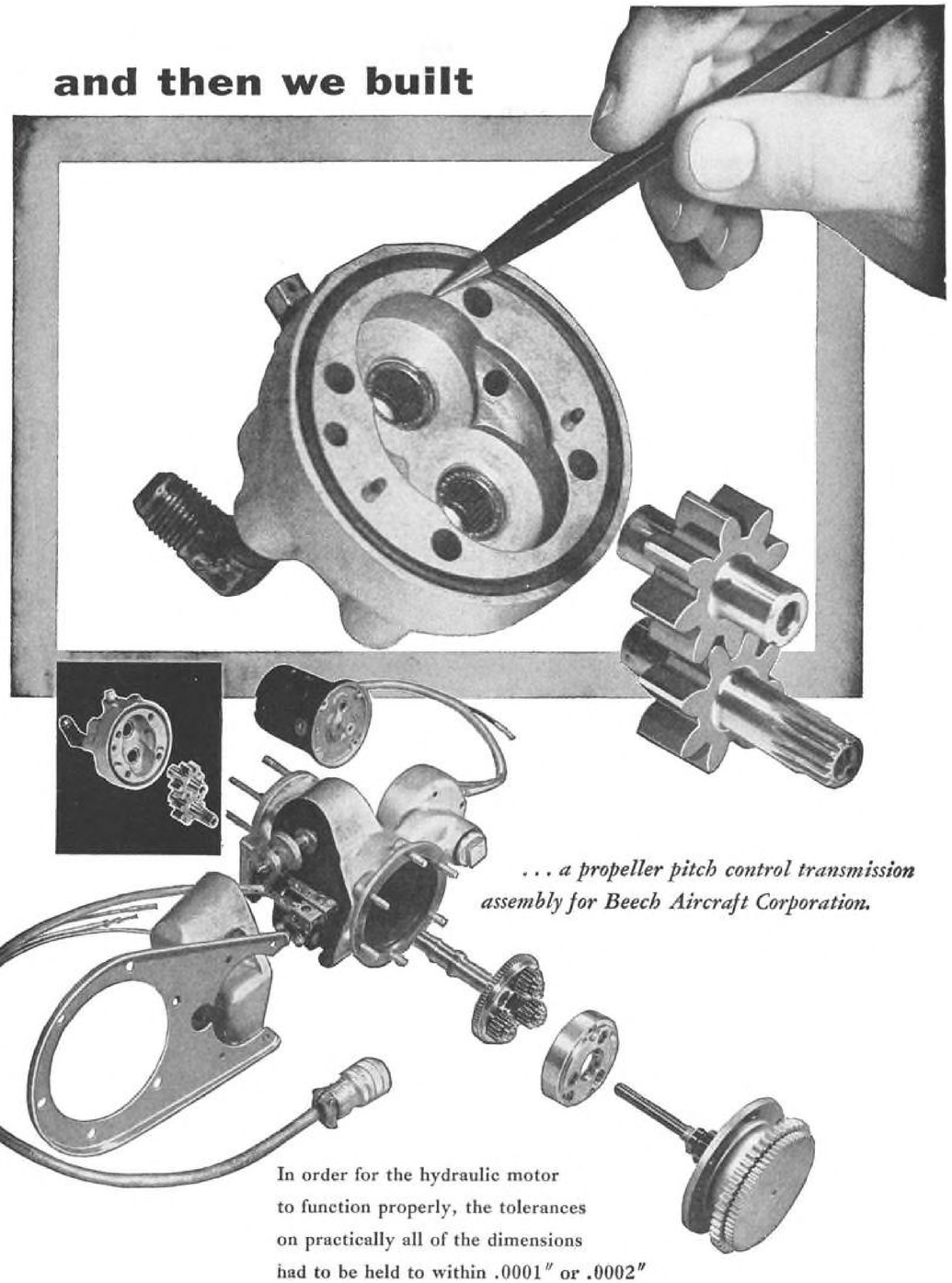
Many ingenious guidance systems are logical and easily understood when viewed in their entirety. However, when conditions are such that only small parts of the overall presentation can be seen, these systems frequently become unworkable. In the case of some systems, when only fragmentary parts are visible, these portions tend to be misleading, resulting in a wrong response. It is therefore essential that if parts of the system's presentation are to be useful at all, the information they furnish must be of a positive character.

The worst conditions under which a guidance system is still fully effective could be considered the minimum conditions for the system. (In practice a safety factor would be added.) However, flight conditions often fluctuate so widely and so rapidly that it is not possible to stay consistently above fixed minimums. A system which fails completely, or even worse, gives misleading information whenever conditions go below the minimum for the system, is not a safe system.

Paradoxically, it is often the more simple systems which best stand the test of providing useful positive information in their fragmentary parts. Complex systems, because of the integration of different kinds of information into one presentation, frequently do not meet this test.

For example, in the centerline system, even a single light visible will furnish some information regarding track, provided the heading is known. If only two consecutive lights are visible, some information regarding both track and course is provided. In the case of the slopeline system, a single

and then we built



. . . a propeller pitch control transmission assembly for Beech Aircraft Corporation.

In order for the hydraulic motor to function properly, the tolerances on practically all of the dimensions had to be held to within .0001″ or .0002″ for squareness, parallelism and concentricity.

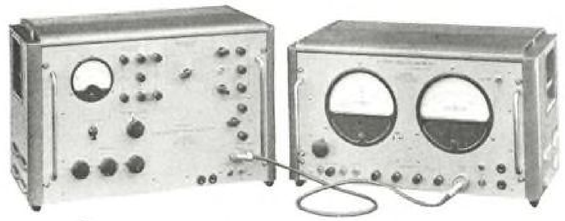
INDIANA GEAR

INDIANA GEAR WORKS, INC. · INDIANAPOLIS, INDIANA

another conquest... this time in aviation electronics

YOU TOO will be right ON TOP

with the new Solartron Transfer Function Analyser. Hailed at the International Instrument Exposition, Los Angeles, as the world's foremost servo test equipment, its advantages over other contemporary types will lead you to use it, as do all United Kingdom aircraft and G.M. manufacturers. Cable Solartron for our engineer to give you a demonstration, or write for fullest information.



- Tailored for airframe vibration and engine servo problems
- Frequency range covers both hypersonic and ground resonance bands
- Direct readings independent of all interference
- Answers G.M., fire-control, simulator, computor, vibration, magamp and all servo problems

THE SOLARTRON ELECTRONIC GROUP LTD.

Thames Ditton, Surrey, England. Cables: Solartron, Thames Ditton. Telephone: EMBerbrook 5522

• LETTERS

fixture visible provides no useful information and even several consecutive fixtures do not always provide a bit of useful, positive information.

Another criterion which ought to be applied to a guidance system is the requirement that a system's presentation be fully compatible with normal visual information received simultaneously, and that information should be presented in the same manner as the same information is received under normal conditions.

The tendency to combine several functions into one presentation is not necessarily the most efficient or safest solution. The resulting multi-function presentation is often so unlike the normal appearance of the problem that special training is required to interpret it effectively. This has been discussed in detail by others.

There is another aspect of the "unnatural" presentation which deserves serious thought. This is the fact that an "unnatural" presentation is basically incompatible with normal visual information. When using such a system one must rely on it entirely and little use can be made of any bits of normal visual information which are still getting through. (And more is still getting through than is generally realized.) By inhibiting the use of normal visual information, the valuable corrobrating effect of duplicating information is lost, as well as any additional intelligence it might furnish. Further, it makes the eventual transition from the "unnatural" presentation to the actual situation an abrupt one. This is the reason for the difficulty in "going visual" after an instrument let-down.

Ideally, a guidance system would merely amplify essential bits of normal visual information without distortion. Practically, this can best be achieved by an uncomplicated (though possibly extensive) presentation which allows a pilot to make his usual evaluations of the situation in a manner as normal as possible.

Robert W. Breiling
17 Front St
Schenectady 5, N. Y.

Plastic Mounts

I was somewhat amused at your photograph of a plastic mount used for holding metallurgical specimens, Aviation Week May 16, 1955, page 66. The note implied something new had been added for the Metallography Laboratory. I am sure it will be of interest to you to know that such plastic mounts and the mounting procedures described have been used in "up-to-date" laboratories for at least fifteen years.

Metallography laboratories now use plastics in liquid form in addition to the powder plastics described. The liquid plastic methods eliminate the need of pressure and heat permitting the microscopic examination of very fragile samples.

R. J. Gray
Metallography Dept.
Oak Ridge National Laboratory
Oak Ridge, Tenn.

. . . . Useful, Complete, Comprehensive . . . . Aviation Week Buyers' Guide, Nov. 28

WHAT *Sound* BARRIER?

BRILES FASTENERS manufactured *exclusively* for the Aircraft and Missile Industries, pierce the "*Sound Barrier*" daily while capably binding together the world's fastest craft!

BRILES "Cold Headed" FASTENERS undergo rigid, scientific inspection during and following each operation and manufacture. "Including X and R Process Qualities Control Plotting" of Critical Dimensions

BRILES complete modern Final and Magnaflux inspections assure Aircraft and Missile Manufacturers the highest quality fasteners obtainable.

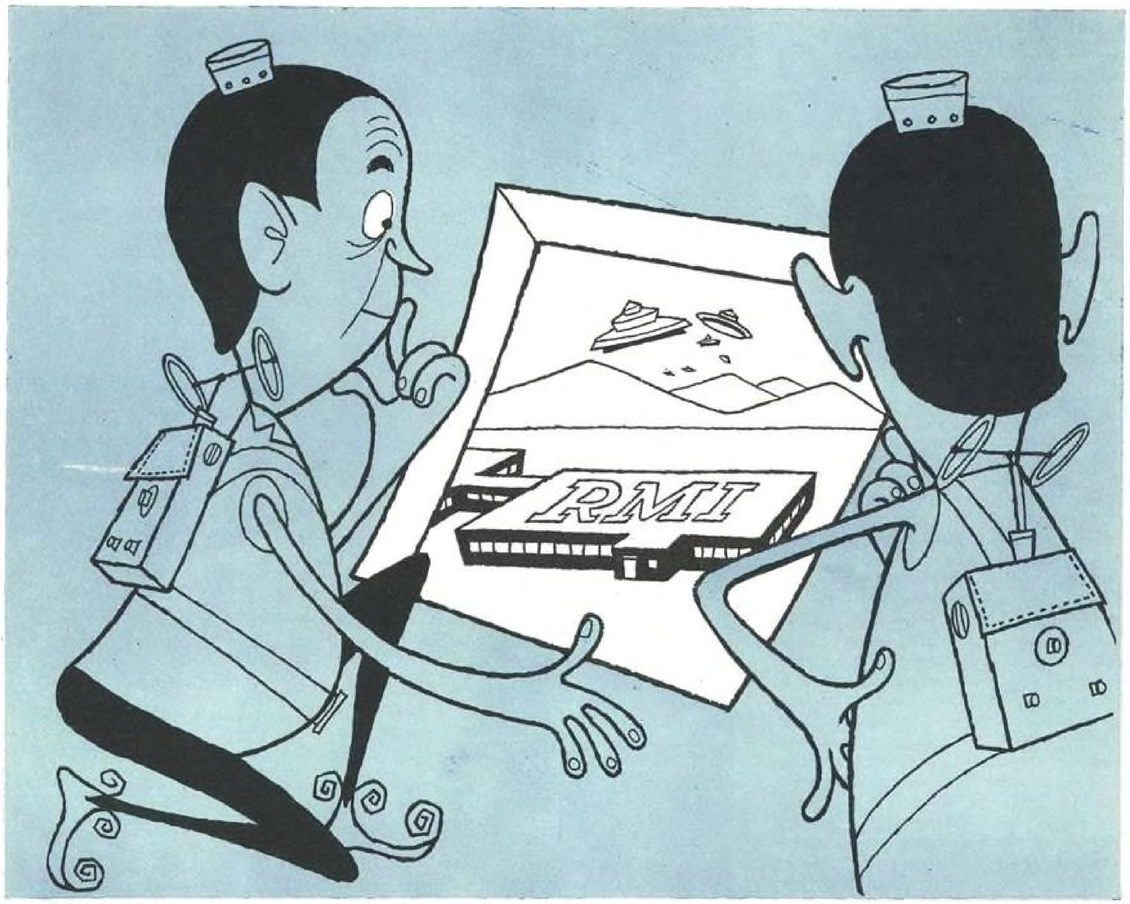
BRILES modern Engineering, Metalurgical and Manufacturing facilities are both anxious and qualified to help you with your Special fastener requirements.

BRILES also offer NAS, AN & MS Standard fasteners that surpass Air Force and Naval Specifications in their ability to withstand impact, shock, stress and strain!

COLD HEADED BOLTS AND RIVETS 3/32" to 1¼" Dia.

BRILES Manufacturing Co.
El Segundo, California

Representatives:
Eastern: RUSSELL ASSOCIATES, Bay Shore, N.Y., Cincinnati, Chicago, Detroit, Hartford, Conn., Boston, Atlanta, Ga., Buffalo, N.Y., Geneva, Ill., St. Charles, Ill., Brightwater, N.Y.
Seattle, Wash. & Wichita, Kansas FACTORS INC.
San Diego, Calif. HAROLD BECK
Dallas, Texas EDWARD SOSTETKE



"Calling all FLYING SAUCERS"

● Sure flying saucers are real. What's more, they contain strange little men from a strange little planet. They're master scientists searching for more knowledge . . . better ways to do things . . . better, greater power for their strange craft. They've heard of RMI's great work with rocket engines . . . its progressive strides in attaining greater thrust and efficiencies.

We at RMI extend a friendly invitation to our celestial visitors – as well as to all earthlings interested in rocket power applications – to investigate our products and visit our new and expanded research and production facilities at Denville, N. J.

Spearheading Progress through Research

RMI

Career opportunities available for experienced mechanical, aeronautical, electrical and chemical engineers, physicists, chemists. Send complete resume to employment manager.

REACTION MOTORS, INC.
Denville, New Jersey
Affiliated with OLIN MATHIESON CHEMICAL CORP.

AVIATION SAFETY

CAB Report on Executive PV-1 Crash

Pilot Off Course, Hits Mountain

THE ACCIDENT

At approximately 1740,[1] Nov. 20, 1954, a Lockheed PV-1 aircraft, owned and operated by the Plymouth Oil Co., Inc., Pittsburgh, Pa., crashed on Calf Pasture Mountain, near Waynesboro, Va. All five occupants, including the two crew members, were killed. The aircraft was demolished by impact and fire.

HISTORY OF THE FLIGHT

N 1505V departed Sinton, Tex., at 0845, Nov. 20, 1954, on a VFR (Visual Flight Rules) non-stop flight to Baltimore, Md., with Pilot Arthur Milton Soper, Co-pilot Joseph R. Kolodzie, and three passengers, all company executives. No flight plan was filed with CAA.

Prior to departure, the pilot telephoned the forecaster at the nearest U. S. Weather Bureau Station, Corpus Christi, Tex., and was briefed on en route weather conditions. He was advised that the weather should remain suitable for VFR flight as far as Atlanta but beyond that point ceilings would probably lower. Pilot Soper said that if these conditions existed when he was near Atlanta he would land and refuel.

A routine flight was made to Atlanta and the aircraft landed at 1313. The aircraft was on the ground approximately 2 hours and 25 minutes because ARTC (Air Route Traffic Control) could not clear the flight sooner due to traffic delays in the Washington area. During this period the pilot was briefed on en route weather and the aircraft was refueled with 208 gallons of 100 octane fuel.

The aircraft departed Atlanta at 1535 for Baltimore on an IFR (Instrument Flight Rules) clearance. The clearance specified a cruising altitude of 11,000 feet over airways Green 6 and Red 77 to Lynchburg, Va., Red 37 to Gordonsville, Va. and Red 33 and Red 17 to Baltimore. At 1628, when in the vicinity of Spartanburg, S. C., the flight requested a change in altitude to at least 10,000 feet on top of clouds because icing conditions were being encountered. This necessitated a climb of approximately 5,000 feet which was immediately approved by ARTC.

At 1708, Greensboro, N. C., radio received the following position report: "N 1505V on instrument flight rules, 6 minutes northeast of Greensboro range at 08 on top at 16,000 feet, request lower altitude, estimating Lynchburg at 22." Accordingly the aircraft was cleared to descend to and maintain 11,000 feet.

At 1724 Lynchburg radio received a position report from N 1505V, "Over Lynchburg at 1722, at 11,000 feet, estimating Gordonsville at 38." The Lynchburg altimeter setting, 29.50, was given the flight and the flight's position report was relayed to Washington ARTC.

A few minutes later the following clearance was relayed to the flight, "ARTC clears N 1505V to cross Remington at 11,000, cross Arcola range station at 10,000, maintain 10,000."

The 1628 Baltimore and Washington weather was then given as: Baltimore, scattered clouds 1,000 feet, estimated ceiling 7,000 feet, overcast; visibility 3 miles; light rain and haze; temperature 61; dewpoint 61. Washington, ceiling measured 8,500 feet, overcast; visibility 10 miles; light rain; temperature 60; dewpoint 57; wind east-northeast 16; pressure falling rapidly. The flight acknowledged this message at 1727 and canceled its IFR flight plan. This was the last radio contact with the aircraft. Approximately 13 minutes later it crashed on the mountainside and burned.

INVESTIGATION

The accident occurred in a downward-sloping open field adjacent to the Skyline Drive and 6 miles north of its junction with U. S. Highway 250. Heading of the aircraft at first impact was 91 degrees magnetic and the altitude above sea level was approximately 2,100 feet.

The right wing struck a fence post while the aircraft was making a shallow right turn; the impact severed the wing tip. The aircraft then struck the ground with terrific force 75 feet beyond the post. In sequence the right wing struck the ground followed by the right propeller and engine, the nose of the aircraft, and the left propeller and engine. The aircraft then bounced into the air and shed parts along a path for 1,300 feet at which point the main portion of the wreckage came to rest and burned. Parts of the aircraft were found 1,940 feet from the point of first ground impact.

Examination of the airframe disclosed no evidence of structural failure prior to impact.

Impact forces tore both engines from the aircraft and they were found among the most forward components along the wreckage path. The propellers were also found at widely separated points. Engines and propellers were badly damaged. No evidence of failure or malfunctioning of the engines prior to impact was found. It was determined that at the time of impact both propellers were operating within the cruise range. Both propellers were equipped with deicer fluid distributors.

The radio equipment of the aircraft consisted of ADF, VOR, and VHF. This equipment sustained extensive damage in the ground impact and fire with the result that little information of value could be learned from an examination of the individual units. The most recent check of the radio equipment was on Oct. 27, 1954,

[1]All times herein are eastern standard and based on the 24-hour clock.

BIG or SMALL
they all SHINE BEST
SHINE LONGER
SHINE EASIER with

NEVR-DULL
Aluminum Cleaner and Polish

The original chemically-impregnated cotton wadding – Cleans quicker, gives higher, longer-lasting gloss, leaves protective film. Saves time, labor and money! Avoid inferior imitations.

AVAILABLE AT LEADING DISTRIBUTORS

MANUFACTURED EXCLUSIVELY BY
George BASCH Co.
559 Longfellow Avenue, New York 59, N. Y.

Save ⅔ of your Wire Twisting Costs

ROBINSON WIRE TWISTERS

reduce safety wiring labor costs as much as $140 per engine. Split second whirling action wires 3 engines in time required for one by any other method.

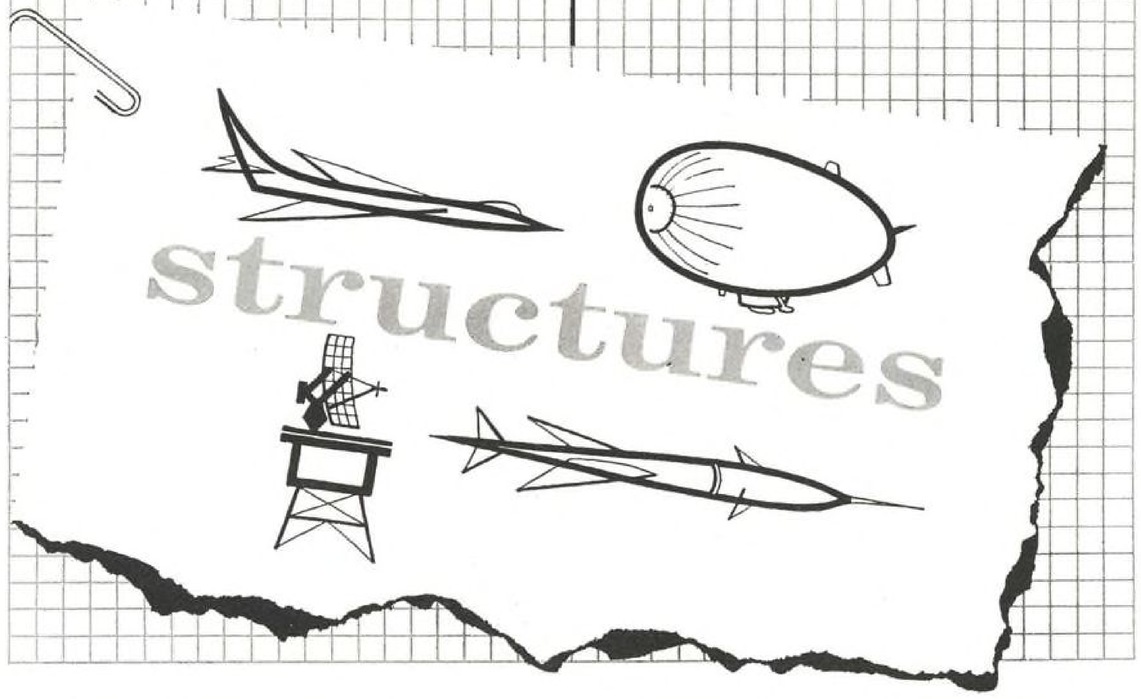
Approved and used by military and civilian installations all over the world.

3-tools-in-1: Pliers . . . Cutters . . . Twisters. 12" and 9" length, $21.50 and $20.50 each, FOB Sacramento.

Unconditional guarantee! Write for details including specifications, testimonials and list of users. RALPH C. ROBINSON CO., Box 494C, North Sacramento 15, Calif.

Engineering | **Design**

Research | **Development**



Structural engineers will find real scope and diversification at Goodyear Aircraft—where completely new aircraft configurations, utilizing a host of new weight-saving materials, are among the interesting assignments.

Here is an opportunity to work with Goodyear-built plastic laminates and bonded sandwich structures – to explore new avenues of approach to structural design through the services of the Goodyear-built analog computer laboratory, one of the largest in the world.

In virtually any engineering specialty, a challenging and bright future awaits creative men who come to Goodyear Aircraft—where missiles, jets, helicopters, airships and radar structures take shape.

We invite you to send a resumé or write for an application blank. Address:

C. G. Jones, Personnel Department, Goodyear Aircraft Corporation, Akron 15, Ohio.

Plants in Akron and Litchfield Park, Arizona.

They're doing big things at

GOODYEAR AIRCRAFT

THE TEAM TO TEAM WITH in AERONAUTICS

THE *Beaver* **L20**

The airborne "½-ton truck" of the U.S. Army

Operating from a 900 foot strip, the L20 in its ambulance role, will carry a pilot, attendant, 2 litter casualties and 2 walking wounded.

For liason/cargo work it will accommodate 6 passengers or 1000 lbs. of freight for a range of 500 miles.

Designed & Manufactured by

THE DE HAVILLAND AIRCRAFT OF CANADA LIMITED

POSTAL STATION "L" TORONTO ONTARIO

For Informative Brochure: Write Dept. AW-2

512

specialized radar... made by specialists

BENDIX PACIFIC AIRBORNE RADAR

Bendix-Pacific has the *specialized* engineering talents, the production facilities and the know-how to develop and build the *exact* radar for your requirements.

The experience Bendix-Pacific has already acquired in developing many advanced types of radar equipment and systems offers you a *plus value* that can mean excellence in design and efficiency in manufacture for *your* systems projects.

Let us place a qualified radar systems engineer at your service. He will be glad to visit you at your convenience.

If you are a highly qualified radar engineer, Bendix-Pacific offers you an excellent future. Write for details.

Bendix
PACIFIC DIVISION
Bendix Aviation Corporation
NORTH HOLLYWOOD, CALIF.

EAST COAST OFFICE: 475 5th AVE., N.Y. 17 • **DAYTON, OHIO**–1207 AMERICAN BLDG., DAYTON 2, OHIO • **WASHINGTON, D.C.**–SUITE 803, 1701 "K" ST., N.W.
CANADIAN DISTRIBUTORS: AVIATION ELECTRIC, LTD., MONTREAL 9 • **EXPORT DIVISION:** BENDIX INTERNATIONAL, 205 E. 42nd ST., NEW YORK 17

at which time operation was satisfactory. All radio contacts were normal throughout the flight and there was no indication of any radio equipment malfunctioning. The aircraft received no service during the Atlanta stop other than refueling.

Investigation indicated that the aircraft descended from 11,000 feet at Lynchburg to the northwest of Red 37 airway. This airway's course from Lynchburg to Gordonsville is 54 degrees and is over lower terrain that was free of fog at the time of the accident. The aircraft was first seen flying a north-northeast heading at about 2,500 feet m. s. l. in the Blue Ridge Mountain area, 16 miles south of the accident site. The mountain tops were covered with fog and there was a layer of fog over the valley to the west. Eyewitnesses near Skyline Drive testified that they saw the aircraft flying at a very low altitude just below this fog layer.

A floodlighted marble edifice (a tourist attraction known as Swannanoa) is located ¼ mile south of the junction of the Skyline Drive and U. S. 250, on top of a mountain 2,400 feet above sea level. A caretaker standing outside this building saw the aircraft heading northeast nearly hit one of the building's 60-foot high towers as it passed over. It was apparently flying with power reduced.

N 1505V, its flashing lights on, then circled to the left and passed over Swannanoa again in a northerly direction. This time it just missed an 85-foot high statue situated on the building grounds. The caretaker, formerly an Air Force mechanic, said both engines were developing power as the aircraft turned left toward the Shenandoah Valley.

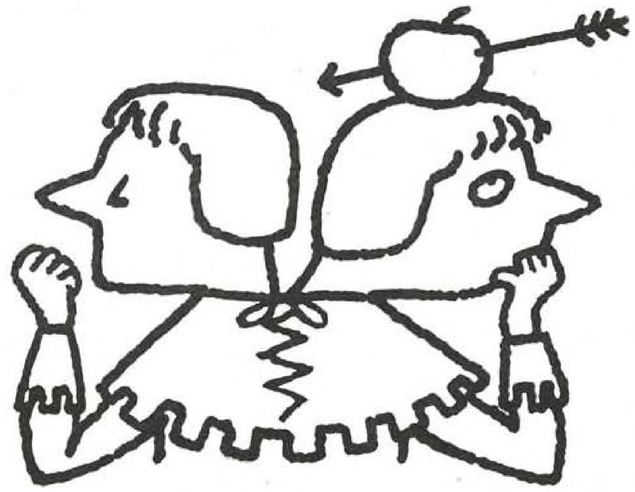
A witness in the valley northeast of Waynesboro had several glimpses of landing lights in breaks in the fog about 600 feet (2,000 m. s. l.) above the ground. In the general area there were fog covered peaks ranging in altitude from 2,500 to 4,000 feet m. s. l.

Another witness, 2½ miles southwest of the accident scene, heard the aircraft at what seemed a very low altitude heading northeast toward the ridge with its engines sounding normal.

On Nov. 20, 1954, a cold front extended southward from Lake Ontario to the South Carolina Coast. One of several frontal waves was located in North Carolina and moved northward along the front into southern Virginia during the afternoon. This wave had a direct influence on the weather encountered by the flight from Atlanta and at the time of the accident it had moved into central Virginia with accompanying thunderstorm activity and moderate showers.

Terminal forecasts used by the pilot at Atlanta indicated 2,500-foot ceilings and 7 miles visibility at the time the flight would be due to arrive in the Washington-Baltimore area. Ceilings 7,000 to 9,000 feet maintained in that area during the period. West of Red 77 and 37 airways the tops of the mountains were obscured by clouds, showers, and fog. On the morning of November 20 Pilot Soper told the U. S. Weather Bureau meteorologist at Corpus Christi, Tex., while receiving weather in-

. . . . Useful, Complete, Comprehensive . . . .
Aviation Week Buyers' Guide, Nov. 28



OFTEN

TWO HEADS ARE BETTER THAN ONE

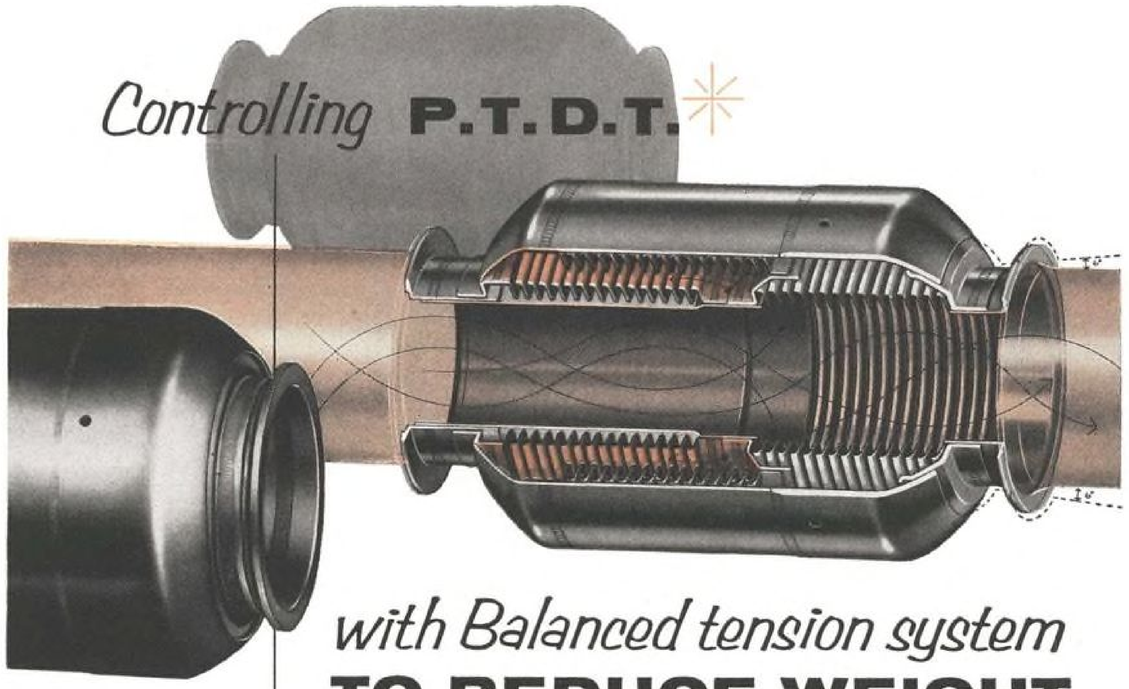
Sometimes two heads are the only solution to a part or fastener problem. Take a quick look at the belt buckle roller illustrated. This was a really special job and it solved a special problem for both the Armed Services and their suppliers. The big problem here was to produce this roller in *quantity, inexpensively* and *quickly* . . . and HASSALL double-heading did the trick.

Double-heading is only one example of the almost limitless possibilities Hassall cold-heading offers you. If you have a fastener problem just send us samples or specifications for a quotation.

WRITE FOR CATALOG . . . with it we will send our popular decimal equivalent wall chart.
John Hassall, Inc., Box 2223, Westbury, L. I., N. Y.

HASSALL

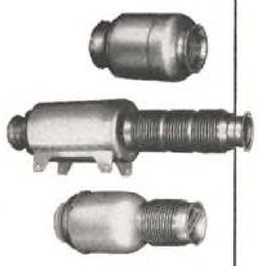
SINCE 1850 — NAILS, RIVETS, SCREWS AND OTHER COLD-HEADED FASTENERS AND SPECIALTIES



Controlling **P.T.D.T.**

with Balanced tension system

TO REDUCE WEIGHT



Stainless Steel Pressure Compensator Bellows

Here is the first practical method of balancing the powerful end thrust or "pressure growth" of a pneumatic metal ducting system employing bellows. It is a Pressure Compensator which balances the tension, eliminates the end load and therefore the need for heavy structural bracing. Thus, it saves weight and is particularly applicable for use in bleed air systems in turbo jet and turbo prop powered aircraft.

The primary duct line bellows in this compensator provides for thermal expansion, flexure and misalignment. To offset the tendency of the bellows to straighten out or elongate under pressure, the internal duct pressure is bled off to a series of secondary bellows which create an opposing force to the primary bellows and nullify the end thrust.

Arrowhead builds three types of Pressure Compensators plus tie-rod assemblies and other stainless steel duct components including bellows, and braided assemblies. They are made in all sizes up to 8" I.D. Are capable of handling air pressures of 250 psi or over and temperatures up to 900° F. All spot and seam welding is performed to specification MIL-W-6858.

Pneumatic Thermal Duct Thrust is the end force or reaction created by a rigid metal duct system employing bellows. This duct thrust is caused by the tendency of the bellows to elongate or straighten out under pneumatic pressure.

ARROWHEAD METAL PRODUCTS DIVISION *FORMERLY AIRITE*

ARROWHEAD, leading manufacturer of fiberglass impregnated ducts, sleeves and couplings, now offers stainless steel bellows and duct assembly components to answer all aircraft problems in handling air, gas or fluids. Arrowhead is the first and only manufacturer of ducts who can provide this complete manufacturing service. Field engineers in all localities for consultation.

ARROWHEAD RUBBER COMPANY

2350 CURRY STREET, LONG BEACH, CALIFORNIA

Pioneer fabricators of silicone rubber; Originators of rubber-fiberglass ducting

For complete information and engineering data, write Metal Products Division.

formation by phone, that he intended to descend before reaching Washington and proceed VFR to his destination.

Pilot Soper was employed as a pilot by the Plymouth Oil Co. in 1945, and until the summer of 1953 the company aircraft in use were of a lighter and smaller type than the one involved in this accident. The company purchased the PV-1 at the suggestion of Mr. Soper and its modification was completed at San Antonio, Tex., in June 1953. On July 10, 1953, at San Angelo, Tex., he obtained a rating on PV-1 aircraft and this rating was effective at the time of the accident.

ANALYSIS

The heading of Red airway 37 between Lynchburg and Gordonsville is 54 degrees magnetic. This airway passes over low rolling terrain and at the time of the accident the cloud ceilings were 6,000-7,000 feet. Although this airway was specified in the flight's clearance it is apparent that this course was not flown after passing Lynchburg but rather that the aircraft continued to fly on about the same heading which was flown between Greensboro and Lynchburg. A continuation of this heading passes over the accident site.

There is also the possibility that after passing Lynchburg the pilot used the Montebello Omnirange as a means of navigation. If this was done it might account for the aircraft being where it was when the accident occurred. The Montebello range station is 25 miles southwest of the accident scene and is nearly on a continuation of the course flown between Greensboro and Lynchburg. A 53-degree magnetic radial of the Montebello Omnirange is Victor airway 140 and it is on course between Montebello and Baltimore. This airway also passes over the scene of the accident.

The area of the Montebello Omni station, Skyline Drive, and the nearby Blue Ridge Mountains would have required instrument flight on Nov. 20 due to fog and clouds covering the mountain tops. Because of this condition the flight should have maintained an altitude of at least 5,000 feet m. s. l. for safe terrain clearance. Had the flight remained on the course north of Lynchburg, which was specified in its clearance, the ground could have probably been seen between breaks in the clouds and a descent in this direction would have resulted in the aircraft being clear of all clouds at an altitude of about 6,000 feet.

It is believed that the pilot was not certain of his exact location because he descended to a dangerously low altitude in a mountainous area. This belief is supported by the pilot's circling of the floodlighted building in a probable attempt to identify his location. Winds at the flight's altitude over Lynchburg were from 220 degrees at 30 knots and at lower altitudes in the accident area were from 320 degrees at 15-20 knots. From the wind direction given it is apparent that the flight could not have been blown off course into the accident area.

The last radio contact canceling the IFR clearance ended at 1727. From this time until the accident occurred there was 13 minutes of radio silence. It is not known

For Reliable Circuit Protection

DE HAVILLAND

Otters

equipped with

KLIXON

Circuit Breakers

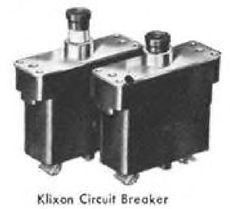
De Havilland Otters are doing an outstanding job in moving passengers, cargo, and supplies where wanted, when wanted . . . promptly!

To insure maximum performance, De Havilland uses Klixon Circuit Breakers to protect electrical circuits in the Otters and in other personal and business aircraft. Their experience has proven that Klixon Breakers are outstanding for dependability.

Klixon Breakers withstand shock and vibration far in excess of the values normally encountered. They are precision calibrated and individually tested for ultimate trip and 200% load tripping characteristics to assure dependable protection.

Write for data giving complete details.

panel installation in De Havilland Otter D6751
Push-Pull, Trip-Free
Manual Reset
Ratings: 5 to 50 Amps.



Klixon Circuit Breaker

KLIXON

METALS & CONTROLS CORPORATION
SPENCER THERMOSTAT DIVISION
2809 Forest Street, Attleboro, Mass.

THIS IS FOR YOU ... IF YOU HAVE AN AC GENERATOR COOLING PROBLEM!

SPECIFICATIONS

208/120 Volts, 0.75 Power Factor, Y-connected, 400 CPS

Type No.	Rating KVA	Rated Cooling Air Pressure "H_2O	Rated Cooling Air lb./min.	Diam. in.	Speed RPM	Approx. Weight lbs.	Flange and Drive Spline
*28E16-1	20	6	11	8.25	6000	60	AND10266 XVI-A
*28E17-1	30	5	13	8.25	6000	69	AND10266 XVI-A
*28E14-1	40	5	14.5	9.25	6000	83	AND10266 XVI-A
*28E15-1	60	6	16	9.25	6000	100	AND10266 XVI-A
28E19-1	10	6	8.4	6.5	8000	31	AND10262 XII-A
28E19-3	10	6	8.4	6.5	8000	32	New 9" Flange
28E20-1	20	6	8.5	6.5	8000	45	AND10262 XII-A
28E20-3	20	6	8.5	6.5	8000	46	New 9" Flange
28E21-1	30	10	12.4	6.5	8000	60	AND10262 XII-A
28E21-3	30	10	12.4	6.5	8000	61	New 9" Flange
**28E10-1	9	6	8.6	6.5	8000	39.5	AND10262 XII-A

*These generators include integral fan permitting full load continuously up to 80°C at sea level with no additional cooling.

**This generator incorporates a DC output of 30 volts, 50 amps capacity in addition to the AC output.

All generators have been designed to MIL-G-6099 and MS-33542 which specifies cooling air of 120°C at sea level, 40°C at 50,000 ft., and —12°C at 65,000 ft., and will deliver full rated load under these conditions.

Bendix Red Bank

HIGH-TEMPERATURE AC GENERATORS

meet military class C air-cooled specifications ... offer maximum performance at minimum size and weight ... range from 9 KVA to 60 KVA

These generators are designed as part of complete Red Bank high temperature AC generating systems that also include magnetic amplifier voltage regulators and system protection components. For full details, write Red Bank Division, Bendix Aviation Corporation, Eatontown, New Jersey.

West Coast Sales and Service: 117 E. Providencia Ave., Burbank, Calif.
Canadian Distributor: Aviation Electric Ltd., P.O. Box 6102, Montreal, P.Q.
Export Sales: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.

Red Bank DIVISION — Bendix AVIATION CORPORATION

if the aircraft radio equipment failed during this time. However, this appears unlikely since there were on board several radio receivers covering different navigational aids. This is supported by two facts:

(1) All previous radio contacts were made in a normal manner.

(2) The pilot may have become aware of his position in the last minutes of the flight since when the accident occurred the aircraft was heading directly toward the Gordonsville radio range station and the originally approved course.

Regardless of the pilot's reasons for making the various turns it is difficult to find a logical or reasonable explanation why he proceeded into instrument conditions and let down to such a low altitude over mountainous terrain.

FINDINGS

On the basis of all available evidence the Board finds that:

1. The flight crew and aircraft were currently certificated.

2. According to company records the aircraft was under its allowable gross weight and the load was distributed so that the center of gravity of the aircraft was within approved limits.

3. There was no evidence indicating power or structural failure, malfunction of controls or communication and navigation equipment prior to impact.

4. Had the flight continued on airways on an IFR flight plan at 11,000 feet to Gordonsville and then descended it would have established visual flight conditions and have been over low terrain.

5. The flight made a descent under instrument conditions to a low altitude after canceling the IFR clearance near Lynchburg.

PROBABLE CAUSE

The Board determines that the probable cause of this accident was the pilot's failure to follow his original and approved course and the letdown over mountainous terrain which resulted in the aircraft entering a cloud deck and striking the mountain during an attempt to regain a proper course.

By the Civil Aeronautics Board:

Joseph P. Adams
Josh Lee
Chan Gurney
Harmar D. Denny

(Ross Rizley, Chairman, did not participate in the adoption of this report.)

TWA Monthly Report

Trans World Airlines reported 359.9 million passenger-miles flown in the month of July, an increase of 11% over the same month in 1954. TWA flew 76.5 million passenger-miles on international air routes and 283 million passenger-miles in domestic service during July for gains of 16% and 9%, respectively, over the same period in 1954.

YOUR EXECUTIVE AIRCRAFT DESERVES THE BEST

ENGINE OVERHAUL

For aircraft engine overhaul service, Pratt & Whitney Aircraft's Airport Department is "home" for many types of business aircraft. Like many of the nation's leading companies, you can enjoy the advantages and reassurances that go with engine work performed at the factory. It can cost less, too, in the long run.

PARTS REPAIR

Certain types of engine parts repair, such as rebarreling cylinders or rematching crankcases, require factory facilities and factory methods that are available to you at the Airport Department. Complete equipment for all possible parts repair jobs—large or small—assures prompt dependable work.

AIRFRAME OVERHAUL

Expanded service hangar facilities can accommodate even the largest commercial aircraft. Service is prompt. Regular work includes inspections, engine changes, radio and instrument repair, airframe repairs or modifications, and general aircraft maintenance.

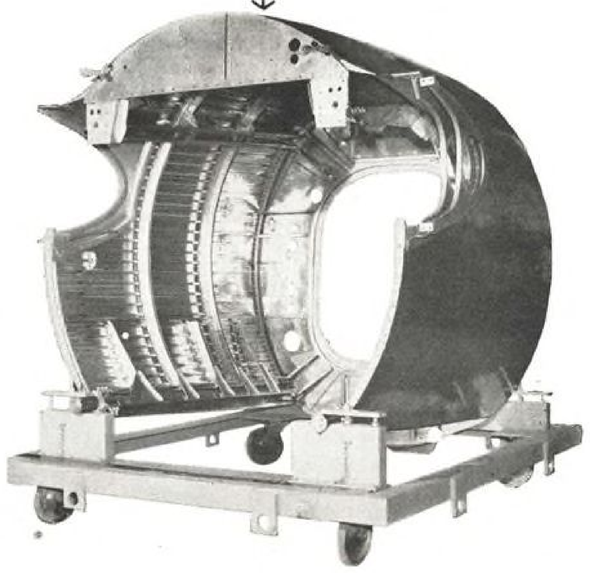
For further information
on your particular requirement fly to, or write:

PRATT & WHITNEY AIRCRAFT
DIVISION OF UNITED AIRCRAFT CORPORATION
AIRPORT DEPARTMENT

RENTSCHLER AIRPORT — EAST HARTFORD, CONNECTICUT

UNIQUE STAINLESS STEEL NACELLES

built by Solar of course!



WHEN NAVY PATROL PLANES hit the carrier deck, the impact calls for rugged construction. So in the famed Neptune series, Lockheed's designers made a radical departure starting with the P2V-5. They called for engine nacelles of stainless steel, to provide greater structural strength with less installed weight than conventional aluminum nacelles. Weighing only 370 pounds, each nacelle must support a Wright turbo-compound powerplant weighing over 5000 pounds.

Solar was selected to take on the challenging job of producing these nacelles. It involved precise forming and welding of half- to full-hard stainless steels in fabricating the intricate skin and rib structure. With more than 550 detail parts assembled with more than 38,000 individual spotwelds, the nacelles required development of many special tools and processes.

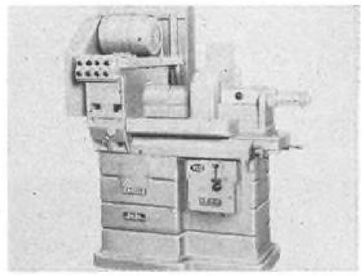
Volume manufacture of stainless steel nacelles and other airframe structures typifies Solar's skills with high strength alloys—skills based on 27 years of research, engineering, and fabricating experience with these metals. This backlog of knowledge is available to every company faced with difficult applications of stainless and titanium alloys. How can Solar help *you?*

SOLAR
AIRCRAFT COMPANY
SAN DIEGO DES MOINES

INFORMATION: *Write Solar Aircraft Co. Department B-62, San Diego 12, Calif.*

DESIGNERS, DEVELOPERS AND MANUFACTURERS • "Mars"® and "Jupiter" Gas Turbine Engines and Power Units • Jet Engine Components and Afterburners • Sola-Flex® Bellows and Industrial Expansion Joints • Solaramic® Coatings for Metals • Custom-Engineered Aircraft Controls and Ducting Systems • Welding Fluxes • Exhaust Manifolds • Precision Fabrications of Titanium and All High Temperature Alloys

NEW AVIATION PRODUCTS



Precision Hole Drilling Tool

Precision drilling tool bores holes straight and round within .0005 in., holding diameter within .0005 in. Finish does not exceed 15 mu-in root mean square, and the machining time per piece is 30 seconds.

Tool is clamped to a simple fixture and held stationary. Parts may be of any shape or size. Coolant is supplied under high pressure through the gun type drill. The coolant washes the chips out through the single flute in addition to dissipating heat. Cored holes in castings can be finish-machined in one operation.

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

Carbide-Tipped Live Center

Tungsten carbide tips increase live center life five to 10 times. Cross center is designed to withstand higher speeds and increased pressures set up by carbide cutting tools.

Twin radial and thrust-load ball bearings in the head and twin radial-load needle bearings in the shank give the cross live center a two to three-times greater load capacity.

Herbert Cross & Son, 14 Highland Ave., Bala-Cynwyd 58, Pa.

Multiple Temperature Unit

Conax multiple Speedwell temperature measuring device provides readings at two, three, four or five different points simultaneously from same vessel wall entrance.

High rate of response is due to low mass and low thermal inertia of stainless steel protection tube ($\frac{3}{8}$ in. diameter by .035 in. wall). Thermocouple element is sealed inside well, eliminating oxidation and corrosion by oxygen or toxic gases.

Device operates in pressure range from full vacuum to 3,000 psi. and temperatures from −300 to 2,000F°. Sales at top of wells hold system pressure in the event of tube failure.

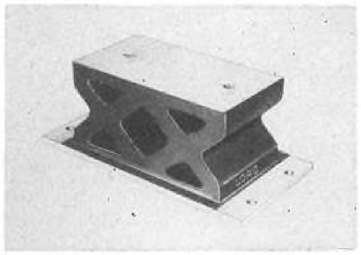
Conax Corp., 7811 Sheridan Drive, Buffalo 21, N. Y.

Material Cuts Lens Glare

A new material known as Luxorb and developed in Northrop's Associated Products Department, enables optical devices to absorb more light and produces sharper, glare-free images. Application of the new material to the edges of prisms in telescopes, gunsights and cameras is expected to considerably increase their efficiency.

The light absorbing chemicals can be compounded in either liquid or solid form.

William I. Mann Co., Monrovia, Calif.



Lattice Mounting Cuts Vibration

Bonded-rubber mountings provide a high degree of vibration and noise isolation, particularly in low-frequency, high-amplitude ranges. Capacities range from 250 to 3,000 lb. and static deflections from $\frac{1}{4}$ to $1\frac{1}{2}$ in.

Mountings feature a latticed rubber section which is bonded to horizontal steel plates at top and bottom. Lattice design permits shock load to be carried by rubber in shear, providing a high degree of horizontal stability. No lubrication is required.

Lord Manufacturing Co., 1635 W. 12 St., Erie Pa.

Lightweight Computing Gunsight

New K-19 computing gunsight for supersonic jet fighters can be used with all weapons normally carried by such a plane for both air-to-air and air-to-ground firing.

It is much lighter than previous models, says the manufacturer.

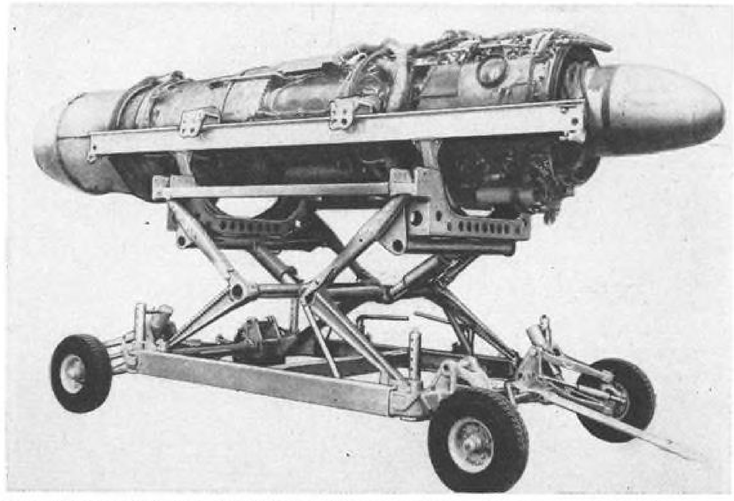
General Electric Co., Schenectady 5, N. Y.

Automatic Pressure Air Pump

Integral motor pump unit, Model RG-10470, is adaptable to a process or machine requiring automatic pressure to 20-psi. gage. A common shaft transmits motor power to pump rotor and sliding blades. Oil-free pump impeller parts are assembled on the end of three ball bearing armature shaft.

Pump is rated at 550 cfm. at 20 psi. discharge pressure. Motor is $\frac{1}{6}$ hp., 3,450 rpm., 115 v. a.c., 4 amp., 60 cycles, single phase, continuous duty, and weighs 36.82 lb.

Lear-Romec Div., Lear, Inc., Elyria, Ohio.



THE ALL-DIRECTIONAL HEAVY-DUTY POSITIONING TRAILER, Model 4000, shown above has been developed for the installation and removal of jet engines, tip tanks, rocket pods and other external stores. Equipped to handle loads of up to 8,000 lb., the trailer can be lowered and rolled under a jet engine in suspended position when clearance of engine from the ground is only five inches. It has a maximum lift of 79 in. from centerline of engine to ground. Manufactured by Air Logistics Corp., subsidiary of Hammond Mfg. Corp., 3600 Foothill Blvd., Pasadena, Calif.

Every overhaul requirement for your business airplane!

MAJOR AIRFRAME OVERHAUL and engine change taking place in one of the AiResearch hangars. Services available include installation of bigger engines, modified wings and new complete systems.

BEAUTIFUL CUSTOM INTERIOR installed by AiResearch in a Convair 340 owned by the Phillips Petroleum Company. Handsome appointments are combined with practicality.

NEW RADIO AND ELECTRONICS CENTER has most complete facilities in the nation for business aircraft. CAA certified for Class I and II

Let our specialists maintain your business airplane in top condition. Experienced mechanics provide every aspect of aircraft servicing, from thorough 100-hour checks to complete modernization. AiResearch is the only company at Los Angeles International Airport with CAA approval for annual relicensing of your airplane.

A complete engineering department, the finest interior stylists and superb craftsmanship assure you of top quality if your problem is comfort, speed, range, payload, power or all five.

Try our rapid and efficient turn-around service!

TYPICAL AIRCRAFT WE HAVE MODIFIED OR OVERHAULED:
Douglas DC-3, Super DC-3, DC-4, DC-6 and A-26 — Convair 340 — Lockheed Lodestar — North American B-25 — Martin B-26 — Beechcraft

THE GARRETT CORPORATION

AiResearch Aviation Service Division
Los Angeles International Airport, Los Angeles 45, California

ALSO ON THE MARKET

Gas tractor uses quick-vaporizing liquid gas for better mixture with intake air and more even distribution in cylinders. Crankcase dilution is said to be impossible since there is no liquid to wash down upper cylinder wall lubricant. Increased compression ratios are necessitated by the fuel.—Mercury Mfg. Co., 4044 S. Halsted St., Chicago 9, Ill.

Positive-locking terminal shielding cover for power switches has the effect of shielding inductive fields.—Clarostat Mfg. Co., Inc., Dover, N. H.

Pick-a-shaft FKS—$\frac{1}{2}$ shaft covers 13 types and includes high-voltage coupler for protection in operations up to 10K volts.—Clarostat Mfg. Co., Inc., Dover, N. H.

New Nobursink deburring and chamfering machine for openly accessible hole faces has black-oxide finish for friction reduction. Manufacturer reports that secondary burr is avoided by accomplishing shaving action with minimum pressure.—Nobur Manufacturing Co., 6860 Farmdale Ave., N. Hollywood, Calif.

Series 1100 lightweight restrictor valves for 3,000-psi. hydraulic service have internal or external threads, an ambient temperature range of −65 to +275F and weigh about 20 to 35% less than other models. Poppets and interior parts are corrosion resistant.—Aircraft Products Co., 300 Church Road, Bridgeport, Pa.

Hydraulic adjustable loading dock with 20,000-lb. capacity, Model No. 4 AF, has automatic safety device and self-leveling action for varying heights of freight carrier beds plus carrier spring deflection during freight transfer.—Rowe Methods Inc., 2534 Detroit Ave., Cleveland 13, Ohio.

Single phase EPDF dial feed rotary indexing welding machine has six welding stations and is said to be able to produce 1,000 completed assemblies per 50-minute hour.—Sciaky Bros., Inc., Department M-3, 4915 W. 67th St., Chicago, Ill.

New miniature centrifugal governor for fractional-horsepower motors is $\frac{1}{2}$ in. long. Made of metal and non-hygroscopic materials for resistance to fungus and humidity.—Nader Mfg. Co., 2661 Myrtle Ave., Monrovia, Calif.

Power supply, designed for operating lab or production testing control equipment on unregulated 28 v. d.c., Model .28-2MX powers relays, solenoids and motors.—Dressen-Barnes Corp., 250 N.

NORTH AMERICAN'S Columbus Division

offers opportunities in OHIO for QUALIFIED

ENGINEERS

North American Aviation, for many years the country's foremost designer and builder of military aircraft, has an established engineering team at the Columbus Division with prime responsibility for the design and development of Navy aircraft.

The Navy's latest "Fury" Jet . . . the FJ-4 . . . is one of the accomplishments of this skilled engineering team. Many other designs for new, high-performance, super-sonic aircraft are being developed from initial concept to flight by North American's Columbus Division.

This fully integrated group of engineers must be further expanded to meet our growing demands. These new projects offer many outstanding opportunities to all types of engineers involving the full complement of skills . . . from basic research to flight test.

IMMEDIATE OPENINGS FOR: Aerodynamicists, Thermodynamicists, Dynamacists, Stress Engineers, Structural Test Engineers, Flight Test Engineers, Mechanical and Structural Designers, Electrical and Electronic Engineers, Wind Tunnel Model Designers and Builders, Power Plant Engineers, Research and Development Engineers, Weights Engineers and many others. Write or wire today for more information: Engineering Personnel, Department 56A, Columbus 16, Ohio.

Engineering Ahead for a Better Tomorrow

NORTH AMERICAN AVIATION, INC.
COLUMBUS DIVISION

THE WORLD'S LARGEST
PRODUCER OF
READY-TO-INSTALL POWER
PACKAGES FOR AIRPLANES
INVITES YOU TO ENJOY YOUR
WORK *AND* YOUR LIFE IN

beautiful

SOUTHERN
CALIFORNIA

We believe we can offer you an opportunity to improve your position in the business world—and improve your way of life here at Rohr Aircraft Corporation in beautiful, temperate, exciting Southern California. To strengthen our personnel in various departments, Rohr has a real opportunity for you if you are skilled as an —

ENGINEER
(Aircraft Design or Structures)
LOFTSMAN
JIG & FIXTURE BUILDER
TOOL PLANNER • TOOL DESIGNER

ROHR
AIRCRAFT CORPORATION

Please write giving complete details and we will answer immediately.

Mr. Ned DeWitt, *Personnel Department 19*
Rohr Aircraft Corporation
Chula Vista, California

9 miles south of San Diego on sunny San Diego Bay.

Vinedo Ave., Pasedena 8, Calif.

Model 21 Mona-Matic manufacturing lathe has four-cut, fully automatic work cycle. Cam stack in programming control dictates operating sequences desired. Dual template air gage tracer offers template control for the last rough cut and final finish cut.—Monarch Machine and Tool Co., Sidney, Ohio.

New silicone impregnating varnish, SR-60, for stator and armature coils, aircraft generators, dry-type transformers and glass asbestos wire, has improved bonding strength, maker reports.—Silicone Products Department, General Electric Co., Waterford, N. Y.

Hydraulic die handling truck Model E-12-16 has 16,000-lb. capacity and lift and push-pull members. It is available in battery, gas-electric or diesel-electric power units.—Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.

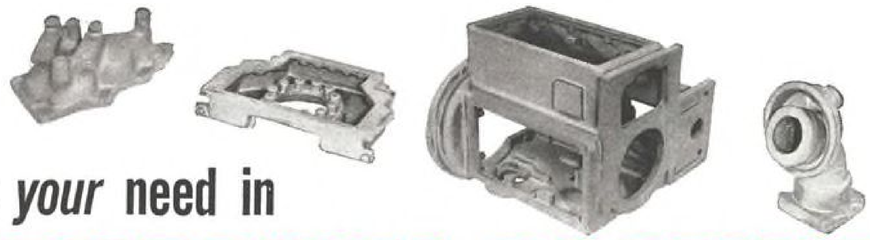
Adjustable-bed hydraulic gap press comes in hand-air-oil or motor-operated models. Both have press frame construction for rigidity under full loads and hydraulic gages calibrated in pounds and tons pressure on the work.—K. R. Wilson, Inc., Arcade, N. Y.

Eight-day elapsed-time aircraft clocks are being installed in Douglas DC-7s. Made with either a 12- or 24-hour dial, center chronographic sweep second and hour register hands, A-10-A clocks are manufactured according to MIL-C-9196 and 10400 USAF specifications.—Wakmann Watch Co., Inc., 15 W. 47 St., New York 36, N. Y.

High resistance temperature probes of 20,000 ohms, when used with TME bridge network, provide five-volt output signals for as little as 150 deg. temperature change. Probes are available in varied configurations for measuring fluid, surface, structure, air, hydraulic line, cylinder head and subminiature component temperatures.—Arnoux Corp., Dept. AW-4, Box 34628, Los Angeles, Calif.

Permanent magnet d.c. motor weighs less than 3 oz. and has an overall body length of less than 1½ in. Housing is machined from solid aluminum. Manufactured with a rotatable brush holder, which can be adjusted for best commutation and power output.—Servo-Tek Products Co., Inc., 1086 Goffle Rd., Hawthorne, N. J.

Open side tool holder provides flexibility of standard yoke type tool holder and combines the rigidity of the conventional open side. One tightening of the wrench locks tool bit and tool block.—Wade Tool Co., Waltham, Mass.



What's *your* need in

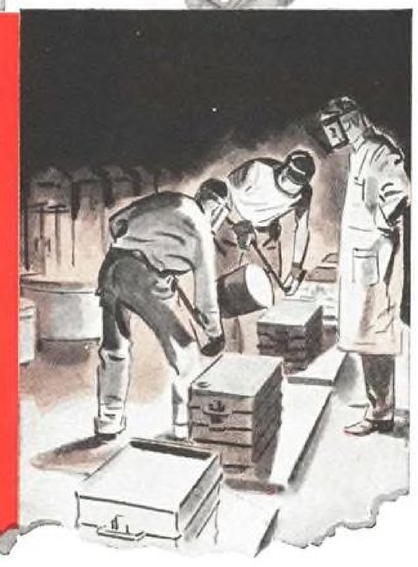
MAGNESIUM CASTINGS

WHATEVER YOUR NEED . . . CALL ON

Bendix

FOUNDRIES

for better quality and faster service



No matter how complicated your magnesium castings are . . . no matter what their size or shape . . . chances are that you can get better quality and faster service by dealing with us.

You save time and money with Bendix Foundries. We have a quarter century of specialized experience in the production of high-precision castings . . . of *all* magnesium and aluminum alloys.

You get what you want with Bendix Foundries. We utilize the most advanced service, methods and equipment . . . including resident government inspectors, X-ray analysis and a completely conveyorized production line.

If ability to produce quality castings in a wide range of sizes, shapes and varieties . . . and in production or made-to-order lots . . . interests you, write us for full details.

Check-Chart Shows Versatility of Bendix Foundries

PROCESS USED	METAL WORKED	
	ALUMINUM	MAGNESIUM
Sand	√	√
Plaster	√	√
Shell Mold	√	√
Die	√	√
Permanent Mold	√	√

FREE . . . "Book of Facts"!

Please send me your "Book of Facts" on magnesium and aluminum castings.

Name _____
Title _____
Company _____
Street _____
City _____ Zone _____
State _____

BENDIX FOUNDRIES

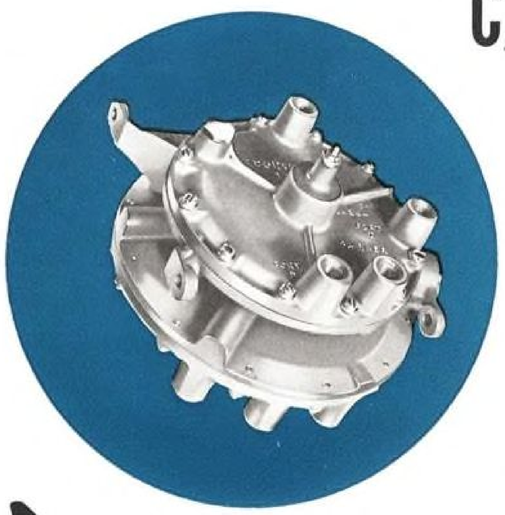
ECLIPSE-PIONEER DIVISION Bendix TETERBORO, N. J.

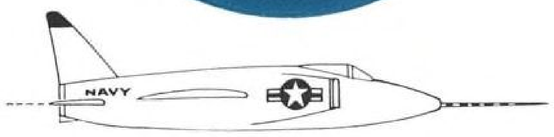
West Coast Office: 117 E. Providencia Ave., Burbank, Calif.
Export Sales: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.

On **Grumman's New F11F-1 Tiger**

Parker Fuel Control System maintains

C/G within 1% of MAC





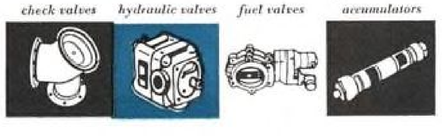
When Grumman Aircraft asked Parker to assist in the design and development of fuel system components for the F11F-1, one requirement was a simple, reliable control system to maintain aircraft longitudinal C/G within close limits through accurate, automatic sequencing of the fuel tanks, widely dispersed from the center of gravity.

To help solve this problem a Parker team of engineers and production specialists from the Fuel Division worked directly with the Grumman design group in order to achieve maximum engineering design and production coordination. As a result of this close teamwork a hydro-mechanical fuel balance system was developed that holds C/G within 1% of MAC. Information and knowledge exchanged first hand between the Grumman engineers responsible for the system design and the Parker engineers responsible for the component design was a large factor in the solution.

During operation of the system, a control unit senses absolute fuel head in forward and aft tanks and feeds these heads into opposing diaphragm chambers at opposite ends of a control valve. This valve in turn operates a shut-off valve between the tanks. Desired fuel head difference is held to ± ½ inch over the complete range of flows, temperatures, and flight attitudes up to 20° climb or dive. One of the principal features of the system is that it continuously works to maintain C/G. Any error is constantly compensated for throughout the entire range of fuel consumption.

...Let a Parker Team help you

A Parker Team is available to you on C/G or other problems involving aircraft fuel valves, hydraulic valves and check valves. If you have a problem in one of these fields or are beginning system design, get a Parker team on your staff.



Parker

Hydraulic and fluid system components

Parker Aircraft Co.
5827 W. Century Boulevard, Los Angeles 45, California
(subsidiary of The Parker Appliance Company)

Examiner Shuffles North-South Routes

American, Eastern, Capital, Trans World would obtain new segments to existing Northeast-Southwest service.

By Craig Lewis

Washington, D. C.—New competition on main routes between the Northeast and Southwest is recommended by Civil Aeronautics Board Examiner William J. Madden in his report in the Northeast-Southwest Service Case.

Madden has recommended route shifts that mean new competition among American Airlines, Eastern Air Lines, Capital Airlines and Trans World Airlines on routes between groups of cities in the Northeast, South and Southwest.

In his report on the case, one of the largest under CAB consideration, the examiner awards routes to carriers already operating in the areas involved.

Through Service Restriction

With the exception of the addition of Tulsa and Oklahoma City to TWA's route, all new route awards would be subject to through flight restrictions to maintain the through service purpose of the routes.

Applications of National Airlines, Delta-C&S Air Lines, Braniff Airways, United Air Lines, North American Airlines and Aero Finance Corp. were rejected by Madden.

Here are the examiner's recommendations:

- **A Houston-Nashville Segment** to connect with American's Route 4 for Houston-New York service, adding Pittsburgh as an intermediate point. San Antonio is also added to Route 4.
- **A Fort Worth Segment** to connect with Eastern's Route 5 for Fort Worth/Dallas-New York service via Memphis, Nashville and alternate routings through Pittsburgh and Philadelphia or Washington, Baltimore and Philadelphia.
- **A New York-Atlanta-New Orleans direct route** for Capital Airlines through extension of Route 55 beyond Atlanta to Birmingham, Mobile and New Orleans; and extension of Route 51 north from Washington to Baltimore, Philadelphia and New York and south from Nashville to Atlanta, Birmingham, Mobile and New Orleans.
- **Addition of Tulsa and Oklahoma City** to Trans World Airlines' transcontinental Route 2 and extension of Route 2 beyond Baltimore to Philadelphia and New York.

The complicated Northeast-Southwest Service Case is basically concerned with the need for competitive service between three groups of cities: New York, Philadelphia, Pittsburgh, Baltimore and Washington in the Northeast; Atlanta, Chattanooga, Knoxville, Memphis and Nashville as the midway cities, and Dallas, Fort Worth, Houston, New Orleans, Oklahoma City, San Antonio and Tulsa in the Southwest.

Nearly all of the route segments under consideration have one-carrier service. Many of the cities involved complained of inadequacy of service over routes without competition. Atlanta and Dallas, among others, complained that their carriers offered service on non-competitive routes inferior to that offered on Competitive routes.

Cites Lack of Service

"While the cities may have fallen short of establishing inadequacy in the technical sense," says the examiner, "they have established in general a situation where mature services under present day standards do not exist. It is useless, in the face of the present economic stature of the airline industry, to attempt an explanation for the absence of some choice of carrier on heavily traveled, long-haul segments such as New York-Atlanta, New York-Dallas, Washington-Houston and New York-New Orleans.

"Attempts at explaining this absence become especially fruitless when there is raised the point that many less dense segments have two (and some three) carriers from which to choose."

Concluding that the competition is needed, the examiner favors an exchange of American and Eastern routes to satisfy the need between the Southwest and Northeast. He feels entry of Eastern into Fort Worth/Dallas and of American into Houston, giving both carriers a route to each point from New York "presents the most forthright, efficient and adequate solution."

Diversion Threat

The report finds that the exchange of American and Eastern routes keeps the threat of diversion to a minimum and requires certification of fewer new route segments than proposals of other carriers.

The route of Delta Air Lines between the Texas cities and Atlanta is protected from diversion by routing Eastern's Fort Worth/Dallas-New York route northward via Nashville.

Addition of Tulsa and Oklahoma City to TWA's route is designed to improve service between the Oklahoma cities and the Northeast. American Airlines currently serves both points, and the addition of Pittsburgh to American's route is regarded as a service improvement.

The adjustments recommended for Capital's route serve to untangle the tortuous route pattern the carrier must contend with in serving Atlanta. The extensions of Routes 51 and 55 give Capital through routes from New York to Atlanta and New Orleans via both Pittsburgh and Washington.

In his report, Examiner Madden

Tourist Service on Polar Route

Los Angeles—The Scandinavian Airlines System will begin DC-6B tourist service over the North Pole to Europe next month.

Peter Tornqvist, SAS district manager in Los Angeles, said the cost of a round trip tourist ticket from Los Angeles to Copenhagen, Paris and London will be $756. Two weekly flights now in operation, one leaving Monday at 12:05 A.M., and a second on Wednesday at 11:55 P.M., will become mixed-service flights on October 5, the beginning of the off-season traffic period.

The combination flights will accommodate 39 tourist passengers in the forward cabin and 8 first-class passengers in the aft section. Full course dinners will be served to all.

Following inauguration of tourist service, SAS will offer a family fare plan from Nov. 1 through March 31 with savings of $300 on first-class round trip tickets and $200 on tourist tickets. Additional savings of $30 on each first-class ticket and $40 on each tourist-class ticket are available on off-season reductions.

says that asking Capital to compete with Eastern on New York-Washington-Atlanta-New Orleans service with its present route pattern amounts to "sending Capital into a contest with its right hand tied."

Pittsburgh Expansion

Madden finds a need for competition on routes between New Orleans, Birmingham and Atlanta and northeastern cities now served effectively only by Eastern, and he feels Capital should get the route rather than Delta or National. Traffic potential on the route isn't found heavy enough to support more than two carriers.

Pittsburgh benefits from a number of the recommendations. Certification of the city as a point on American and Eastern's routes to the Southwest and addition of Tulsa and Oklahoma City to TWA's route all serve to expand Pittsburgh's service to the West.

Addition of Eastern and American also gives Pittsburgh four trunk carriers to New York—Capital, Eastern, American and TWA. Adjustments in Capital's routes give Pittsburgh better service to the South as would a recommended removal of restrictions on Eastern's services to southern cities.

In extending services from the South and Southwest to New York, Madden recommends certification of TWA and Capital from Washington to New York via Baltimore and Philadelphia, a jealously guarded preserve of American and Eastern.

Reasons for Rejections

The report points out that the segments are necessary to avoid discrimination among northeastern cities in serving the South and West and don't constitute finding a need for new service between the Eastern points. TWA and Capital would operate between Washington and New York on a through-flight basis, as National does now on Miami flights, and the service would have little or no effect on Eastern and American, according to the report.

Applications of the remaining carriers were rejected largely because they called for extensive new route grants outside the territory served by the applying carriers. United Air Lines, North American and Aero Finance all proposed new services or new certificates in areas they do not currently serve.

Braniff and National serve parts of the areas under consideration, but their certification would bring them into other areas they do not operate in.

Delta's routes cover a greater part of the area involved, and CAB Bureau counsel had recommended a new route for the carrier from San Antonio to New York. But the examiner found that Delta lacks sufficient historical interest in the Northeast, a new area for the carrier, to warrant extension of its routes to New York.

Delta objects strongly to the examiner's findings.

Delta President C. E. Woolman told AVIATION WEEK that his company will use every "proper avenue open to us to convince the members of the Board that the examiner has erred and that Delta's application as originally filed is an economic must for the good of the South and the continued growth of our company."

DC-8 to Best DC-7 in Flying Cost

Direct operating costs of Douglas Aircraft Co.'s DC-8 jet transport should be lower over longer ranges than the piston-engined DC-7C, and the new airliner's structure will have features designed to reduce indirect expenses.

Chief DC-8 project engineer Ivar L. Shogran figures the direct operating cost of the 125-passenger overwater coach version at approximately 1.3 cents per 200-lb. nautical mile over a range of 1,200 to 3,750 miles. This compares with about 1.7 cents for the DC-7C over a 1,500-to-3,100-mile range. Breaking down the 200-lb. yardstick to the average 160-lb. passenger plus 40 lb. of baggage, the cost apparently is calculated in cents per available nautical seat-mile.

In his DC-8 formula, Shogran took a depreciation period of 10 years and an international fuel price of 20 cents per gallon. For the DC-7C, eight years depreciation and 26½ cents per gallon were used.

In overseas airline service, Shogran says the DC-8's direct operating expenses will be approximately 40% lower than the DC-7C on Paris-New York flights against a 60-knot headwind, 30% between London and New York and 25% on routes down to 500 nautical miles.

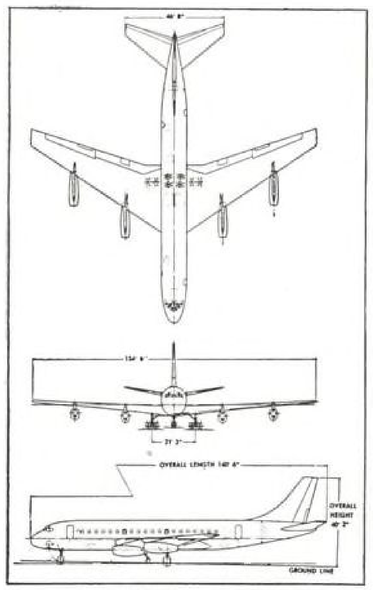
Structural features of the jet transport that will reduce indirect operating costs include:

• **Two passenger doors.** The DC-8's cabin will have forward and aft doors for rapid loading and unloading. They also will aid combination first-class and tourist service.

• **Underwing refueling.** This feature will be incorporated with equipment capable of fueling the airliner in a time span that will match other coordinated loading and unloading.

• **Cargo loading.** Devices have been designed that will load or unload all cargo and baggage in five minutes. In addition, galley servicing will be independent of passenger entrances to free congestion at the terminal gates.

• **Landing gear.** Like the DC-6, the jet transport is designed to pivot around either main gear for maximum ground maneuverability.



DOUGLAS DC-8

Two Australian Lines Show Record Earnings

Melbourne—The two government-owned-and-operated Australian airlines have completed a successful fiscal year of operations, and their annual reports, when published, are expected to show record net earnings.

Qantas Empire Airways, Australia's international airline operator, should show a net profit in excess of $650,000. The net earnings of Trans Australia Airlines will be in excess of $600,000.

Tasman Empire Airways—jointly owned by Australia and New Zealand—will show its first profit, around $80,000. It is small, but it replaces a chronic deficit.

Qantas' successful year is attributed to the introduction of Super Constellations which spurred passenger interest and airline use. Administrative improvements and changes in overseas routings also were responsible for some improvements in earnings.

Preliminary figures show that passengers on international services increased by 5.6 per cent, freight-ton miles by 11.3 per cent, and mail-ton miles by as much as 24.0 per cent.

With Combination Transports

TWA Hopes to Double Tourist Volume

By Gordon Conley

New York—Trans World Airlines is developing combination coach-first class transports as the standard airliner on its domestic trunk routes. With this equipment plus the new $80 fare on nonstop coast-to-coast flights, TWA expects to more than double its transcontinental tourist volume within the next 12 months.

The carrier will be the first to put large numbers of multi-service transports on domestic routes when it starts operating combination nonstop flights Sept. 25 (AW Aug. 29, p. 16). TWA and other international airlines started using split cabins more than two years ago, but service of this type within the United States has been limited.

Flexible Fleet

TWA believes the combination airliner is the only answer to its biggest problem since the start of air coach: how to schedule convenient flights for both tourist and first-class airline passengers.

Trans World now is converting its fleet of 20 Lockheed 1049Gs to multi-service configuration and will use the combination cabin arrangements on its 24 new 1649 Super Connies when the turboprop airliners are delivered in 1957-58.

"The Super-G was the first aircraft that really lent itself to multi-service configuration," says E. O. Cocke, TWA's vice president-sales and the primary backer of combination cabins and the $80 transcontinental tourist fare. "It's two loading doors and fore and aft passenger facilities made complete separation possible for the first time.

"The 1649s will have the same configuration. We now think they'll be used as multi-service transports."

The airline will use this split arrangement on nonstop 1049G flights between the East and West Coasts:

• **Day service.** Forward cabin will seat 20 passengers in five-abreast coach configuration. Aft will be 43 first-class seats and a lounge.

• **Night flights.** Eight berths will be added to the after cabin, reducing first-class facilities to 27 seats. Tourist section will be the same as transcontinental day service.

Seats on the 1049Gs and 1649s will be attached to tracks, allowing quick conversion from multi-service to first-class or coach.

"As we gain experience in convertibility, we should be able to make the change during turnaround time," says Cocke. "It will give us a highly flexible fleet for both domestic and international service.

"This type of operation will be the trend as we get into bigger and better transports."

Sales Gimmick

Trans World Airlines' present ratio of domestic passenger traffic is averaging approximately 60% tourist and 40% first-class. The $80 fare is a sales gim-

TOURIST SECTION of TWA's new combination-class 1049Gs will seat 20 passengers.

TWA Tourist Growth

	Passengers	Passenger-miles
1949	56,622	49,650,000
1950	146,697	170,270,000
1951	187,136	253,779,000*
1952	382,402	582,493,000†
1953	728,839	1,027,704,000
1954	1,071,237	1,370,919,000
1955		
(First Six Months) .	609,497	666,829,000
(Year Projected) .	(1,403,000)	

* First years of complete transcontinental tourist service and $110 fare.
† Year of $99 transcontinental fare.

mick designed to bring domestic coach volume to a level equal to or higher than the international average of 80% tourist and 20% first-class.

"It's like the family and fly-now-pay-later plans," says Vice President Cocke. "It will increase traffic on Mondays, Tuesdays, Wednesdays and Thursdays and it will even out the peaks and valleys.

"We'll make money on this despite the low fare. The 20% cut will be made up in increased volume. We'll probably take some business away from our competitors, from the nonskeds and also develop some new passenger traffic."

Competition Factor

Competition was an important factor in TWA's decision to slash fares on transcontinental tourist flights. Officials felt they had to match nonsked North American Airlines' low prices in order to compete on this coast-to-coast service.

Trans World's announcement of tariff reductions touched off similar action by American Airlines and United Air Lines, broadening the low-fare tourist operations among scheduled carriers (AW Aug. 22, p. 18). American asked Civil Aeronautics Board for permission to make its new rates effective Sept. 12 to match TWA's starting date. UAL has asked CAB for Sept. 16.

Cocke says early passenger interest in the $80 fare and nonstop transcontinental service indicates it will be highly successful. "We've had a substantial number of telephone inquiries and a large increase in advance reservations—unusual for tourist flights," he reports. "We'll get a definite fix on what the increase will be in late September, but it should more than double coast-to-coast tourist volume."

For the future, Cocke says **TWA** has no plans to go lower than the $80 fare.

Convair 440 Orders Pass $11-Million Mark

San Diego—Convair will offer its new Model 440 Metropolitan airliner (AW Aug. 29, p. 15) in both 44 and 52-seat versions. Two extra rows of seats will be installed in the forward cabin area to meet the needs of overseas operations.

Delivery of 14 440s worth more than $11,250,000—eleven to Scandinavian Airlines, two to Real Transportes S. A. of Brazil and one to Aero O/Y Finnair—is scheduled to begin in February.

Real Transportes will take another two 52-passenger Metropolitans as substitutes for two Model 340s ordered earlier this year. Continental Air Lines will do the same, taking 44-passenger 440s instead of three 340Bs.

Additional foreign and domestic orders are being negotiated, according to Convair President Joseph T. McNarney. The SAS decision to buy 440s was a setback for the Vickers Viscount. The Scandinavian airline had previously narrowed its final choice to Convairs or the British turboprop. The decision also may influence other European airlines now in the transport market.

The possibility that the U. S. military may finance further development of the twin-engine Convair may have had some influence on these new commercial orders.

Convair's Model 440 will be powered by two Pratt & Whitney Aircraft R2800 piston engines with new cylinder baffles and cylinder head deflectors for improved performance, particularly during climbs for maximum continuous power.

Use of jet engines for additional wing-tip power is being considered for Air Force versions of the Convair transport.

The maximum range of the new transport is given as 1,310 mi. with no wind, a 1,500-lb. fuel reserve under cruise operation at 20,000-ft. and a maximum takeoff weight of 49,100-lbs.

This compares with 1,150 mi. for Model 340. The 52-passenger version of the 440 will have a range of nearly 1,000-mi. under the same flight conditions.

Direct operating costs will be 1.79 cents per seat-mile over an average trip length of 165 mi., according to Convair.

"No transport designed for short and medium range operation can match this figure," McNarney told AVIATION WEEK.

A weather mapping radar nose will be incorporated in the 440 at the buyer's option.

New TCA Coach

Montreal—Trans-Canada Air Lines will inaugurate air coach flights to Florida, Bermuda and the Caribbean Nov. 1. Fares will be up to 34% lower than present first-class tariffs on TCA's southern service.

The airline will operate North Star transports with 50 seats arranged two-abreast. Meals and liquor will be sold on the tourist flights. Passengers will be allowed 44 lb. of free baggage.

National Asks Court To Halt Merger Case

An injunction has been sought by National Airlines in the U. S. Court of Appeals for the District of Columbia to halt further procedural steps by the Civil Aeronautics Board in the Eastern Air Lines-Colonial Airlines merger case pending a review by the Court.

Hearings by CAB have been completed in the case and briefs are due this week. National said that unless a stay is granted it will suffer irreparable injury by loss of its statutory right to a fair and speedy comparative hearing.

In its request for a stay of the merger proceedings, National charged CAB with elimination of these issues:

- **Whether an Eastern-Colonial integration** would be consistent with the public interest.
- **Whether a monopoly** would result from an Eastern-Colonial merger.
- **Whether Eastern controlled Colonial** at the commencement of negotiations.
- **Whether the public interest** would be better served by a National-Colonial integration than an Eastern-Colonial integration.

National claimed "these errors constitute a prejudgment in favor of the Eastern-Colonial merger since the problems raised in the issues so eliminated automatically removes the principal obstacles to approval."

National asked the court to "annul, vacate and set aside" the Board's order limiting the issues of the Eastern-Colonial merger and order CAB to reopen the record and afford National a full hearing.

Airways Pioneer Dies

Harry W. Howard, 63 pioneer airways lighting expert, died last week. He was supervisory airways engineer of the Civil Aeronautics Administration. Howard designed and originated the automatic engine generators for keeping air aid lights in service when local power failed. He also helped install the first lighted airway, from New York to Jacksonville, and at most other major airways in the country.

CAA Finds Viscount Tests Satisfactory

A Civil Aeronautics Administration review of Capital Airline's 100-hour simulated airline operation of the Viscount turboprop transport shows that the British-made plane matched, or exceeded, expectations in almost every field of operation.

A. S. Koch, CAA's aviation safety director, said:

"A good many of the problems anticipated with the Viscount failed to turn up. Generally with a new airplane there are some difficulties expected but they just didn't develop in this case."

He also said that maintenance and operation of the Viscount "seems to fit in well for Capital from a safety standpoint."

The review of Viscount performance data was made at a meeting of CAA engineering and other operations specialists.

The review also provided information on aircraft proving programs for the two CAA officials who will make a three-week tour of European aircraft manufacturing plants.

W. H. Weeks, chief of the Aircraft Engineering Division, and H. W. Helfert, European area supervisor of the International Region, left this week to gather first-hand information on new foreign civil aircraft in the development or test stages.

They will also hold various discussions with several groups of foreign government officials responsible for aviation safety and engineering in their respective countries.

While in England, Weeks will visit the British Air Registration Board and Vickers-Armstrongs, Ltd. He will also represent CAA Administrator Fred B. Lee at the Farnborough Air Show. In Italy, Weeks will present a CAA airworthiness type certificate to the manufacturers of the Piaggio Royal Gull aircraft.

WCTU Hits Airlines

Long Beach, Calif.—The Woman's Christian Temperance Union last week passed a resolution condemning the practice of serving drinks aboard airlines in no uncertain terms.

The resolution, adopted during the WCTU national convention, complained, in part, that airlines have been "soliciting passengers to drink while nondrinkers have to wait for their lunch or dinner" and added:

"The sober public has every right to demand sobriety and safety on the airlines."

Loose Fasteners Cited In CAA Warning

Civil Aeronautics Administration issued an emergency aircraft engine maintenance procedure last week because of an accident investigation indicating the possibility of hazardous results of cylinder barrel failure.

In a series of telegraphic notices to all CAA regions, the power plant engineering branch recommended the following procedure for cylinders subjected to operation with loose studs or cap screws: "In any case where two studs or cap screws are found loose or broken and adjacent studs of screwcaps are found torqued to at least minimum torque values, remove and inspect cylinder for flange warpage and magnaflux for cracks . . . if outside overhaul tolerances, or where more than two studs or capscrews involved, retire cylinder."

It was reported that the accident under investigation was the Aug. 4 crash of an American Airlines' Convair 240 at Fort Leonard Wood, Mo., which indicated a cylinder that had barrel failure had previously been subjected to operation with a loose stud.

Handley Page Herald Inaugural Flight

The Handley Page Herald prototype, designed as a transport-freighter replacement for the DC-3, made its first flight on Aug. 25 from Radlett Airport, Hertfordshire. Australia National Airways already has ordered a number of the four-engined, 44-passenger craft which, when converted into freighter configuration, can carry some five tons of cargo.

Safety Unit Approved

A safety device that warns pilots against inadvertent retraction of landing gear on the Beechcraft C18S has been approved by the Civil Aeronautics Administration. Inventor of the warning device, Frank P. Davis, deputy chief of CAA's Aircraft Control Division, received an award of $250 for the invention from CAA.

The device consists of a guard over the gear retraction switch which, if it is lifted while the plane is on the ground, or at any time the plane does not have flying speed, sounds a horn in the cockpit. Davis estimates that a kit for the device could be sold for about $10 and installation should not cost more than $25. Details of the warning unit, including drawings for installation, are available on request at CAA in Washington.

CAB ORDERS

(Aug. 18-24)

GRANTED:

Trans-Pacific Airlines an exemption to provide free transportation to one tour conductor when accompanying 15 or more persons on an advertised tour in the Hawaiian Islands, for one year.

United Air Lines and Burlington, Iowa, permission to intervene in an investigation of the need for air service by Ozark Air Lines between Peoria, Ill., and Fort Dodge, Iowa, via Galesburg, Ill., and Burlington, Ottumwa and Des Moines, Iowa.

Permission to intervene in the Mackey Airlines certificate renewal case to the Post Office Dept., the Broward County, Fla., Board of Commissioners and the Palm Beach Chamber of Commerce.

Ozark Air Lines authority to suspend service at Columbia, Mo., until the runway at Columbia Municipal Airport is made safe for scheduled service.

Permission to intervene in the ACTA-IMATA commercial charter exchange investigation to Aerovias Sud Americana, Flying Tiger Line, Slick Airways and Seaboard & Western Airlines on the issue of whether they should be allowed to participate in a clearing house arrangement proposed by the examiner.

Flying Tiger Line an exemption to perform a flight from New York to Geneva, Switzerland, pursuant to a contract with Moral Rearmament.

APPROVED:

Agreements between Delta Air Lines, Trans World Airlines and various other carriers relating to inter-carrier arrangements.

Braniff Airways and Eastern Air Lines' supplemental agreement relating to their Balboa interchange agreement.

Agreements between American Airlines, Mohawk Airlines and various other carriers relating to inter-carrier arrangements.

ORDERED:

Effectiveness of CAB's cease and desist

order in the North American Airlines' compliance case postponed from Aug. 30 to Sept. 3 to allow time for court hearing on North American's petition for stay.

Lake Central Airlines' temporary mail rate set at the rate proposed by the Board in its show cause order for the period starting May 2, 1955.

Suspension and investigation of a Trans World Airlines excursion fare between San Francisco and Las Vegas.

Application of Eastern Air Lines for a route between Tampa, Fla., and Nassau, B. W. I., and application of National Airlines for routes between Nassau and West Palm Beach and Havana consolidated with the Mackey Airlines certificate renewal case. Various other motions for consolidation by Eastern, National, Pan American World Airways and Delta-C & S Air Lines are denied.

DISMISSED:

Application of Lancaster, Pa., for air transportation to Washington, D. C., at the request of the applicant.

DENIED:

Permission to intervene in the New York-Florida Service Case to the Greater Pensacola, Fla., Chamber of Commerce, the Marianna-Jackson County, Fla., Chamber of Commerce, the City and Chamber of Commerce of Atlantic City, N. J., the Atlantic City Hotel Assn., the Pittsburgh, Pa., Chamber of Commerce and the State of Connecticut.

North Central Airlines permission to serve Chicago through O'Hare Airport.

SHORTLINES

► **British Overseas Airways Corp.** carried 150,600 lb. of cargo between U. S. ports and the United Kingdom in June, a gain of 28% over June, 1954.

► **British West Indian Airways** expects to start Viscount service Nov. 5 between New York and Trinidad via Bermuda, San Juan and Barbados.

► **East Germany** has signed air agreements with Bulgaria and Czechoslovakia to cover operations of the new East German Lufthansa.

► **Swissair** has opened a new $125,000 flight kitchen at Idlewild Airport to serve trans-Atlantic flights.

► **Trans-Texas Airways** flew 13,784 passengers in July, 13% more than the previous July. Load factor was 40%, compared with 33% in July 1954.

► **British European Airways** has inaugurated a twice-weekly direct service between London and Cairo. The Viscount flights are designed as a business-man's service. . . . BEA reports summer traffic up 25% over last year.

NATIONAL COVERAGE

EMPLOYMENT OPPORTUNITIES

The Advertisements in this section include all employment opportunities—executive, management, technical, selling, office, skilled, manual, etc.

Positions Vacant | Civil Service Opportunities | Employment Agencies
Positions Wanted | Selling Opportunities Wanted | Employment Services
Part Time Work | Selling Opportunities Offered | Labor Bureaus

DISPLAYED —RATES— **UNDISPLAYED**

The advertising rate is $23.35 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An Advertising inch is measured ⅞" vertically on a column—3 columns—30 inches to a page.

Subject to Agency Commission.

$1.80 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Box Numbers—counts as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Not subject to Agency Commission.

Send NEW ADS to AVIATION WEEK, 330 W. 42nd St., N. Y. 36, N. Y., for September 19th issue closing September 8th

LOCKHEED AIRCRAFT CORPORATION

Georgia Division

Has immediate openings for

STANDARDS ENGINEERS

Engineers needed to investigate and develop new production standards; coordinate information on types and characteristics of specific products, quantity requirements, production problems, nature of demand and source of supply. Should be capable of insuring that required proof tests are run and should be able to determine effect of proposed standards on company design and shop practices. M.E., A.E. or E.E. degree, plus minimum of two years experience in standards work required. Knowledge of all types of fasteners particularly helpful.

Write in complete confidence
Dept. AWSE-95
761 Peachtree St., N.E.
Atlanta, Georgia

LOCKHEED AIRCRAFT CORPORATION

SALES MANAGER
SOUTHERN CALIFORNIA

Aeronautical accessories distributed by leading, well-established company. Supervise nation-wide marketing program including direct representation and manufacturers' representatives. Excellent stock option, pension, and profit sharing in addition to top salary. Man selected will be between 35 and 45 with broad marketing background in the electro-mechanical or aeronautical accessories fields.

In first reply please give all pertinent information including age, experience, education and salary. All replies confidential.

Write
P-7573, Aviation Week
1111 Wilshire Blvd., Los Angeles 17, Calif.

STRUCTURES ENGINEER

- Opportunity to pioneer in wing design for aerodynamic heating.
- Development program for wing structures of high performance aircraft.
- Association with scientists and engineers in a small, aggressive company engaged in advance research and development programs for guided missiles.

Write to: Personnel Manager

AEROPHYSICS DEVELOPMENT CORPORATION
(Subsidiary of Studebaker-Packard Corp.)
P. O. BOX 949
SANTA MONICA, CALIF.

WE'RE GROWING

WE NEED a project engineer for direction of current projects. Desire an individual with aircraft aerodynamics or preliminary design experience who wants to accept responsibility for complete programs.

WE NEED competent imaginative engineering designers for design of aeronautical facilities such as large flexible nozzle trisonic wind tunnels.

These positions will challenge you and provide excellent compensation.

FLUIDYNE
Engineering Corporation
425 No. 7th Street, Mpls. 5, Minn.

Electrical Engineers

FORMATION OF NEW GROUP
At
NORTH AMERICAN AVIATION
Provides Special Opportunities for

ELECTRICAL ENGINEERS

Here's a special opportunity to work with a NEW engineering group at NAA in design and manufacture of specialized electrical motors.

Work with new metals and NEW IDEAS in producing motors to meet the specifications of FUTURE AVIATION DESIGN.

Experienced in fractional horse power. AC and/or DC. Electrical motor design required.

★ ★ ★

Many more electrical and electronic projects are under way to test ingenuity and imagination of Engineers with degrees and experience in

ELECTRONICS
INSTRUMENTATION
ELECTRICAL DESIGN
PHYSICS

WIND TUNNEL INSTRUMENTATION ENGINEERS

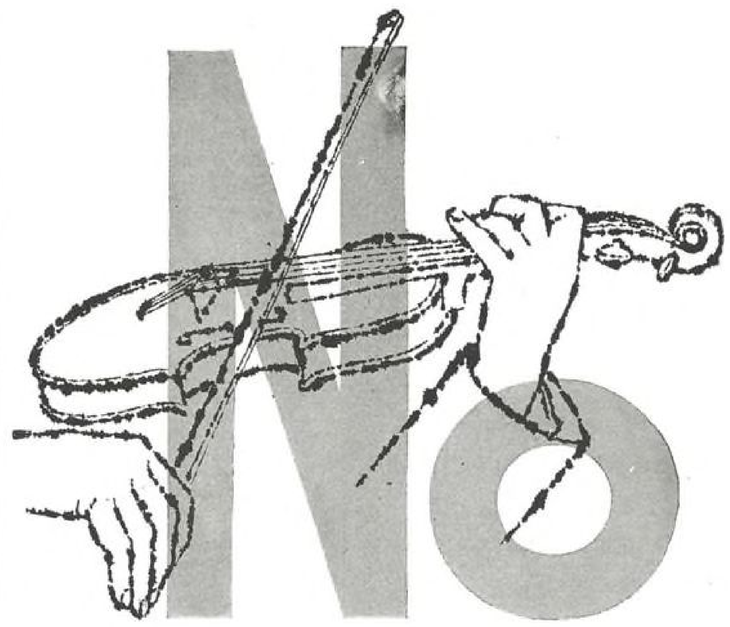
Design of electrical circuits for wind tunnel tests. At least 2 years' exp. in use of electrical instruments and evaluation of electrical circuits.

Join the Company that is Engineering ahead for a better tomorrow!

CONTACT
ENGINEERING PERSONNEL
(S.E. Corner International Airport. Enter Gate 19 from Imperial Highway. Ample parking opposite Gate 19.)

CONTACT BOX A-L2
ENGINEERING PERSONNEL
NORTH AMERICAN AVIATION
Los Angeles International Airport
Los Angeles 45, Calif.

NORTH AMERICAN AVIATION



violin music

The demand exceeds the supply. It's that simple!

With 3 engineering jobs available for every 2 engineers, some 5,000 companies are bidding for you with offers, inducements and background music. But don't be mistaken! Most of today's "opportunities" are *jobs*, not futures.

We, too, want engineers. But we're offering no violin music—only the opportunity for intelligent and careful evaluation—you of us and we of you—with the possibility of your joining one of the finest team operations in the whole new world of flight systems development.

Most of the people on that team are young, and moving ahead fast. They weren't lured here. They found out—and figured out—for themselves. We hope you'll do that too.

Write to J. M. Hollyday, Dept. A-9, The Glenn L. Martin Company, Baltimore 3, Maryland.

MARTIN
BALTIMORE · MARYLAND

ENGINEERS

LONG-RANGE CONTINUING OPPORTUNITY FOR ELECTRICAL AND MECHANICAL

ENGINEERS

AT

Bendix

OPENINGS EXIST FOR. . .

LIQUID PROPELLANT ROCKET CONTROLS ENGINEER

Mechanical or electrical engineer to supervise the research and development of liquid propellant rocket controls, systems design, component design, development and testing.

CONTROL ENGINEER

Requiring an engineering degree in electrical engineering or math and physics, plus at least three years of experience in design analysis of feedback control systems. Should be familiar with frequency response methods as applied to feedback control synthesis. Analog computer and simulator experience highly desirable. Activity is in the field of aircraft and missile power plant controls including gas turbine, ram jet, and rocket types. Controls are largely hydro-mechanical. The fuel metering research facility includes an analog computer and jet engine simulators.

MAGNETIC AMPLIFIER SYSTEMS ENGINEER

Electrical engineer supervisory capacity on research and development of magnetic amplifier circuitry, control systems, and component design and testing, supervising other engineers and technicians. The salary of these positions will be determined by your ability and experience.

Send detailed resume listing education, engineering experience, and salary requirement to:

Technical Employment Department S.B.
Bendix Products Division of
Bendix Aviation Corporation
401 North Bendix Drive
South Bend 20, Indiana

We guarante you an immediate reply -

RAPIDLY EXPANDING COMPANY NEEDS

Aerodynamics, Heat Transfer and Fluid Mechanics Engineers

in our

Development Programs in Hypersonic Missiles

and

Research Programs

in

Hypersonic Fluid Mechanics and Heat Transfer

We are looking for engineers who have experience in:

- Supersonic and Hypersonic fluid mechanics
- Supersonic Wing Theory
- Missile Dynamic and Control Analyses
- Missile Trajectory and Disperson Analyses
- Aerodynamic Heating
- Heat Conduction
- Ballistic-range or Free-flight Research Techniques
- Basic Research in Fluid Mechanics

Encouragement will be given to Engineers who can initiate and conduct research programs in the field of Hypersonic Fluid Mechanics. Openings are available for graduate Engineers with advanced degrees and/or experience.

Write to: Personnel Manager

AEROPHYSICS DEVELOPMENT CORPORATION
(Subsidiary of Studebaker-Packard Corp.)
P. O. Box 949 Santa Monica, Calif.

ENGINEER

AE OR ME

AIRCRAFT PRELIMINARY DESIGN

For Advanced Design Group of The Aircraft Nuclear Propulsion Department.

This is a history-making assignment with the company pioneering the nuclear powered plane of tomorrow. At General Electric, an unmatched complex of facilities, equipment, and top-ranking scientific personnel is devoted to solving the problems of aircraft and nuclear propulsion.

The position now open offers many opportunities for professional achievement and unique engineering experience. It involves the preliminary design of major aircraft structures, and the coordination of structural design with power plant design requirements. 4-6 years experience in aircraft design and development required.

Send complete resume to:
TECHNICAL PERSONNEL
Aircraft Nuclear Propulsion Dept.

GENERAL ELECTRIC

Cincinnati 15, Ohio

Flight Operations Chief of ADMINISTRATIVE CALIBER

Familiar with maintenance communication and coordination of both company and military flight operations group.

Must have a minimum of 6,000 hours with commercial and military single and multi-engine land and instrument ratings. Engineering experience and "ATR" are desirable.

CO-PILOTS

Minimum of 1,500 hours valid first pilot time with commercial single and multi-engine land and instrument ratings.

Openings exist with large diversified aircraft company.

Write giving full details and work experience to

P-7600, Aviation Week
520 N. Michigan Ave., Chicago 11, Ill.

FOR RATES AND INFORMATION
about placing an employment advertisement in this section
write:
AVIATION WEEK
330 West 42 St., N. Y. 36, N. Y.

ELECTRONIC INSTRUMENTATION ENGINEERS

Beechcraft has immediate openings for Electronic Instrumentation Engineers. Three to five years experience in experimental research testing of high speed aircraft or missiles required. Knowledge of instrumentation and telemetry coupled with ability to instrument, record and analyze is essential. Graduates with E.E. degree preferred. Excellent opportunity with a progressive company.

Please address inquiry with resume of past experience to

ROY F. KUNZ
EMPLOYMENT DEPT.

BEECH AIRCRAFT CORPORATION
WICHITA, KANSAS

Beechcraft

UNITED AIR LINES needs Flight Officers

Expansion program involving 65 million dollar aircraft order requires more flight officers... and it may be your opportunity to begin a career with the Nation's No. 1 Airline!

Applicants will be considered for immediate openings as well as for positions becoming available over two year period extending into 1957.

You'll get excellent pay ($465 per month to start on assignment to line, plus periodic increases), broad insurance program, retirement income plan, and other benefits.

To qualify: Age 21-28, 5'7" to 6'4", U. S. Citizen, high school graduate, commercial license with 165 hours, pass company flight physical with no waiver. Applicants with C.A.A. Instrument Rating or flight engineer examination written portion passed will be accepted through age 29; with both, through 30.

Successful applicants will attend United's Flight Training Center and receive salary while training. Look to commercial aviation . . . apply now for both present and future employment!

WRITE: C. M. Urbach
Placement Superintendent
Department Avia-9
UNITED AIR LINES
Stapleton Air Field
Denver, Colorado

SKILLED

PILOTS

AVAILABLE
No Fee to Employers
PILOTS EMPLOYMENT AGENCY
Teterboro (N. J.) Airport
Hasbrouck Heights - 8-1091

ENGINEERS

Creative Opportunities with Republic Aviation

Aerodynamics

AERODYNAMICIST An aerodynamics engineer (3-4 years experience) experienced in analysis of aerodynamics data and stability problems. To investigate stability and control problems under supervision. Extremely interesting work in advanced problems.

AERODYNAMICIST Man with ability to combine theoretical and practical aerodynamics to determine aerodynamic load distributions and to work in the field of aeroelastic analysis. A background knowledge of compressible and incompressible flow of perfect fluids and an understanding of basic engineering mathematics is desirable. This position offers an exceptional opportunity for professional development in fundamental aerodynamic analysis.

Flight Test

AERODYNAMICIST For Flight Test Engineer position. Aero education and experience with stability required. To work on planning and analysis of high speed experimental flight programs.

MATHEMATICIAN For Flight Test Engineer position. Math education required, aircraft experience preferred. To work on application of automatic computing procedures for flight data. An opportunity to develop new techniques in an expanding field.

Research

ELECTRONIC INSTRUMENTATION ENGINEER Three to five years aircraft instrumentation experience required. Knowledge of transducers, amplifiers and recording equipment used in experimental research testing of hi-speed jet aircraft is essential. Knowledge of servo loop theory as applied to aircraft systems coupled with ability to properly instrument, record and analyze is desirable. Graduates with E.E. degree preferred.

Thermodynamics

Specialized openings for Thermodynamics engineers in the following categories. B.S. in M.E. or A.E. required.

SENIOR THERMODYNAMICS ENGINEERS (1) Four years experience with engine control systems. (2) Inlet specialist. Four years experience on both subsonic and supersonic design. (3) Four years experience in heat transfer.

Flutter & Vibration

SENIOR DYNAMICS ENGINEER Position open for a qualified engineer to work on flutter problems of supersonic aircraft and direct work of other engineers. Opportunity to work on the most advanced high performance aircraft which will challenge the ingenuity of the man who takes this job. Several years experience in flutter analysis required. Chance for advancement good.

Stress Section

SENIOR STRESS ANALYST Engineering degree with a minimum of 3 to 5 years stress analysis and design experience on major airframe components.

SR. WEIGHTS ENGINEER A.E. or M.E. degree preferred. Two openings for weights engineers with 2 or more years experience at the senior level. One with structural weights experience; the other requires thorough knowledge with aircraft systems as they affect the weight problem.

NOTE THESE REPUBLIC BENEFITS

You'll enjoy a top salary scale, and important personal benefits; life, health and accident insurance up to $20,000, company paid, plus hospital-surgical benefits for the whole family; and 2/3 of the cost of collegiate and graduate study.
NEW ALL-EXPENSE-PAID RELOCATION PLAN, for those living outside the New York City and Long Island area, relieves you of all financial worries. The company pays interview expenses for qualified candidates; actual and reasonable costs of insured moving of household and personal effects, and where necessary, free storage up to 30 days. Also $10 per diem up to 30 days, while getting settled. And of course you'll live and work on fabulous Long Island, playground of the east coast.

Please address complete resume, outlining details of your technical background, to:

Assistant Chief Engineer
Administration
Mr. R. L. Bortner

REPUBLIC AVIATION
FARMINGDALE, LONG ISLAND, NEW YORK

CHIEF ENGINEER

ELECTRO-MECHANICAL

Direct the design and development programs for leading, well-established manufacturer of aeronautical accessories and electro-mechanical components. Man selected for this outstanding opportunity will be a graduate E.E. with closely related experience. Salary is open. Age 32 to 45.

In first reply please give all pertinent information including age, experience, education and salary. All replies confidential. Our employees know of this ad.

P-7575, Aviation Week
1111 Wilshire Blvd., Los Angeles 17, Calif.

LOCKHEED AIRCRAFT CORPORATION
GEORGIA DIVISION

THE TOOL DESIGN DEPARTMENT
Has opening for

MANUFACTURING RESEARCH ENGINEER

Degree in Mechanical Engineering. Five years experience in manufacturing engineering in aircraft or allied field.

Write in complete confidence

Dept. AWMR-95
761 Peachtree Street, N.E.
Atlanta, Georgia

LOCKHEED AIRCRAFT CORPORATION

LOCKHEED AIRCRAFT CORPORATION
Georgia Division

THE PRODUCTION ENGINEERING DEPARTMENT
Has opening for

METALLURGIST

Minimum of 10 years experience in the fabrication, design and metallurgy in ferrous materials required. Aircraft or directly associated experience preferred. B.S. degree required, preferably in Metallurgy. Work will involve contact with Engineering and Manufacturing personnel and familiarity with suppliers of ferrous materials. Some travel will be necessary.

Write in complete confidence

Dept. AWM-95
761 Peachtree Street, N.E.
Atlanta, Georgia

LOCKHEED AIRCRAFT CORPORATION

CAREERS for ENGINEERS

Ryan's increased activity in aircraft, powerplant and avionics engineering and manufacture is opening many new opportunities for you to live and work in beautiful Southern California. Your reply to the Administrative Engineer will be strictly confidential.

Ryan Needs:
- Aerodynamicists
- Mechanical Engineers
- Engineering Designers
- Systems Analysts
- Electronics Engineers
- Flight Test Engineers
- Propulsion Engineers
- Electronics Technicians

RYAN
AERONAUTICAL COMPANY
SAN DIEGO, CALIF.

ENGINEER

ME, EE, or AE

For Engine Design Unit of the Aircraft Nuclear Propulsion Department

The next great step forward in aviation is nuclear propulsion. Now in the process of development at GE, this field offers great possibilities for individual achievement on both the professional and personal levels.

The present position requires 1 to 3 years' experience in aircraft control or accessory systems design and application, and involves the design of turbine type engine controls. Both creative and analytical ability are desirable.

Send complete resume to:
TECHNICAL PERSONNEL
Aircraft Nuclear Propulsion Dept.

GENERAL ELECTRIC

Cincinnati 15, Ohio

ENGINEERS

ME or AE

For Engine Design Unit in the Aircraft Nuclear Propulsion Field

This next big advance in aviation is nuclear powered flight, a field which offers exceptional possibilities for professional achievements. This major company, located in the Midwest, now has a position open in this new field.

Qualifications include 2 to 6 years' experience in thermodynamics and aerodynamic development. Work involves thermodynamic and fluid flow aspects of turbine type aircraft engines and components.

Send complete resume in confidence to:

P-7443, Aviation Week
520 N. Michigan Ave.,
Chicago 11, Ill.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)
LOS ANGELES: 1111 Wilshire Blvd. (17)

POSITIONS VACANT

Engineer with extensive flight test and instrumentation background who has a flair for sales and has executive and administrative targets for his future. An unusual opportunity for growth and responsibilities if he can prove leadership and business judgment. Forward resume. Location: New York area. P-7534, Aviation Week.

Charter Pilot and Instructor. Prefer pilot thoroughly experienced in Bonanza and Apache. Attractive offer to qualified, ambitious person. P-7489, Aviation Week.

POSITIONS WANTED

Experienced aviation manager seeks opportunity seeling four-engine equipment to airline market for U.S. or foreign manufacturer. Extensive industry and airline experience. Good contacts all major carriers. Commercial sales background leading manufacturer. Thorough technical knowledge including jets. Young, U.S. citizen. Go anywhere. PW-7519, Aviation Week.

Pilot: Executive—Industrial—5400 hours 13½ continuous accident free. Broad administrative and electronic background. Commercial DC-3, DC-4, PBY (sea). Instrument. All single engine including jet. Complete resume on request. PW-7561, Aviation Week.

Experienced Salesman with executive and college background. Desires position with Aircraft Co. Aircraft accessories or instrument mfg. commercial line. Will relocate. Resume on request. PW-7586, Aviation Week.

Sales Engineer-Pilot. Available as company representative pilot in field. Have liaison contact, design, sales and company contact experience. Light-plane commercial pilot. PW-7611, Aviation Week, 330 West 42nd St., New York 36, N. Y.

Don't forget the
BOX NUMBER

When answering the classified advertisements in this magazine don't forget to put the box number on your envelope. It's our only means of identifying the advertisement you are answering.

ENGINEERS and DESIGNERS NEEDED
for:
MISSILE GUIDANCE SYSTEMS
BOMBING NAVIGATIONAL COMPUTER SYSTEMS
NEW CIVIL AVIATION PRODUCTS
JET AND TURBO-PROP ENGINE CONTROLS
AIRBORNE FIRE CONTROLS

AC

GM CAREER OPPORTUNITIES IN

- Systems Engineering and Analysis
- Experimental Engineering
- Development Engineering
- Project Coordination
- Design Engineering
- Product Engineering
- Product Evaluation
- Field Engineering

AND WE ALSO NEED:

DESIGNERS • CHECKERS • LAYOUT MEN

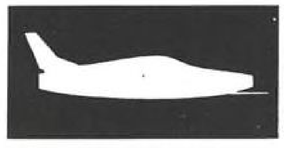
Positions Are Permanent — Excellent Advancement Opportunities
Every inquiry treated confidentially and given immediate attention and personal reply.

WRITE TODAY FOR EMPLOYMENT APPLICATION

Mr. Louis R. Berks
Supervisor of Employment

AC SPARK PLUG DIVISION
Precision Instrument Plant

GENERAL MOTORS CORPORATION
Milwaukee 2, Wisconsin



CHOICE OPENING for ENGINEERING TEST PILOT

THIS IS IT . . . a really rare opportunity in Southern California with all the benefits North American is famous for. Put in exciting flight time in association with the industry's top scientists and engineers—using North American's most advanced facilities.

QUALIFICATIONS: Minimum of 2000 hours first pilot time—with commercial, single and multi-engine land and instrument ratings. Must have some jet experience. Bachelor's Degree in Engineering is required, MS is preferred. Engineering experience and ATR are desirable.

Please send resume to:
P-7523, Aviation Week
1111 Wilshire Blvd., Los Angeles 17, Calif.

---

is YOUR FUTURE as promising as a HELICOPTER'S?

We think the future of the helicopter is virtually unlimited. Why not make your future just as promising?

SIKORSKY, pioneer helicopter manufacturer, needs . . .

WEIGHTS ENGINEERS
ELECTRICAL ENGINEERS
STRESS ANALYST ENGINEERS
AIRFRAME DESIGN ENGINEERS

to do important work in the fascinating and fast-growing helicopter field. Expanding military and commercial requirements are a challenge to skilled men—offer excellent opportunities to further your professional stature.

Engineers whose abilities or experience qualify them for these responsible positions will enjoy a well-rewarded career with a secure future and many benefits for themselves and their families.

Send a complete resume to R. L. Auten, Personnel Department

SIKORSKY AIRCRAFT
Bridgeport 1, Connecticut

SEARCHLIGHT SECTION

(Classified Advertising)

BUSINESS OPPORTUNITIES — EQUIPMENT - USED or RESALE

UNDISPLAYED —RATES— **DISPLAYED**

$1.80 a line, minimum 3 lines To figure advance payment count 5 average words as a line.
Box Numbers count as one line.
Discount of 10% if full payment is made in advance for 4 consecutive insertions.

The advertising rate is $18.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns, 30 inches to a page.

Closing Date: 11 days before issue date, subject to space limitations.

!!BELIEVE IT—OR NOT!!

A TRIMOTORED CARGO-PASSENGER C125

A revolutionary and fantastic 20 ton aircraft with cub performance in and out of pastures and improvised landing strips with 3 engine safety factor. Depending on load and wind, takeoff distance 250' to 1850'; landing 450' to 650'; climb 1350' to 700' per min.; cruise 165 mph; top 201 mph; stall 69 mph; range 2000 mi.; empty weight 25,000 lbs; gross 38,000 lbs with Wright 1820-99 1200 H.P. engines. With 1820-101 engines gross increases to 45,000 lbs.

Built by Northrop in 1950 for Arctic Rescue and Assault Transport to replace gliders but with ability to takeoff in short distances.

Rear loading power operated drive-in ramp for trucks, bulldozers, etc; ideal for Uranium prospecting, pipe & powerline maintenance, oil prospecting etc; where trucks, equipment and ground crews can be carried. Passenger conversion 30-40 passengers. Provisions for dual wheels for plowed field takeoff and landing, also fittings for skis or pontoons. Landing gear fixed for low maintenance and rough landings. Engine change 45 min. max. Designed for minimum of maintenance and operating cost and is of rugged constructoin.

Only 18 of these are available and total airframe time since new average 35 hours.

FOR SALE OR LEASE

FRANK AMBROSE AVIATION COMPANY, Inc.

P. O. Box 181, Int'l Airport Branch

5383 N.W. 36th St.
Miami 48, Florida

PHONES: 88-2464
JE 1-7225

ENGINE WORKS

Lambert Field Inc. St. Louis

Largest supplier of engines for executive DC3. We stock, overhaul, and install—

SUPER-92

Wright	Pratt Whitney
R1820	R1830
-202, -56, -72	-75, -92, -94

Also R2000-D5, -13 R1340 R985

DC3 Owners—write for our DC3 engine evaluation form, and engine exchange plan.

NEW P&W 985-14B ENGINES

Available immediate delivery in their present condition
$4500 each.

Or, — after complete factory overhaul by Pratt & Whitney. FOB Hartford
$6000 each.

DEAL DIRECTLY WITH OWNER

Dealers protected Discount on quantity purchase.

Since these engines can not be replaced, offering must be subject to prior sale. Only 2 left!!

TRADE-AYER COMPANY
Linden Airport, Linden, N. J.
Linden 3-7690

BEECHCRAFT D-18S

Serial A-97, built 1946. 2550 total hours Engines 40 and 222 hours S/OH, Hydromatic props 136 S/OH. Flares, anti-icing, full blind flying panel, 80 Gal. nose tank, reinforced gear. Excellent radio including Narco VHF, Omni, ADF, MDF, range receiver, marker beacon. All Airworthiness Directives complied with. Offered on behalf of corporate owners exclusively by us.

Lund Aviation, inc.
230 Park Ave., N.Y.C. MUrray Hill 9-3620

FOR SALE OR LEASE

DIRECT FROM OWNER

PBY5A CONVERTED ZERO TIME

TOTAL TIME 1409 HRS. CLIPPER BOW. ENGINEERS COMPARTMENT REMOVED. TAIL MODIFICATION COMPLIED WITH. LARGE CARGO DOOR. ALSO CARGO DOOR IN FWD. COMPARTMENT. CARGO FLOOR. GAS TANKS SEALED. ALL NEW FABRIC.

NEW TIRES. NEW BATTERIES. PLANE IS ABOSOLUTELY CORROSION FREE. IMMEDIATE DELIVERY ON THIS PLANE.

PASSENGER VERSION. 30 DAY DELIVERY.

JAMES N. ROUTH

3314 LADOGA AVE. LONG BEACH 8, CALIFORNIA
PHONE 395-660

HELICOPTERS

HILLER

UH12B's

AVAILABLE FOR LEASE OR SALE

Complete spares for foreign operation. Float gear, etc.

Reply to

FS-7150, Aviation Week
330 W. 42 St., New York 36, N. Y.

FOR SALE
C-46F AIRCRAFT
FULLY EQUIPPED
Cargo Passenger Configuration
FS-7604, Aviation Week
330 W. 42 St., New York 36, N. Y.

FOR SALE
New Sperry Portable
Engine Analyzer
complete for 9 Cylinder engine.
P. O. Dr. 2150, Lafayette, Louisiana

FOR SALE
TWIN BEECH D-18S
Corporation owned aircraft in excellent condition. Just relicensed. Total aircraft time 3,208:35. 91:55 on both P&W engines SMOH. Used for executive use only and purchased new by this company. Write for complete information.
FS-7391, Aviation Week
330 W. 42 St., New York 36, N. Y.

C47

FOR SALE

CARGO AIRCRAFT

- 4400 HRS TOTAL TIME SINCE NEW
- EXCEPTIONALLY CLEAN AIRCRAFT
- THIS IS A PREMIUM AIRPLANE AVAILABLE FOR IMMEDIATE INSPECTION MIAMI, FLA.

"We are Owners"

LEEWARD
AERONAUTICAL SALES, INC.
P.O. Box 233 *INTERNATIONAL AIRPORT*
Miami 48, Florida
Telephone 65-6463

SPECIALTY ITEMS IN—

BOSCH	P & W
JACK & HEINTZ	WRIGHT
HOLTZER-CABOT	HAM. STANDARD
LEECE-NEVILLE	SCINTILLA
ECLIPSE	DOUGLAS
JANITROL	OIL COOLERS

WRITE FOR LIST

AVIAPARTS INC.
P. O. Box 65 Miami 48, Fla.

SURPLUS INVENTORY MATERIALS FOR SALE

DOUGLAS DC3-DC4
PRATT AND WHITNEY
HAMILTON STANDARD

Exceptionally Low Prices
This Material Must Be
Sold To Make Room For
New Equipment Inventory

SEND US YOUR INQUIRIES
WRITE FOR LISTINGS

SUPERVISOR, SURPLUS SALES
ALASKA AIRLINES
Paine Field, Everett, Wash.

FOR SALE
19 SB9RN-2 Magnetos
all in A-1 condition
P. O. Dr. 2150, S.L.I.;
Lafayette, Louisiana.

created for the Executive...

engineered for the pilot!

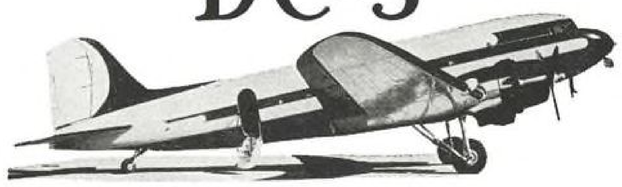
Top interior designers and craftsmen build perfect surroundings for relaxing travel comfort into every L. B. Smith executive aircraft.

The same painstaking care is evidenced in modern, comfortable cockpit design . . . to make the pilot's job easier and safer!

L. B. Smith AIRCRAFT CORPORATION

INTERNATIONAL AIRPORT • MIAMI 48, FLORIDA

DC-3



AVAILABLE FOR IMMEDIATE LEASE

- EXECUTIVE INTERIORS
- AIRLINE INTERIORS

Contact Our Leasing Division of

Leeward
AERONAUTICAL

P. O. BOX 210 FORT WAYNE, INDIANA
P. O. BOX 233 INTERNATIONAL AIRPORT MIAMI 48, FLORIDA

BEECHCRAFT TWIN BONANZA

137 hrs. 45 min. Total Time since New. $11,000, radio installation. Being completely majored to Zero time on everything. Exterior Blue and White. Sale or lease. Will finance or trade.

AIRLINE EQUIPMENT CORPORATION
Newark Airport
Market 2-0963 Newark, N. J.

FOR SALE
DC4
2800 Gal. Gas
73000# Gross Weight
Executive C-47 Also Available
BACON CORP.
Municipal Airport
Santa Monica, Calif.
TExas 05107 Exmont 73581

HIGH ALTITUDE AIRCRAFT FOR SALE OR LEASE
PRESSURIZED CABIN
Superior to any Jets now available for High-Altitude Research and Environmental testing or Mapping.
Capable of 3 Hours at 45,000 feet
FS-7480, Aviation Week
1111 Wilshire Blvd., Los Angeles 17, Calif.

C-47 - DC-3C DOUGLAS AIRCRAFT
26 and 28 airline passenger aircraft for immediate delivery on lease-purchase, long term payment purchase or straight cash purchase at below market price. Aircraft in excellent condition having airstair door, outside baggage compartment.
Call, write or wire . . . .
WILLIAM C. WOLD ASSOCIATES
516 Fifth Ave. New York 36, N. Y.
Cable: BILLWOLD Tel. MUrray Hill 7-2050

"Take a Heading for Reading"
FOR THE BEST
MAINTENANCE - OVERHAUL - MODIFICATION - INSTALLATION
READING AVIATION SERVICE, INC.
MUNICIPAL AIRPORT Phone 3-5255 READING, PENNSYLVANIA

FOR SALE
1955 Brand new Cessnas, 170-180, 195-310 for lease to corporations. Immediate delivery. Wet or dry. International Aviation. White Plains, N. Y. Tel: 8-2049.

Executive Transport Aircraft. For complete market report of available multi-engine aircraft, including Beech, Convair, Curtis, Douglas, Grumman and Lockheed manufacture, write or call William C. Wold Associates, 516 Fifth Avenue, New York 36, N. Y. Telephone Murray Hill 7-2050.

SPECIAL SERVICES *TO THE* AVIATION INDUSTRY

PARTS & SUPPLIES

R. K. Brown Co.
PARTS SPECIALIST
STROMBERG INJECTION CARBURETOR
CARBURETORS PARTS ASSEMBLIES
CARBURETORS SUPPLIED IN REPAIRABLE CONDITION OR OVERHAULED AND CERTIFIED BY CAA APPROVED REPAIR STATION.
PARTS ALSO AVAILABLE FOR HOLLEY CARBURETORS
WEbster 9-9250, 9-9251 Cable Address "Brownaero"
238-A PARK AVE. EAST RUTHERFORD, N. J.

NAVCO INC. Lambert Field St. Louis, Mo. PErshing 1-1710
Has all Parts and Supplies for Executive DC-3 LODESTER BEECH
Airframe Engines Radios
A.R.C. Bendix Collins Lear Sperry Wilcox
P&W Continental Wright Goodrich Goodyear

AIRCRAFT DEALERS

EXECUTIVE & AIRLINE AIRCRAFT LEASES, SALES & FINANCING
Also since 1923 the oldest and largest aircraft dealers with largest stock parts for P&W, WAC, HS, Douglas, etc., and accessories.
Frank Ambrose Aviation Co., Inc.
P. O. Box 181, Miami Int'l Airport
Phone 88-2464 Miami 48, Florida

PROFESSIONAL SERVICE

WALSH ENGINEERING COMPANY
Design and Prototypes of Electronic Apparatus
In which Transformers and Magnetic Components are especially important factors in Performance, Size, Weight and/or Cost
34 DeHart Place
Elizabeth, N. J. ELizabeth 2-7600

OVERHAUL & MAINTENANCE

ONLY 1½ HOURS FROM N. Y.
PORTLAND, ME.
QUICK SERVICE ON
100 HOUR INSPECTION
Repair Station
Complete Facilities
CAA Inspectors on Field
Specializing in Twin Beech, Grumman Widgeon, Beech Bonanza, Navion, all other light aircraft.
NORTHEAST AVIATION
Portland Mun. Airport Portland, Me.
Milton V. Smith, Gen. Mgr.
Phone: Portland 40309

REMMERT-WERNER, Inc.
Lambert Field St. Louis, Mo.
offer your choice of
1 DAY 100 hour INSPECTIONS OR 2 DAY for BEECHCRAFT DC-3 OR 3 DAY 100 hour OVERHAULS LODESTAR

OXYGEN EQUIPMENT
SALES & SERVICE
REGULATORS — MASKS — VALVES
PORTABLES & CYLINDERS
FIXED INSTALLATIONS
GOV'T. APPROVED REPAIR STATION
ZEP AERO Phone: ORegon 8-1161
EL SEGUNDO, CALIFORNIA

AIRCRAFT UPHOLSTERING
A Complete Service
Single Seats to Complete Interiors
Over 50 years of experience
BAUCO 26 GLENN ROAD RUTHERFORD, N. J.
Adjacent to Teterboro Airport
GENEVA 8-8900

IF YOU RENDER A SERVICE TO THE AVIATION INDUSTRY YOU SHOULD INQUIRE ABOUT THIS SECTION!
Write
Classified Advertising Division
330 W. 42 St., New York 36, N. Y.

WANTED

AIRPLANES WANTED
Need 50 Bonanzas, Navions, 180's, 190's, 170's, Aero Commanders, Twin Navions, Twin Beeches, etc.
Will Buy Dealers' Stocks New or Used
Vest Aircraft Co.'s Skyranch
BOX 5306, DENVER 17, COLORADO

We Buy DC-3 and C-47
—also components, fuselages, center sections. Prefer runout or needing work, airline, passenger, or cargo. Pratt & Whitney or Wright. State price, time, quantity, type engines.
We are not brokers
REMMERT-WERNER, INC.
Lambert Field St. Louis, Mo.

WANTED
For Immediate Cash Purchase
DC-3 C-47 DC-4
Trans-International Airlines, Inc.
P. O. Box 233 Miami 48, Florida

WANTED
USED TWIN ENGINE EXECUTIVE AIRCRAFT
Immediate cash for clean aircraft
GRAUBART AVIATION
677 N. Michigan — Chicago — MOhawk 4-7190

WANTED—SURPLUS ROD & BAR
Stainless-Aluminum-Steel-Brass. Any size; type and quantity. Cash for termination inventories.
Send lists to:
COLLINS ENGINEERING COMPANY
9050 Washington Blvd., Culver City, Calif.

SPARKPLUGS WANTED
Surplus or used aircraft sparkplugs wanted. Highest prices paid for R.B. 19R, 485S2, 5/2, 5/3, 5/4, 5/5, 23R, 27-R, 23, 212S2, 312S2; R.P. 43S; LE 44, 45; L.S. 4B; A.C. 181, 281; R.S. 19-2R, 14-1R; R.C. 9R; R2-14-R; R-214; R.N. 5/3; 590S2, 613S2 63S*, 64S.
RADIO & ELECTRONICS SURPLUS
13933-9 Brush St. Detroit 3, Mich

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—SEPTEMBER 5, 1955

ADMIRAL CORPORATION (GOVERNMENT LABORATORIES DIV.) 50
Agency—Cruttenden & Eger Associates Adv.
AERO SUPPLY MFG. CO. INC. 67
AIRBORNE ACCESSORIES CORP. 8
Agency—Gray & Rogers Adv.
AIRCOOLED MOTORS, INC. 25
Agency—Richards & Webb, Inc.
AIRCRAFT EQUIPMENT TESTING COMPANY 8
Agency—Mahool Advertising, Inc.
AIRESEARCH AVIATION SERVICE DIV. THE GARRET CORP. 90
Agency—J. Walter Thompson Co.
AIRWORK CORPORATION 10
Agency—Gene Wyble Advertising
AMERICAN ELECTRONICS, INC. (MINIATURE COMPONENTS DIV.) 67
Agency—Clyde D. Graham Adv.
AMERICAN MACHINE & FOUNDRY COMPANY.. 62
Agency—Fletcher D. Richards, Inc.
AMPEX CORPORATION 64
Agency—Boland Associates, Adv.
ARROWHEAD RUBBER CO. DIV. OF NATIONAL MOTOR BEARING CO., INC. 84
Agency—Dan Ehberts Adv. Service
AUBURN SPARK PLUG CO., INC. 30
Agency—Richards & Webb, Inc.

BASCH COMPANY, GEORGE 79
Agency—Davis, Parsons & Strohmeier, Inc.
BRIDGEPORT THERMOSTAT DIV., ROBERT-SHAW-FULTON CONTROLS CO. 59
Agency—Arndt-Preston-Chapin-Lamb & Keen, Inc.
BRILES MFG. COMPANY 77
Agency—McKee-Burns Advertising
BUCKEYE IRON & BRASS WORKS 51
Agency—Kircher, Helton & Collett, Inc.
BURROUGHS CORPORATION 19
Agency—Campbell-Ewald Company, Adv.

CHAIN BELT COMPANY, SHAFER BEARING DIV. 53
Agency—The Buchen Company
CHANCE VOUGHT AIRCRAFT, INC. 60, 61
Agency—Ruthrauff & Ryan, Inc.
CINCINNATI MILLING MACHINE CO., THE... 20
Agency—The Keelor & Stites Company
CLEVELAND PNEUMATIC TOOL CO. 66
Agency—Meldrum & Fewsmith, Inc.
CONVAIR, A DIV. OF GENERAL DYNAMICS CORP. 52
Agency—Pacific Western Adv. Agency
CO-OPERATIVE INDUSTRIES 36
Agency—Richard LaFond Adv., Inc.

deHAVILLAND AIRCRAFT OF CANADA LTD., THE 81
Agency—Paul-Taylor-Phelan, Ltd.
DOW CORNING CORPORATION 4
Agency—Wagnitz Advertising, Inc.

EATON MANUFACTURING CO. (AIRCRAFT DIV.) 49
Agency—Clarke & Bobertz, Inc.
EASTMAN KODAK CO. (X-RAY DIVISION).... 47
Agency—J. Walter Thompson Co.
ECLIPSE-PIONEER DIV., BENDIX AVIATION CORP. 93
Agency—MacManus, John & Adams, Inc.
EX-CELL-O CORPORATION 39
Agency—Holden-Chapin-Larue, Inc.

FAIRCHILD ENGINE & AIRPLANE CORP..... 109
Agency—Gaynor & Company, Inc.
FEDERAL TELEPHONE & RADIO CO. (COMPONENTS DIV.) 58
Agency—J. M. Mathes, Inc.
FOOTE BROS. GEAR & MACHINE CORP..... 31
Agency—Waldie & Briggs, Inc.

GENERAL ELECTRIC COMPANY..... 34
Agency—G. M. Basford Company
GOODRICH CO., THE B. F. 3
Agency—Batten, Barton, Durstine & Osborn, Inc.
GOODYEAR AIRCRAFT CORP. 80
Agency—Kudner Agency, Inc.
GRUMMAN AIRCRAFT ENGINEERING CORP. Front Cover
Agency—Fuller & Smith & Ross, Inc.

HARNISCHFEGER CORPORATION (WELDING DIV.) 58
Agency—Hoffman & York, Inc., Adv.
HASSALL, INC., JOHN 83
Agency—Sanger-Funnell, Inc.

INDIANA GEAR WORKS, INC. 75
Agency—Bozell & Jacobs, Inc.

KAISER METAL PRODUCTS, INC. (FLEET-WINGS DIV.) 45
Agency—Gray & Rogers Adv.

LEACH RELAY CO., DIV. OF LEACH CORP. Third Cover
Agency—Hixson & Jorgensen, Inc. Adv.
LINK AVIATION, INC. 44
Agency—Gaynor & Co., Inc.
LOUD MACHINE WORKS, INC. H. W..... 24
Agency—Walter C. Davison Company

MALLORY-SHARON TITANIUM CORP..... 26
Agency—The Griswold-Eshleman Co.
MARQUARDT AIRCRAFT COMPANY.....27, 72
Agency Heintz & Co., Inc.
MOOG VALVE CO., INC. 46
Agency—Warman, Robins & Gurham, Inc.

NORTHROP AIRCRAFT, INC. 109
Agency—West-Marquis, Inc.
NORTH AMERICAN AVIATION, INC. 91
Agency—Batten, Barton, Durstine & Osborn, Inc.

PACIFIC DIV., BENDIX AVIATION CORP..... 82
Agency—The Shaw Company Adv.
PARKER AIRCRAFT COMPANY 94
Agency—Willard G. Gregory & Co. Adv.
PATENT PRODUCTION DEPT. 69
PIONEER CENTRAL DIV. BENDIX AVIATION CORP. 74
Agency—MacManus, John & Adams, Inc.
PRATT & WHITNEY AIRCRAFT DIV., UNITED AIRCRAFT CORP. 87
Agency—Lennen & Newell, Inc.
PYE TELECOMMUNICATIONS LIMITED..... 38
Agency—Arks Publicity Limited

RADIO CORP. OF AMERICA (ENGINEERING PRODUCTS DIV.) 56, 57
Agency—Al Paul Lefton Co., Inc.
REACTION MOTORS, INC. 78
Agency—J. Wheelock Associates
RED BANK DIV., BENDIX AVIATION CORP....86
Agency—MacManus, John & Adams, Inc.
ROBINSON CO., RALPH C. 79
Agency—Chapin-Danum Adv.
ROHR AIRCRAFT CORPORATION 92
Agency—Barnes Chase Company
ROLLS-ROYCE LTD. 37
Agency—The Wesley Assoc.

SEARCHLIGHT SECTION.....100, 101, 102, 103, 104 105, 106, 107, 108
SERVOMECHANISMS, INC. .....Fourth Cover
Agency—Sanger-Funnell, Inc.
SHAFER BEARING DIV., CHAIN BELT COMPANY 53
Agency—The Buchen Company
SKYLINE PRODUCTS, INC. 69
Agency—Triton Advertising
SOLAR AIRCRAFT COMPANY 88
Agency—The Phillips-Ramsey Co. Adv.
SOLARTRON ELECTRONICS GROUP LTD. THE.. 76
Agency—James A. Hodgson Ltd.
SPENCER THERMOSTAT DIV., METALS & CONTROLS CORP. 85
Agency—Sutherland-Abbott Adv.
STRATOS A DIV. OF FAIRCHILD ENGINE & AIRPLANE CORP. 54
Agency—Gaynor & Company, Inc.
SUNDSTRAND MACHINE & TOOL CO...Second Cover
Agency—Howard H. Monk & Assoc.
SURFACE COMBUSTION CORP. (JANITROL AIRCRAFT-AUTOMOTIVE DIV.) 70, 71
Agency—Odiorne Industrial Adv.

VICKERS, INC. DIV. OF SPERRY RAND CORP. 55
Agency—Witte & Burden Adv.

WESTERN GEAR WORKS 73
Agency—Ruthrauff & Ryan, Inc.
WESTINGHOUSE ELECTRIC CORP.....41, 42, 43
Agency—Fuller & Smith & Ross, Inc.
WYMAN GORDON CO. 6
Agency—John W. Odlin Co., Inc.

CLASSIFIED ADVERTISING
F. J. EBERLE, Ass't. Mgr.

EMPLOYMENT OPPORTUNITIES 100-105
SPECIAL SERVICES TO THE INDUSTRY..... 108
PLANES—EQUIPMENT
(Used or Surplus New)
FOR SALE 106-108
WANTED
Planes—Equipment 108

Engineering Versatility

If you enjoy diversified assignments, check your opportunity with Fairchild. We're looking for engineers experienced in

Aero Design
Stress Technology
Weights Technology
Design Coordination
Engineering Test Lab Coordinator

Write our EMPLOYMENT MANAGER

ENGINE AND AIRPLANE CORPORATION
FAIRCHILD
Aircraft Division
805 PENNSYLVANIA AVENUE
HAGERSTOWN, MARYLAND

AERODYNAMICISTS

★ New subsonic and supersonic projects are creating an urgent demand for aerodynamicists at Northrop Aircraft, Inc., America's first company in the vital development, design and production of all-weather and pilotless aircraft.

★ If your training and experience qualify you for one of these challenging assignments, please telephone or wire collect:

Mr. Robert Ehinger
Manager of Engineering
Industrial Relations
Northrop Aircraft, Inc
Hawthorne, California

★ Expense-free Los Angeles interviews will be arranged for qualified applicants.

NORTHROP AIRCRAFT
INCORPORATED
HAWTHORNE, CALIFORNIA

EDITORIAL

Quarles Choice Is Significant

Selection of Donald A. Quarles as the new Secretary of the Air Force is a wise and significant appointment. Mr. Quarles has long experience in industrial science, and he now has a background of more than two years in the Pentagon in its top research and development job. During his service as Assistant Secretary of Defense for Research and Development he became intimately acquainted with the Pentagon problems of inter-service rivalries, the knots still snarling military-industry research and development relations, and more recently with the vital technological race with Russia in the development of nuclear weapons and their aerial delivery systems.

The appointment of Mr. Quarles to the top USAF post is further evidence that this technological race with Russia is of critical importance. This is the first time a man whose background was predominantly scientific has held either the USAF Secretaryship or its earlier equivalent under the old War Department organization.

It again proves that, despite the political smokescreen raised by the Secretary of Defense when AVIATION WEEK first revealed the extent of the latest Russian progress in atomic airpower development (AW May 23, p. 12), both the Pentagon and the Eisenhower Administration now regard the aeronautical pace of the Soviets as critical and calling for decisive and sustained action.

Since May when AVIATION WEEK exclusively revealed the numbers and types of new Russian jet aircraft displayed over Moscow, the Air Force has taken the following steps to speed its weapons program:

- **Accelerated Boeing B-52** long range bomber production by 35% (AW June 6, p. 12).
- **Accelerated production of the McDonnell F-101** long range interceptor and escort fighter with atomic bomb carrying capabilities (AW June 27, p. 12).
- **Accelerated production of the Lockheed F-104** supersonic day fighter (AW June 27, p. 12).
- **Increased the scope and expanded** the size of its basic scientific research effort through the new Office of Scientific Research headed by Brig. Gen. Don Flickinger (AW July 18, p. 12).
- **Attempted acceleration** of the weapon system development cycle by eliminating preliminary design competitions (AW Aug. 8, p. 12).

The appointment of a top scientific man as Secretary of the Air Force is the sixth major action taken by the Defense Department during the past three months to bolster its aerial weapons development program. This is ample confirmation of AVIATION WEEK's editorial warning on May 23 that top level Pentagon leaders were "deeply shocked" by the Russian airpower displays and that our grave concern was no false cry of "wolf" but a genuine danger signal to national survival.

Mr. Quarles is fortunate in finding an excellent quartet of civilian assistants to help him in his new job. Whatever else may be said about former Secretary Harold E. Talbott (and we will have more to say about him soon) he recruited an excellent second tier in his USAF civilian secretariat. James Douglas, Under Secretary, Trevor Gardner, Assistant Secretary for Research and Development, Roger Lewis, Assistant Secretary for Materiel, and Lee White and Lyle Garlock, Assistant Secretaries for Financial Management, have all performed their specialized tasks with consistent distinction and considerable courage in the face of obstacles. The return of Roger Lewis to private industry at the end of this month will be a genuine loss to USAF.

We believe that the American people are counting on Mr. Quarles to produce major progress in aerial weapons development to once again establish the clear and unchallenged superiority of American airpower. We also believe that if he makes it unmistakably clear to the American people that this is his policy and backs it with appropriate action they will support him.

General Boatner Retires

The retirement of Lt. Gen. Bryant L. Boatner last week at the age of 48 after a distinguished career in development, production, modification and testing of aerial weapon systems throws a spotlight on a problem that is giving the Air Force serious concern. Gen. Boatner retired for physical reasons after a series of heart attacks. There is little doubt that these attacks were induced by the strain, pressures and responsibilities of the key positions he held in the USAF weapon systems development and production program. At the very time when his experience had uniquely qualified him for top level posts in this field and his age would have normally permitted USAF to enjoy at least another ten years of his service, Gen. Boatner is forced to leave the service, a victim of the tremendous pressures and strains generated by top level posts in what is now the most important military organization this country has ever had. Gen. Boatner's case is typical of what has been happening to many of USAF's younger generals in top spots.

In his last post, as Deputy Chief of Staff for Materiel, with responsibilities for both development and production of weapon systems, he made notable contributions in the always difficult relations between the research and production organizations. The assignment of clear executive responsibility for weapon systems to either Air Research and Development Command or Air Materiel Command during the development and production cycle was a major step in the right direction. Gen. Boatner was also a strong champion of the subcontractor and components producer as an integral and valuable part of the USAF materiel structure and made special efforts to protect their rights.

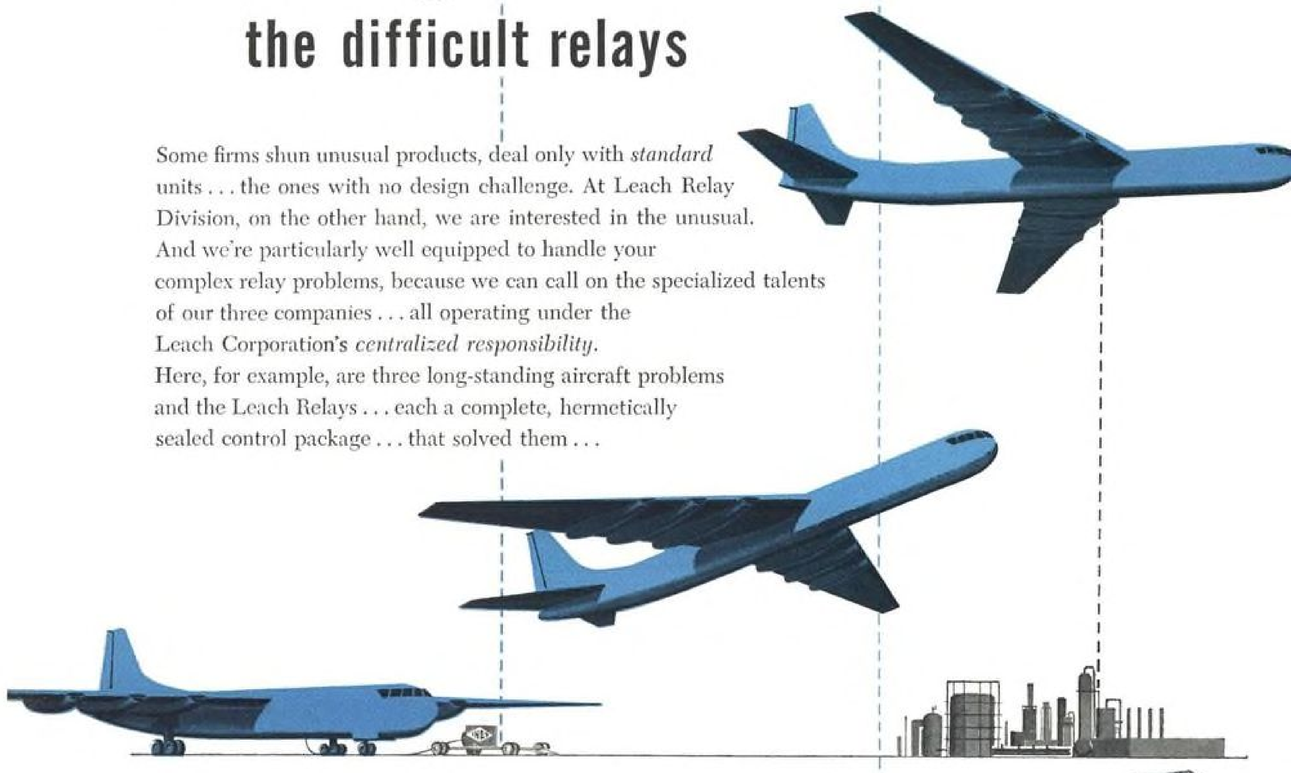
Both USAF and the aircraft industry have suffered a genuine loss in the premature retirement of Gen. Boatner. His case poses a problem that the leaders of both USAF and the aircraft industry should study closely to prevent further loss of able, experienced executives and commanders.

—Robert Hotz

one phase of **LEACH** *leadership*

Building, not avoiding, the difficult relays

Some firms shun unusual products, deal only with *standard* units . . . the ones with no design challenge. At Leach Relay Division, on the other hand, we are interested in the unusual. And we're particularly well equipped to handle your complex relay problems, because we can call on the specialized talents of our three companies . . . all operating under the Leach Corporation's *centralized responsibility.*
Here, for example, are three long-standing aircraft problems and the Leach Relays . . . each a complete, hermetically sealed control package . . . that solved them . . .



ON THE GROUND . . . incorrectly phased ground power can cause serious damage.

LEACH'S ANSWER . . . 9243 Phase-Sequence Relay, which includes a 3-phase stall torque motor and control switches. Unless the predetermined phase sequence is applied at normal voltage, the relay will not allow the main contactor to close.

IN THE AIR . . . relays must operate from low-level indicators (e.g., thermocouples, subminiature tubes, small slip rings) and shock resistance is vital.

LEACH'S ANSWER . . . 9262, a combination of relay and magnetic amplifier, is sensitive to 1 *milliwatt,* is immune to shocks as great as 50 g. In addition it is compact and light.

ON COURSE . . . gyro compasses drift if voltage input drops, but the back EMF they generate holds normal relays closed for 15-30 minutes.

LEACH'S ANSWER . . . 9247 Close-Differential Relay, a combination of magnetic amplifier, rectifier, and relay which warns the pilot of any drop as small as 5 volts.

LEACH CORPORATION / LEACH RELAY DIVISION

5915 AVALON BOULEVARD, LOS ANGELES 3, CALIFORNIA

LEACH RELAY DIVISION
PALMER GENERATOR DIVISION
INET PRECISE POWER DIVISION

SERVING INDUSTRY IN THE LABORATORY . . . IN THE PLANT . . . ON THE GROUND . . . IN THE AIR

DISTRICT OFFICES AND REPRESENTATIVES IN PRINCIPAL CITIES OF U.S. AND CANADA

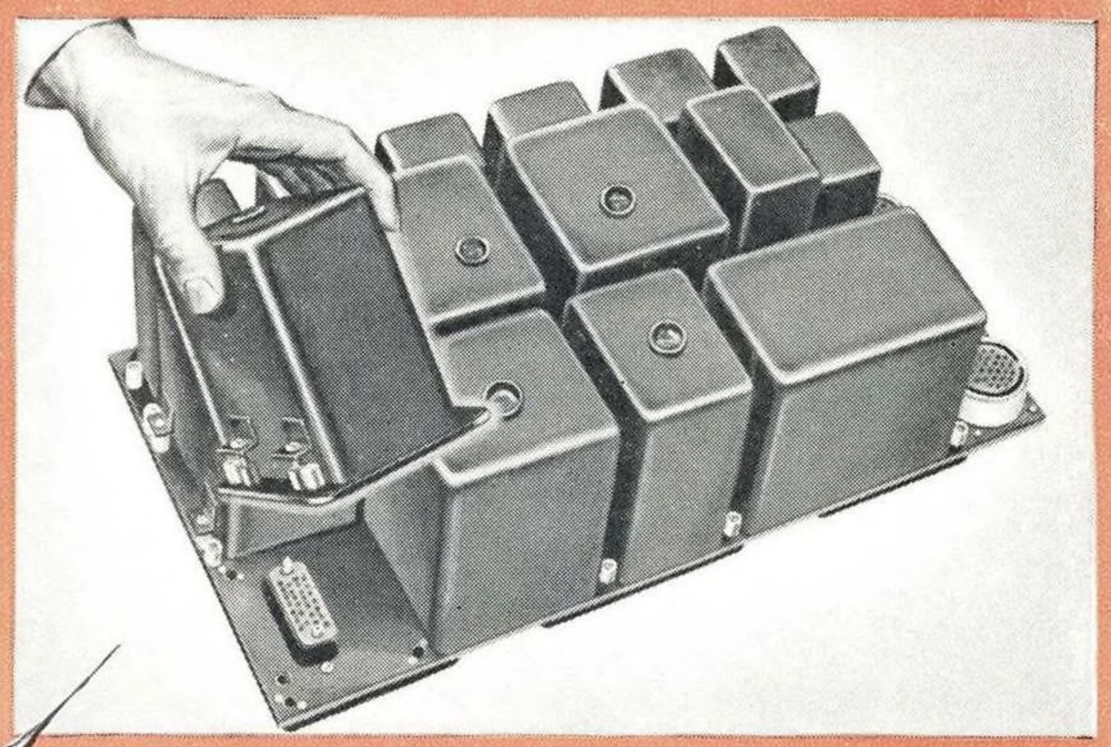
THE MASTER AIR DATA COMPUTER

Another

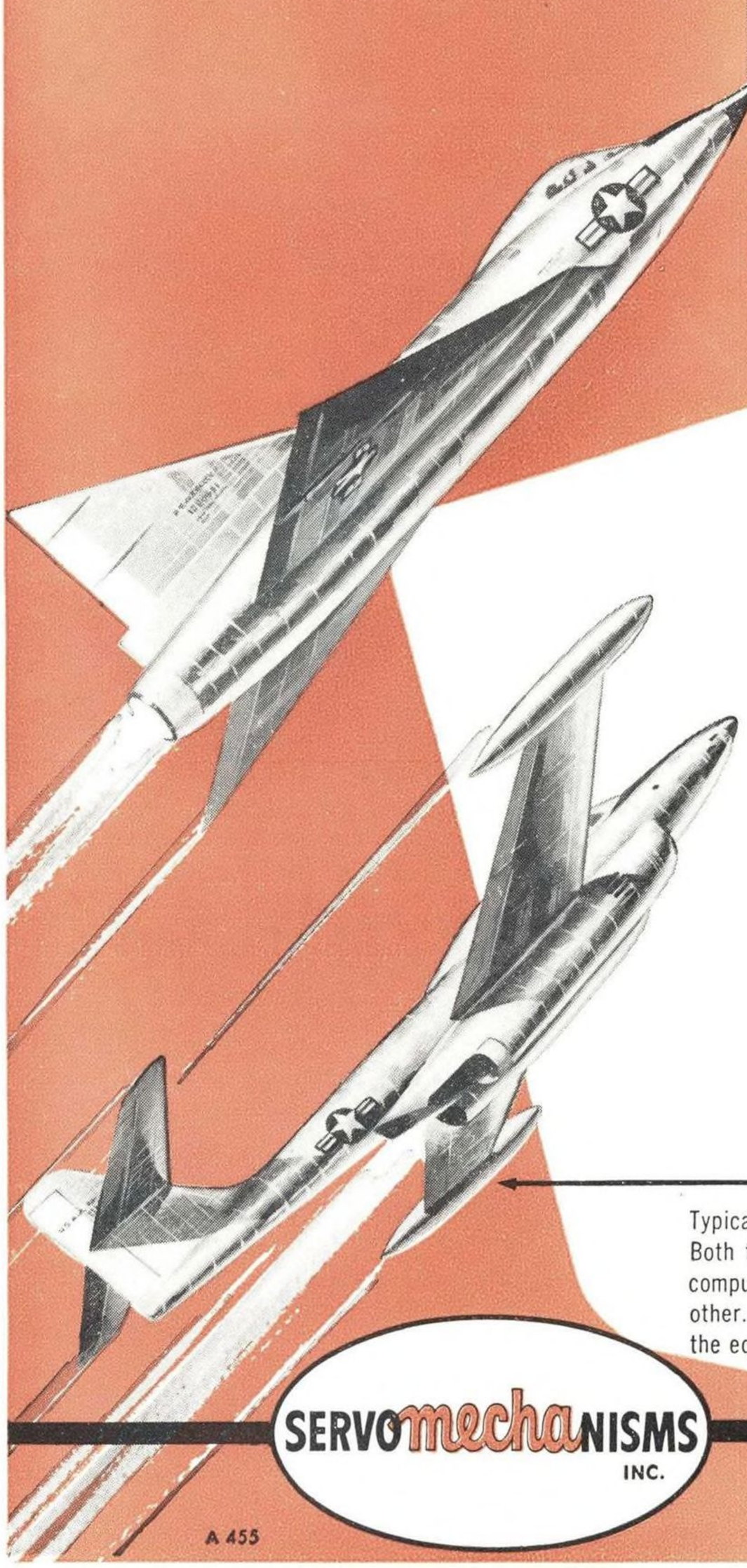
SERVOMECHANISMS

Building Block

System



The Master Air Data Computer provides a single coordinated source for input information required by the various aircraft control and instrumentation systems. It is a central "clearing house" for aerodynamic intelligence. There is no fundamental limit to the number of functions, outputs or services that this computer can perform.



The Master Air Data Computer represents another outstanding example of Servomechanisms' design philosophy. As a result of our complete and careful analysis of the problem, our engineers have developed a series of standard plug-in components which, when assembled in "building block" fashion, produce many versions of the Master Air Data Computer—each for a specific application. Consequently each requirement can be tailored quickly and economically through the use of selected "building blocks." At most, only one or two of the "building blocks" require any internal changes. The remaining components are standard for all configurations. In addition to the fast economical and accurate solutions to our customers' problems, all plug-in components of the same type are completely interchangeable thus insuring **maximum** reliability through simplifying maintenance in the field.

Servomechanisms proven ability to **anticipate** and **interpret** our customers' needs, to **design** to specifications, to **produce** in quantity and **follow-up** throughout the life of the delivered equipment, all add up to a **complete service.**

Write for Air Data Computer Brochure, GA3.

Typical example of Servomechanisms "building block" philosophy. Both the Convair F102 and the Northrop F89 use variations of this computer. One requires somewhat different information than the other. A simple change in one of the plug-in "building blocks" and the equipment became custom made for each aircraft.

SERVOmechaNISMS INC.

A 455

Eastern Division Post & Stewart Avenues, Westbury, N.Y.
Western Division 12500 Aviation Boulevard, Hawthorne, Calif.
Components Division 625 Main St., Westbury, N.Y.
Industrial Electronics of Canada, Ltd. 83 Torbarrie Rd., Toronto 15, Canada