# *The* AIRCRAFT YEAR BOOK *For 1949*

DeWITT C. RAMSEY, Admiral USN (ret.)

# *The* AIRCRAFT YEAR BOOK *for 1949*

# *The*

# AIRCRAFT YEAR BOOK

## *for 1949*

***Thirty-first Annual Edition***

*Official Publication*

of

**The Aircraft Industries Association of America, Inc.**

*Edited and Published by*

**Lincoln Press, Inc. • PUBLISHERS**
**WARNER BLDG. • WASHINGTON 4, D. C. • STERLING 1944**

**Editors**

Fred Hamlin
Arthur Clawson
William G. Key
Eleanor Thayer

PRINTED BY
THE MONUMENTAL PRINTING COMPANY, BALTIMORE, MD.

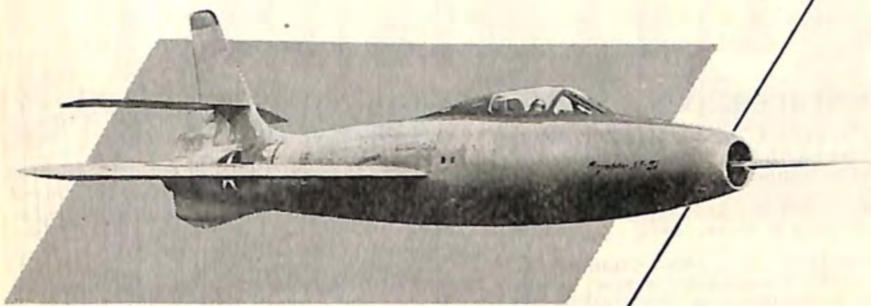
# TABLE OF CONTENTS

## ACKNOWLEDGEMENTS

The material briefly outlined below and delineated in great detail in the Index represents the work of some of the best editorial talent in the aviation industry. Hardly an item has gone into the book without help from some company public relations official, an aviation writer volunteering his talents from the sidelines, or an aircraft executive for the moment more interested in documenting aviation history than in making it. The Aircraft Year Book for 1949, in sum, represents the combined editorial talent of the industry, and we are as grateful for their aid and advice as we are lacking in space to list all the names of those who have made the book possible. We should, however, like to take this occasion to express our special gratitude to the patient cooperation and helpful criticism of the Year Book Editorial Board of the Public Relations Advisory Committee of the Aircraft Industries Association, who gave much valuable time in suggesting the handling of the material and getting the bugs out of the final copy. The Committee was under the chairmanship of Mr. Harold Mansfield, Director of Public Relations and Advertising for the Boeing Airplane Co. Serving with him were Mr. Al Cline, Director of Public Relations for Northrop Aircraft, Inc., and Mr. Ken Ellington, Director of Public Relations of Republic Aviation Corp. Coordinating the work of the Committee was Mr. Bert C. Goss, Director of Public Relations of the Aircraft Industries Association. We are also especially grateful to Mr. William T. Raymond, of the Air Transport Association for his editorial advice in writing the chapter on the airlines. Others whose help was invaluable included: Burt English, Aircraft Industries Association; Max Karant, AOPA; Charles E. Planck, CAA; Edward E. Slattery, CAB; and Mary Thorton, CAA.

THE EDITORS

# THIS IS THE XF-91



*Made by the makers of the mighty Thunderbolt . . . which set enviable records in the hands of Air Force pilots during World War Two . . . and later, builders of the F-84E Thunderjet now being manufactured in quantity for the Air Force . . . Republic is justifiably proud of the XF-91 presently undergoing flight tests at the Muroc Air Force Base in California. ¶ Conceived and produced to perform as a high speed . . . high altitude interceptor . . . with both turbo jet and rocket power . . . the final acceptance specifications of this great ship will, we are confident, prove to be one more vital weapon in Democracy's arsenal.*

*. . . Republic Aviation Corporation, Farmingdale, Long Island, New York*

**REPUBLIC AVIATION**

*Makers of the Mighty Thunderbolt • Thunderjet • XR-12 • XF-91*

# AVIATION BOOKS PUBLISHED IN THE UNITED STATES IN 1949

The following bibliography was compiled by Arthur G. Renstrom, Ass't. Chief, Aeronautical Division, Library of Congress.

## COMMERCIAL AVIATION

DEARING, CHARLES L. AND WILFRED OWEN. National Transportation Policy. Washington, Brookings Institution. 459p. $4.00

FREDERICK, JOHN H. Airport Management. Chicago, Richard D. Irwin. 331p. $4.00

GILL, FREDERICK W. AND GILBERT L. BATES. Airline Competition; a Study of the Effects of Competition on the Quality and Price of the Airline Service and the Self-Sufficiency of the United States Domestic Airlines. Boston, Division of Research, Graduate School of Business Administration, Harvard University. 704p. $5.75

GOODRICH, M. GEORGE. The Federal Subsidy of Commercial Aviation. Chicago, The Author. 214p.

INTERNATIONAL CIVIL AVIATION CONFERENCE, CHICAGO, 1944. Proceedings. Vol. II. Washington, U. S. Govt. Print. Off. 1509p. (Department of State. Publication 2820.) $2.50

KIMBALL, FREDERIC P. Domestic Mail Rate Decisions; a Summary and Analysis of Opinions of the Civil Aeronautics Board Granting Permanent Mail Rates Currently in Effect for Domestic Carriers. Tarrytown, N. Y., The Author. 258p. $1.75

KROPF, GENE. Airline Traffic Procedures. New York, McGraw-Hill Book Company. 406p. $5.50

U. S. CIVIL AERONAUTICS ADMINISTRATION. Airport Accounting, Budgeting and Insurance. Washington, U. S. Govt. Print. Off. 36p. (Airport Management Series.) $.15

U. S. CIVIL AERONAUTICS ADMINISTRATION. Airport Design. Washington, U. S. Govt. Print. Off. 64p. $.30

U. S. CIVIL AERONAUTICS ADMINISTRATION. Civil Aeronautics Manual 42: Irregular Air Carrier Certification and Operation Rules. Washington, U. S. Govt. Print. Off. $1.00

U. S. CIVIL AERONAUTICS BOARD. Airline Traffic Survey, September 1947. Washington, U. S. Govt. Print. Off. 5v. $6.00

U. S. CIVIL AERONAUTICS BOARD. Airline Traffic Survey, March 1948. Washington, U. S. Govt. Print. Off. 5v. $6.40

U. S. CIVIL AERONAUTICS BOARD. Annual Airline Statistics, United States Certificated Air Carriers, Calendar Year 1947. Washington, U. S. Govt. Print. Off. 120p. $1.00

U. S. CIVIL AERONAUTICS BOARD. Economic Regulations in Force July 1, 1949. Washington, U. S. Govt. Print. Off. 84p. $.40

U. S. DEPARTMENT OF STATE. Aspects of United States Participation in International Civil Aviation. Washington, Department of State, Division of Publications. 118p. (Department of State. Publication 3209.)

WOOD JOHN WALTER. Airports and Air Traffic; the Airport Needs of Your Community. New York, Coward-McCann. 159p. $3.75

ZWENG, CHARLES A. Aircraft Dispatcher Rating. North Hollywood, Calif., Pan American Navigation Service. 427p. $4.00

## DESIGN

ABBOTT, IRA H. AND ALBERT E. VON DOENHOFF. Theory of Wing Sections Including a Summary of Airfoil Data. New York, McGraw-Hill Book Company. 693p. $15.00

AIRCRAFT INDUSTRIES ASSOCIATION. Design Manual on Aircraft Fire Protection. Washington, Aircraft Year Book. 20p. $1.00

AMERICAN HELICOPTER SOCIETY. Proceedings of the Fourth Annual Forum, Philadelphia, Apr. 22-24, 1948. Bridgeport, Conn., The Society. $6.00

BRUHN, ELMER FRANK. Analysis and Design of Airplane Structures; 1949 rev. ed. Cincinnati, Tri-State Offset Company. $6.50

COURANT, RICHARD AND KURT OTTO FRIEDRICHS. Supersonic Flow and Shock Waves. New York, Interscience. 480p. (Pure and Applied Mathematics. Vol. 1.) $7.00

DAILEY, C. L. AND F. C. WOOD. Computation Curves for Compressible Fluid Problems. New York, John Wiley and Sons, Inc. 33p. $2.00

DIEHL, WALTER S. Engineering Aerodynamics. 2d ed. New York, The Ronald Press. 556p. $7.00

DWINNELL, J. H. Principles of Aerodynamics. New York, McGraw-Hill Book Company. In press.

FERRI, ANTONIO. Elements of Aerodynamics of Supersonic Flows. New York, The Macmillan Company. 434p. $10.00

KRISTIAN, PAUL F. Aircraft Woodworking. St. Louis, Educational Publishers, Inc. 134p.

PERKINS, COURTLAND D. AND ROBERT E. HAGE. Airplane Performance, Stability, and Control. New York, John Wiley & Sons, Inc. 493p. $7.00

# WOULD YOU?

## do business with THIS Company!

Glendale News-Press

MONDAY, NOV. 22, 1948

PAGE 4-B

### Integrity in Business

Although business concerns, both large and small, have long been pointed to as the "big bad wolves" of our economic life, the fact is that most business organizations are considerably better members of the economic family than certain minority groups would have us believe.

Integrity in business is the rule, rather than the exception. But even so, it is interesting and encouraging to find such evidences of business integrity as recently have been demonstrated by the Grand Central Airport Co., right here in Glendale.

This company, one of Glendale's most important industries, recently completed an interesting contract for the Chinese Air Force, in the performance of which 100 C-46 Curtiss Commando cargo airplanes were overhauled and modified.

The planes had been left in storage at Walnut Ridge, Ark., at the cessation of hostilities following World War II. Grand Central sent a crew of experts to Walnut Ridge to "ready" the planes for flight, after which they were flown to Glendale, completely overhauled and modified, and then flown to China.

Obviously this was a difficult and an unusual undertaking and one which brought commendation from all quarters of the aviation industry. It becomes more outstanding when it is realized that every one of the planes flown from Walnut Ridge to Glendale and worked over by the highly trained Grand Central technicians arrived safely in China, being flown via Honolulu, Wake, Guam and thence to Shanghai.

To the layman, however, the most noteworthy part of the entire accomplishment lies in the method of charging for the job.

The work on the planes was contracted for by the Chinese Air Force at a fixed price for a fixed number of hours. But the Glendale concern, by the efficiency and skill of its operation, was able to reduce substantially the number of hours required for the job. Instead of pocketing the difference, however, Grand Central passed the savings on to the Chinese.

The company recently has received a letter of commendation from Gen. Pang-tsu Mow, deputy commanding general and Chinese Air Force representative in Washington, D. C. It is understood that funds for the work were originally advanced to the Chinese by the United States.

A similar instance of "integrity in business" came to light following the completion of a contract by Grand Central to overhaul 24 C-54's, the Douglas four-engined transport now being used by the United States Air Force on the Berlin air lift.

The ships required a complete general overhaul and the company was given a contract at a flat rate per hour, following rigid specifications, with no top amount set by the government.

As with the Chinese contract, the local company completed the job satisfactorily and on schedule. And again, by careful planning and the use of highly skilled technicians, Grand Central turned out these planes at approximately $15,000 per job cheaper than other concerns doing exactly the same work. So a saving of approximately $360,000 was effected—this time for the United States government.

The history of business in the United States must have many similar chapters. But it is of special pride to Glendale citizens to realize that in Grand Central Airport Co. the community has one of the organizations that takes pride in practicing integrity in business.

Which probably is one of the important reasons why the concern, which operates the important Grand Central Airport as well as its large shops and a technical school, has continued to stay in business and to prosper since 1929, even in the face of strong competition.

Similar action by every business would be of great aid to the fight against inflation and for lower prices.

(REPRINT OF AN EDITORIAL, IN GLENDALE NEWS-PRESS, NOV. 22, 1948)

## GRAND CENTRAL AIRPORT CO.

C. C. MOSELEY, PRESIDENT AND CHAIRMAN OF THE BOARD

**Specializing in Overhaul, Repair and Conversion of Airplanes and Engines . . .** *and its subsidiary*

## CAL-AERO TECHNICAL INSTITUTE

**Specializing in training of Aeronautical Engineers and Master Aviation Mechanics**

**GLENDALE, (*Los Angeles County*) CALIFORNIA**

SERBIN, H. An Introduction to the Aerodynamics of the Airplane (Part 2) 2d ed. W. Lafayette, Ind., Rose Company. $6.10

SIBERT, HAROLD W. High-speed Aerodynamics. New York, Prentice-Hall. 289p. $6.00

STORER, JOHN H. The Flight of Birds Analyzed Through Slow Motion Photography. Bloomfield Hills, Mich., Cranbrook Institute. 109p. (Cranbrook Institute of Science. Bulletin no. 28.) $2.50

TIETJENS, OSCAR G. Hydro-und Aeromechanik nach Vorlesungen von L. Prandl. Vol. 1. Gleichgewicht und reibungslose Bewegung. 2d ed. Ann Arbor, Mich., J. W. Edwards. 248p. $7.00

U. S. MUNITIONS BOARD, AIRCRAFT COMMITTEE. Subcommittee on Air Force-Naval-Civil Aircraft Design Criteria. Strength of Metal Aircraft Elements. Washington, U. S. Govt. Print. Off. 109p. (ANC-5a) $1.25

WEINIG, F. Aerodynamics of the Propeller. Translated and Reproduced from the Original German Text. Dayton, Ohio, Wright-Patterson Air Force Base, Central Air Documents Office, Intelligence Department, Air Materiel Command. 501p.

YOUNG, RAYMOND A. Helicopter Engineering. New York, The Ronald Press. 255p. $10.00

## FICTION

ALDANOV, MARK, *pseud.* A Night at the Airport; Stories. New York, Charles Scribner's Sons. 224p. $3.75

GALLICO, PAUL. The Lonely. New York, Alfred A. Knopf. 182p. $2.50

KNIGHT, CLAYTON. Skyroad to Mystery; Illustrations by the Author. New York, Alfred A. Knopf. 243p. $2.50

LEINSTER, MURRAY, *pseud.* The Last Space Ship. New York, Frederick Fell. 239p. (Fell's Science Fiction Library) $2.50

QUIGLEY, MARTIN. A Tent on Corsica. Philadelphia, J. B. Lippincott Co. 192p. $2.75

## HISTORY

FREUDENTHAL, ELSBETH E. Flight into History; the Wright Brothers and the Air Age. Norman, Okla., University of Oklahoma Press. 281p. $3.75

TURNBULL, ARCHIBALD D. AND CLIFFORD L. LORD. History of United States Naval Aviation. New Haven, Yale University Press. 345p. $5.00

U. S. AIR FORCE. AIR HISTORICAL GROUP. The Army Air Forces in World War II. Vol. 2. Europe: Torch to Pointblank, August 1942 to December 1943. Chicago, University of Chicago Press. 917p. $6.00

WILLIAMS, ROGER Q. To the Moon and Halfway Back. San Angelo, Texas, Newsfoto Publishing Co. In press. $5.00

## JUVENILE

ATWATER, MONTGOMERY MEIGS. Smoke Patrol. New York, Random House, Inc. 214p. $2.50

BRIER, HOWARD M. Skycruiser; Illustrations by Jo Kotula. New York, Pocket Books. 238p. $.25

BROCK, EMMA LILLIAN. Surprise balloon. New York, Alfred A. Knopf. 63p. (Borzoi Books for Young People) $1.50

O'MALLEY, PATRICIA. Faraway Fields, the Career of an Airline Publicity Girl. New York, Dodd, Mead & Company, Inc. 244p. $2.50

WEIR, RUTH CROMER. The Wonderful Plane Ride; Illustrations by Fiore and Jackie Mastri. Chicago, Rand McNally. 33p. (A Rand McNally Book-Elf Book) $.25

## MAINTENANCE AND REPAIR

CIVIL AIR REGULATIONS AND REFERENCE GUIDE FOR A & E MECHANICS. Los Angeles, Aero Publishers, Inc. 120 p. $1.75

DRAKE, ROLLEN H. Aircraft Engine Maintenance and Service. New York, The Macmillan Company. In press. $5.90

DRAKE, ROLLEN H. Aircraft Electrical Systems, Hydraulic Systems, and Instruments New York, The Macmillan Company. 393p. (Drake's Aircraft Mechanic Series) $5.60

DRAKE, ROLLEN H. Aircraft Maintenance and Service. New York, The Macmillan Company. In press. $4.25

NORTHROP AERONAUTICAL INSTITUTE. Aircraft Maintenance and Repair. New York, McGraw-Hill Book Company. 452p. $6.00

SHELTON, WALTER C. Aircraft Assembly and Aircraft Hydraulics Project Manual. St. Louis, Educational Publishers, Inc. 93p.

VALE, JOHN W., JR. The Aviation Mechanic's Aircraft Manual with Questions and Answers. New York, McGraw-Hill Book Company. 757p. $6.00

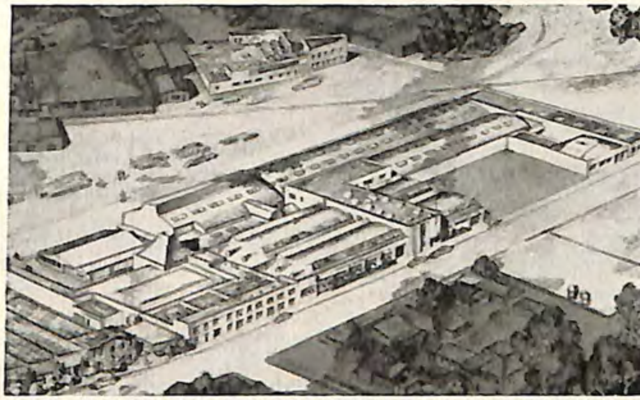
## MLITARY AERONAUTICS

THE AIR OFFICER'S GUIDE. 2d ed. Harrisburg, Pa., Military Service Publishing Company. 582p. $3.50

THE AIRMAN'S GUIDE; A READY REFERENCE OF HELPFUL INFORMATION AND COUNSEL FOR ALL AIRMEN OF THE UNITED STATES AIR FORCE. Harrisburg, Pa., Military Service Publishing Company. 428p. $2.50

ARNOLD, HENRY H. Global Mission. New York, Harper & Brothers. 626p. $5.00

BLACKETT, P. M. S. Fear, War and the Bomb; Military and Political Consequences of Atomic Energy. New York, McGraw-Hill Book Company. 244p. $3.50

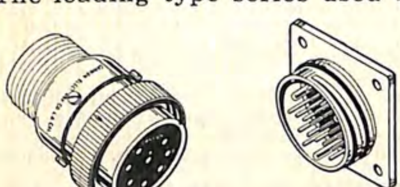


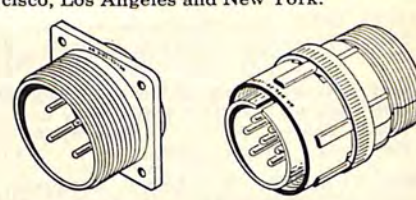
LOS ANGELES OFFICES AND FACTORY OF CANNON ELECTRIC

# PIONEER DEVELOPER AND GREATEST PRODUCER OF PLUGS FOR THE AIRCRAFT INDUSTRY

CANNON ELECTRIC is proud to be not only the pioneer in design, development and production of multi-contact electric connectors for the aircraft industries but also its largest producer of plugs. Every major aircraft manufacturer in the United States and Canada depends upon quality connectors made by Cannon Electric U S A and Canadian Plants. The leading type series used by the industry are "AN" and "K", and among the other type series are "DP", "AF", various battery connectors, "XL", "RTC", "GS" and "RS". Cannon D. C. Solenoids and other Specialties are used extensively.

Cannon Electric Development Co., Division of Cannon Manufacturing Corporation, 3209 Humboldt Street, Los Angeles 31, California. In Canada: Cannon Electric Co., Ltd., Toronto. World Export: Frazar & Hansen, San Francisco, Los Angeles and New York.





SINCE 1915

CANNON ELECTRIC

REG. U.S. PAT. OFF.

CHENNAULT, CLAIRE LEE. Way of a Fighter; the Memoirs of Claire Lee Chennault, edited by Robert Hotz. New York, G. P. Putnam. 375p. $4.50

LA FARGE, OLIVER. The Eagle in the Egg. Boston, Houghton-Mifflin Company. 320p. $3.50

LAPP, R. E. Must We Hide? Cambridge, Mass., Addison-Wesley Press, Inc. 182p. $3.00

POSSONY, STEFAN T. Strategic Air Power; the Pattern of Dynamic Security. Washington, Infantry Journal Press. 313p. $5.00

## POWER PLANTS

EAMES, JAMES P. Jet-Propelled Power Plants. San Francisco, Pacific Aero Tech. 121p. $3.00

GODSEY, F. W., JR. AND LLOYD A. YOUNG. Gas Turbines for Aircraft. New York, McGraw-Hill Book Company. 367p. (Westinghouse-McGraw-Hill Engineering Books for Industry) $4.50

KARVINEN, CLIFFORD H. Power Plants Project Book. St. Louis, Educational Publishers, Inc. 193p.

LEY, WILLY. The Conquest of Space. Paintings by Charles Bonestell. New York, Viking Press. 160p. $3.95

SCHLAIFER, ROBERT. History of the Development of Aircraft Engineers in the United States. Boston, Division of Research, Graduate School of Business Administration, Harvard University. In press.

SUTTON, GEORGE P. Rocket Propulsion Elements; an Introduction to the Engineering of Rockets. New York, John Wiley & Sons, Inc. 303p. $4.50

U. S. CIVIL AERONAUTICS ADMINISTRATION. Aircraft Powerplant Handbook. Washington, U. S. Govt. Print. Off. 359p. (C.A.A. Technical Manual 107) $1.25

WILKINSON, PAUL H. Aircraft Engines of the World, 1949. New York, The Author. 324p. $10.00

## PRIVATE FLYING

BABITS, SETH. Opportunities in Aviation. New York, Vocational Guidance Manuals. 96p. $1.00

CHATFIELD, CHARLES H., C. FAYETTE TAYLOR AND SHATSWELL OBER. The Airplane and its Engine. 5th ed. New York, McGraw-Hill Book Company. 380p. $4.50

FOGG, ROBERT S., WILLIAM D. STROHMEIER AND DANIEL J. BRIMM, JR. Seaplane Flying and Operations. New York, Pitman Publishing Corporation. 218p. (Pitman Books on Private and Business Flying) $3.75

LYON, THOBURN C. Practical Air Navigation. 6th ed., 2d printing, with minor changes. Commercial ed. Silver Spring, Md., The Author. 356p.

NORWOOD, ARTHUR G. Private Pilot's Handbook. 2d ed. New York, Pitman Publishing Corporation. 300p. (Pitman Books on Private and Business Flying) $3.00

PIPER, W. J. AND D. J. DUFFIN. Private Flying; Today and Tomorrow. New York, Pitman Publishing Corporation. 294p. (Pitman Books on Private and Business Flying) $4.50

SHIELDS, BERT A. Learning to Fly. New York, Pitman Publishing Corporation. 262p. (Pitman Books on Private and Business Flying) $4.00

U. S. CIVIL AERONAUTICS ADMINISTRATION. Aircraft Use in 1947. Washington, U. S. Govt. Print. Off. 62p. $.30

U. S. CIVIL AERONAUTICS ADMINISTRATION. Fundamentals of Elementary Flight Maneuvers. Los Angeles, Reprinted by Aero Publishers. 55p. (Civil Aeronautics Bulletin no. 32)

ZWENG, CHARLES A. Flight Instructor. 7th rev. ed. North Hollywood, Calif., Pan American Navigation Service. 335p. $3.00

ZWENG, CHARLES A. Ground Instructor Rating. 5th ed. North Hollywood, Calif., Pan American Navigation Service. 186p. $3.00

## REFERENCE WORKS

AERONAUTICAL ENGINEERING CATALOG. Fifth 1949 Edition. Editor Wellman A. Shrader. New York, Institute of the Aeronautical Sciences. 226p. $5.00

AERONAUTICAL ENGINEERING INDEX, 1948. New York, Institute of the Aeronautical Sciences. 243p. $5.00

AIRCRAFT DATA BOOK. 3rd ed., rev. Los Angeles, Aero Industries Technical Institute. 240p. $2.50

AIRLINE RECORD, 1949. Chicago, Roy R. Roadcap. 160p. $7.50

GAUTREAUX, AGNES A. AND MARY LALLY, *compilers*. Aviation Subject Headings; a Concise List for Civil Aviation Libraries or Collections. New York, Special Libraries Association. 56p. $1.75

SPECIAL LIBRARIES, ENGINEERING-AERONAUTICS SECTION. Subject Headings for Aeronautical Engineering Libraries. New York, Special Libraries Association. 245p. $4.00

U. S. NATIONAL MILITARY ESTABLISHMENT. Research and Development Board. Committee on Guided Missiles. Dictionary of Guided Missile Terms. Washington, Public Affairs Press. 57p. Paper $1.00; cloth $2.00

# INDEX

This index was compiled for the Aircraft Year Book by Miss Agnes Gautreaux, one of the outstanding aviation indexers in the country. Miss Gautreaux is co-author of *Aviation Subject Headings* and is Chief Librarian, Civil Aeronautics Administration, Washington, D. C.

THE EDITORS

## A

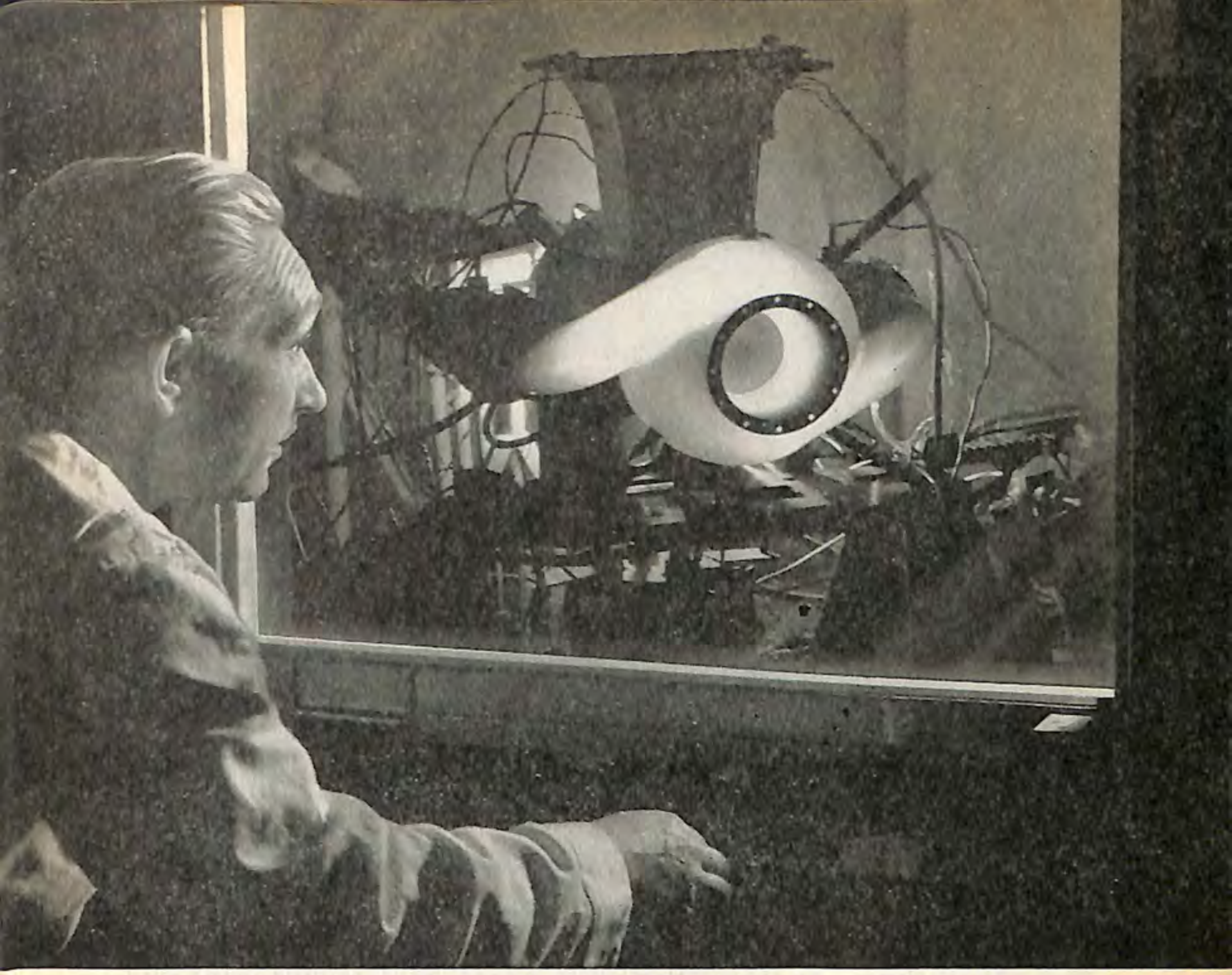

Getting Down to Earth
Silk tumbling into empty space, seven hundred fifty bootsoles itching for the impact of solid ground . . . this is getting down to earth in the air age!
Millions of man-hours went into this one moment of sky-borne drama.
For pilots, it meant careful briefings, weeks of practice, hours flying in formation—plus long years of flight training . . .
For crewmembers, it meant days of mechanical tune-ups and flight checks—based on a wide-ranging technical aviation background . . .
For the paratrooper, it meant scores of classroom lectures and demonstrations along with arduous physical conditioning—a perfect co-ordination of mind and muscle . . .
For the U. S. Air Force and the U. S. Army, it meant the application of world-wide combat experience, an extensive training program and a complex and efficient system of screening personnel . . .
Getting down to earth is much more than a routine maneuver. It is human resourcefulness and engineering skill put to the test. It is the triumph of TEAMWORK in the new air age.
ENGINE AND AIRPLANE CORPORATION
FAIRCHILD
HAGERSTOWN, MARYLAND


MARTIN U.S.A.
ROCKETRY
TRANS-SONIC SPEEDS
JET-PROPULSION
ELECTRONICS
advance-design aircraft
XB-51
XP5M-1
XB-48 SIX-JET BOMBER
P4M-1 MERCATOR
AM-1 MAULER
2-0-2 TRANSPORT
JRM-1 MARS
B-10
1909
B-26 MARAUDER
PBM MARINER
MB-2
BM-1
MARTIN Research Blazes a Trail to the Future!
Since the earliest days of military aviation, Martin research engineers have worked closely with customers . . . producing a long line of great Martin planes for service all over the globe. Today, Martin is reaching for new horizons in rocketry . . . electronic fire-control systems . . . jet propulsion . . . supersonic missiles . . . advance-design aircraft . . . and other far-reaching fields. Look to *Martin* for a look at the *future*. The Glenn L. Martin Company, Baltimore 3, Maryland.
Martin
AIRCRAFT
Builders of Dependable Aircraft Since 1909

## F



## G



# AIR-BORNE SELF-STARTER FOR JETS

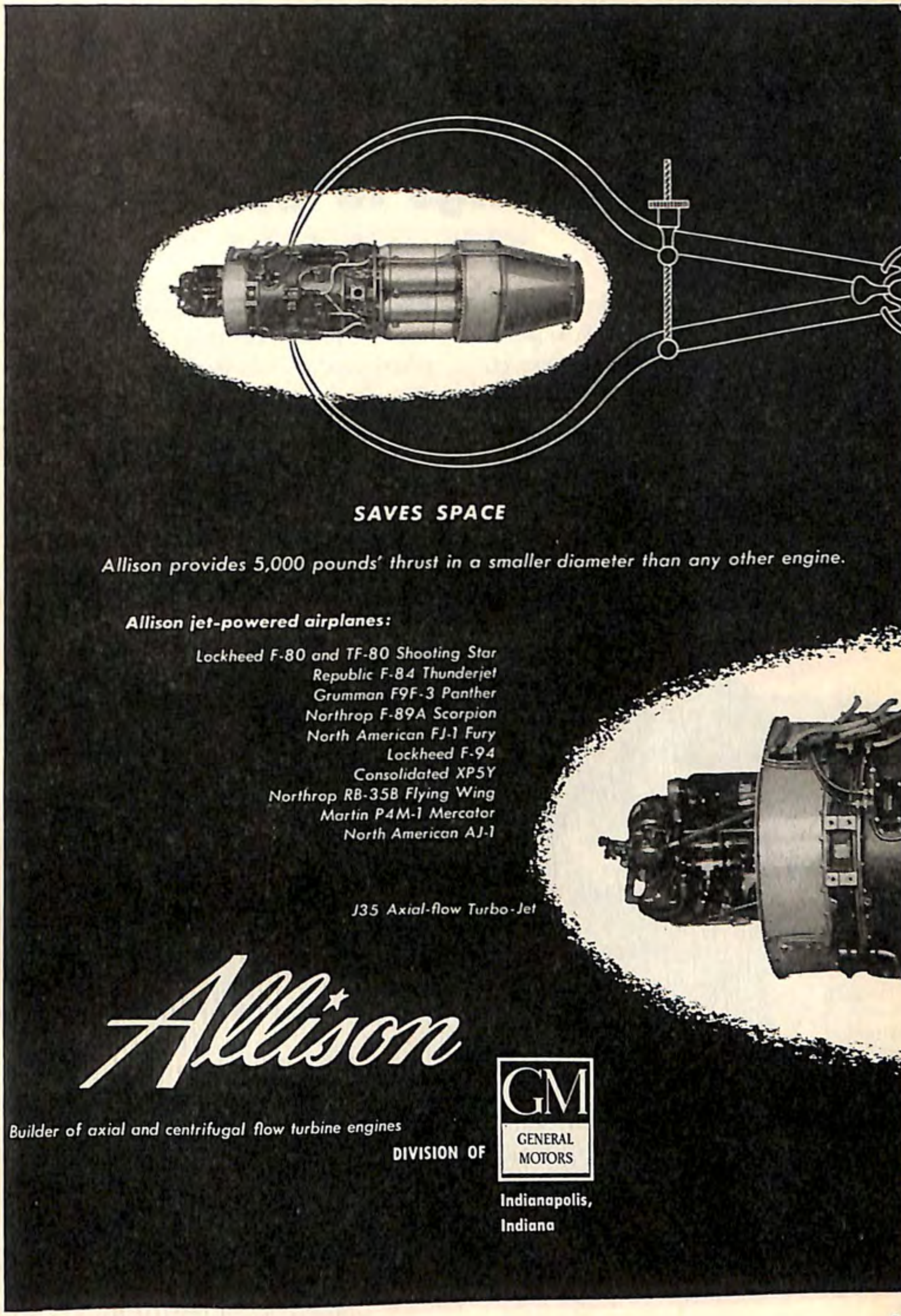
A successful air-borne, self-starting system for jet and turboprop aircraft engines was recently announced by the Navy's Bureau of Aeronautics.

Developed and manufactured by AiResearch, this device makes it possible to start jet and turboprop aircraft without the use of a jeep-drawn trailer of storage batteries, 250-lb generator and ground crew. The new system saves valuable time, equipment and personnel and allows such aircraft to be started anywhere, any time, and under any conditions.

Heart of the new self-starter system is a newly developed 88-lb multi-purpose auxiliary gas turbine. It is the *first* auxiliary gas turbine of *any type* to pass grueling 200-hour government qualification tests. Combustion temperatures as high as 1600° F and wheel speeds as fast as 40,000 rpm make possible its very high ratio of power for weight and size.

AiResearch
DIVISION OF
THE GARRETT CORPORATION

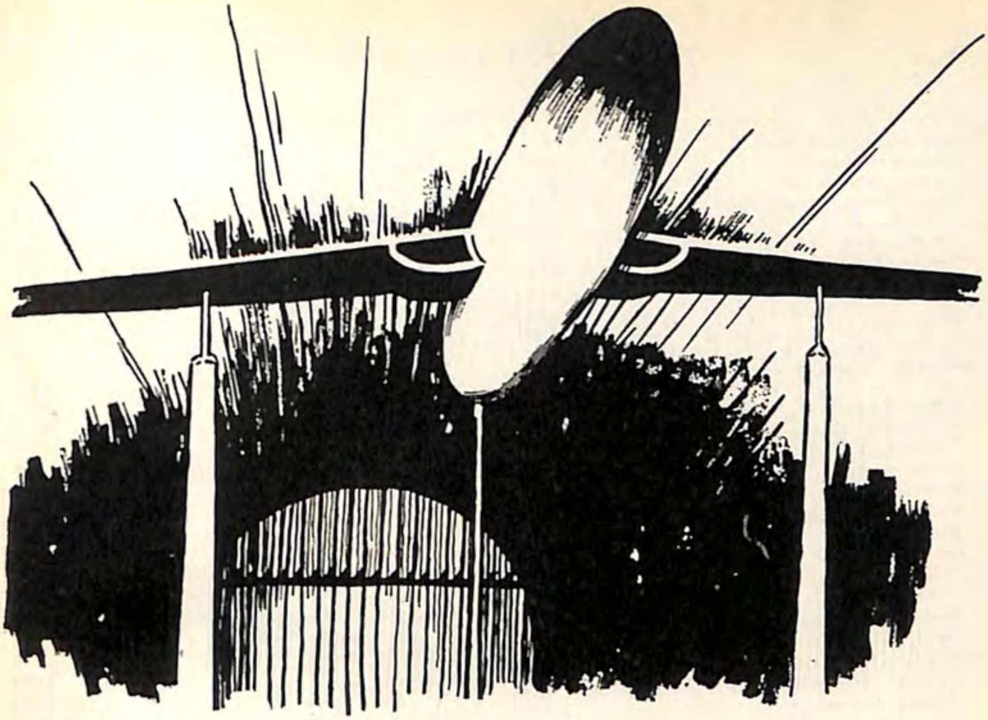
• An inquiry on your company letterhead will receive prompt attention.
AiResearch Manufacturing Company, Los Angeles 45, California


SAVES SPACE
Allison provides 5,000 pounds' thrust in a smaller diameter than any other engine.
Allison jet-powered airplanes:
Lockheed F-80 and TF-80 Shooting Star
Republic F-84 Thunderjet
Grumman F9F-3 Panther
Northrop F-89A Scorpion
North American FJ-1 Fury
Lockheed F-94
Consolidated XP5Y
Northrop RB-35B Flying Wing
Martin P4M-1 Mercator
North American AJ-1
J35 Axial-flow Turbo-Jet
Allison
Builder of axial and centrifugal flow turbine engines
DIVISION OF
GM
GENERAL MOTORS
Indianapolis, Indiana

PERSONALITIES



PERSONALITIES



PERSONALITIES



PERSONALITIES

PERSONALITIES



PERSONALITIES

PERSONALITIES



PERSONALITIES


KOLLSMAN
INSTRUMENTS
FOR
PRECISION FLIGHT
WHEREVER EXTREME ACCURACY is essential in instrumentation or remote control – especially where a pressure-sensitive element is the basic source – the name Kollsman is the hallmark of precision craftsmanship. Among the products from the famous Kollsman laboratories are:
Aircraft Instruments and Controls
Varying Resistance Pickups • Flight Test Instruments
Special Purpose Miniature Motors
Binoculars • Periscopic Sextants • Optical Components
Remote Indicating and Control Systems
as functions of
Air Speed, Altitude, Acceleration,
Mach Number, Differential Pressure, etc.
Kollsman ingenuity, skill and experience are available to you in the solution of instrumentation problems. Your inquiries are invited.
KOLLSMAN AIRCRAFT INSTRUMENTS
PRODUCT OF
SQUARE D COMPANY
ELMHURST, NEW YORK
GLENDALE, CALIFORNIA

PERSONALITIES



PERSONALITIES

PERSONALITIES



PERSONALITIES


6002

PERSONALITIES



PERSONALITIES

PERSONALITIES

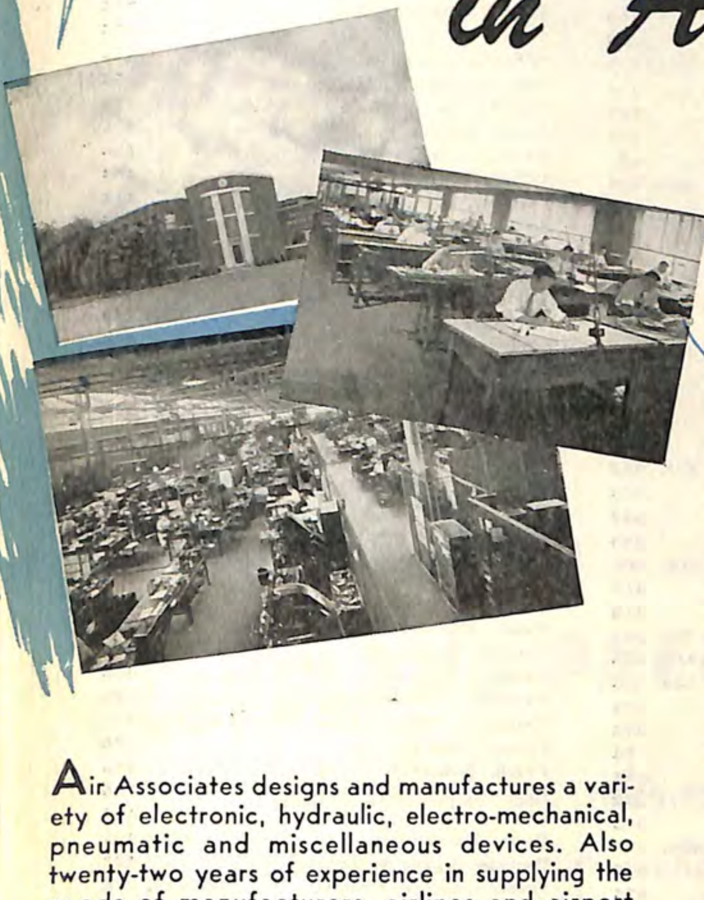


PERSONALITIES

PERSONALITIES



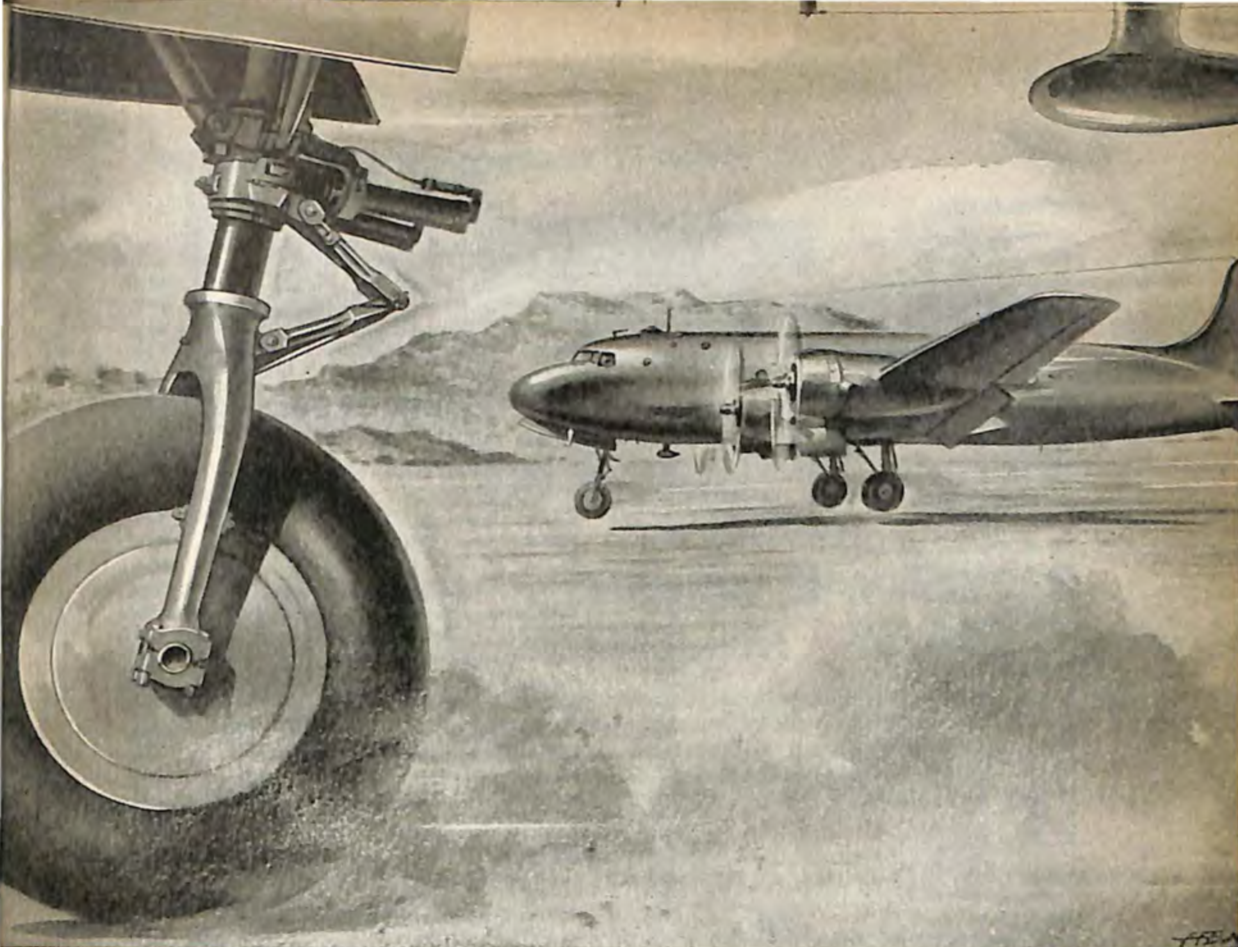
PERSONALITIES



PERSONALITIES



PERSONALITIES



PERSONALITIES



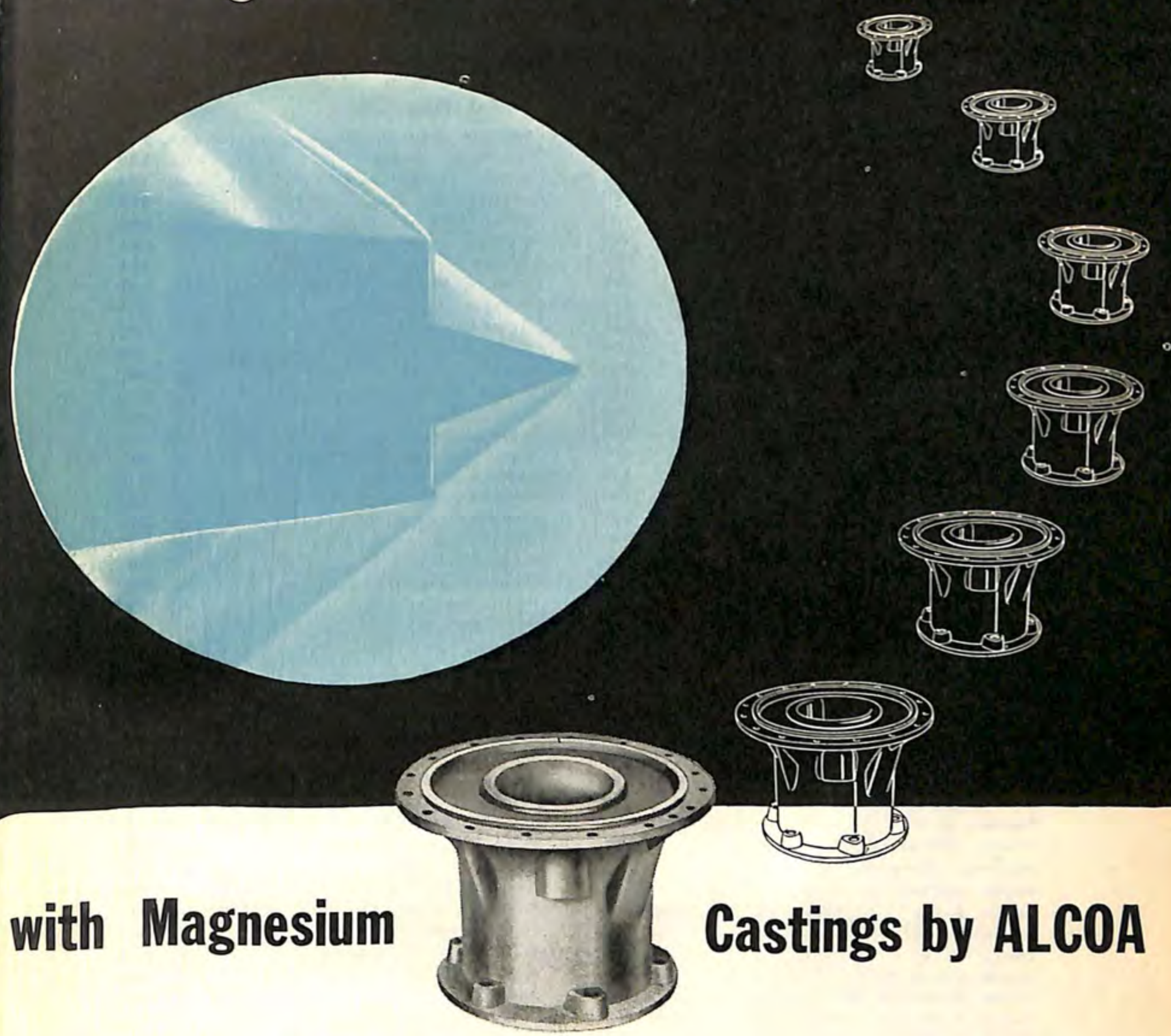
PERSONALITIES

PERSONALITIES



PERSONALITIES

# Tighten thrust-weight ratio



# with Magnesium Castings by ALCOA

You can squeeze higher performance out of available thrust by designing parts for magnesium wherever practicable. Especially the "chunky" parts such as gear housings, where weight saving adds up fast. Magnesium is 35% lighter than aluminum, 75% lighter than steel. Weight for weight, it is twice as stiff as aluminum, 18 times as stiff as steel.

Alcoa foundry specialists are ready to help you make the most of these magnesium advantages. Castings are held to close tolerances, require minimum machining. Soundness and uniformity are assured by rigid inspections.

For more information and a prompt quotation, call your local Alcoa sales office. Send for your free copy of the useful manual, "Designing with Magnesium". ALUMINUM COMPANY OF AMERICA, 1803 Gulf Building, Pittsburgh 19, Pennsylvania.

**ALCOA ALUMINUM and MAGNESIUM**

ALUMINUM INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS
IMPACT EXTRUSIONS • ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • PIGMENTS • MAGNESIUM PRODUCTS

PERSONALITIES



PERSONALITIES

PERSONALITIES



PERSONALITIES

**PERSONALITIES**



**PERSONALITIES**


There's a
PIONEER PARACHUTE
For every plane
For every purpose
Flexible P-3B Back-Pack Parachute—standard equipment for the U.S. Air Forces and other governments, test pilots, leading aircraft manufacturers.
AN-SS Military Model Seat Type Parachute—standard equipment for the Air Forces of the U.S. Army and Navy and other governments.
Pioneer maintains a special department for the manufacturing of Cargo and Air-Sea Rescue parachutes in sizes ranging from 8 ft. to 150 ft. in diameter.
All Pioneer Parachutes are equipped with the exclusive Quick-Fit Harness*. Perfect fit in less than 3 seconds.
*PATENTS APPLIED FOR IN U.S. AND ALL PRINCIPAL COUNTRIES THROUGHOUT THE WORLD
PIONEER PARACHUTE COMPANY, INC.
MANCHESTER, CONNECTICUT, U. S. A.

# Foreword

The AIRCRAFT YEAR BOOK this year reverts to its traditional function as an encyclopedia of the year in aviation. The 1948 issue of this publication was devoted almost entirely to the reproduction of the important reports of the President's Air Policy Commission (the Finletter Commission) and of the Congressional Aviation Policy Board (Brewster-Hinshaw Board).

Prepared under the editorship of Mr. Fred Hamlin, Mr. William G. Key, Mr. Arthur Clawson, and Miss Eleanor Thayer, and published by the Lincoln Press, this year book in effect inaugurates a new series which should be of even greater significance than the previous issues. We do not have to look further than the growing importance of aviation and the aircraft industry itself to understand why this should be true, for certainly aviation and the aircraft industry have become of vital concern to every citizen.

Today air power is conceded to be the first line of our national security. Just as true is the assertion that the aircraft industry is the very foundation of air power. Whether the primary tools and weapons of our air arm are jet or piston-engine bombers or fighters, their adequacy for their mission, both qualitatively and quantitatively, is dependent upon the industry that must produce them.

The Finletter Commission and the Congressional Board and the numerous other studies made of the lessons of World War II point to an undeniable fact about the importance of a peacetime aircraft industry. This is that there must be a healthy and technologically progressive industry in existence at all times to form the nucleus from which the giant industry needed for war can develop and expand. Without such a nucleus the wartime industry cannot reach its potential in time to provide the rapid and orderly flow of weapons required for modern war.

The condition and level of activity in the peacetime aircraft industry determine to a large extent the length of time required to achieve mobilization, irrespective of the amount of money provided immediately following the declaration of an emergency, and the other steps taken, such as priorities, allocations, and manpower control, for this effort. This is why mobilization planners must base their projections of readiness upon the current prevailing production level—allowing a long period for expansion if the level is low and a much shorter period if the level is high.

But apart from his interest in the aircraft industry as a pillar of the national military security, the average citizen now is affected to an important degree by commercial aviation. During some summer months of the past year passenger miles on our commercial airlines exceeded those reported for Pullman travel. A conservative estimate is that one-half of our first class travel in the entire country next year will be by air. Thus, scheduled and non-scheduled air transportation and the transportation of cargo have become big businesses employing many thousands and providing transportation for many hundreds of thousands.

Private flying is also changing the lives and the occupations of our citizens. This branch of aviation has yet to equal the fond expectations of the optimist. But there are almost 93,000 civil aircraft flying now, and private and executive transport aircraft are being used by at least 100 different types of business enterprises.

The manufacturing industry itself is an important factor in this nation's economy. In the early fall of 1949 it was providing employment for around 250,000 people. This compares with 600,000 employment in the iron and steel industry and 980,000 in the automobile industry. While the industry was an insignificant factor in our national economy of the 1930's, its employment now is roughly equal to that of such industries as baking or men's and boys' clothing.

Aircraft manufacturing is today a major employer in at least eight states scattered throughout the country.

Because of the two-fold contribution—to national security and to the national economy—the essential facts about aviation and the aircraft industry should be available in a convenient form. It is felt that the AIRCRAFT YEAR BOOK accomplishes this purpose.

D. C. RAMSEY, *President,*
*The Aircraft Industries Association of America, Inc.*

# CHAPTER ONE

## The Industry

WITH its war-time, all-time-high production peak half a decade behind, the United States aircraft manufacturing industry during 1949 had the best peace-time year of its history. Production orders for current models were, generally speaking, good. Two factors, poles apart, added to these orders to make the industry's over-all balance sheet even better. On the one hand, companies added to their incomes by realistic expansion into non-aviation fields. On the other, they participated in research and development of jets, atomic energy, rockets, supersonic planes and the score of other Buck Rogers projects making up the most all-inclusive government-financed industrial research program in the peace-time history of the United States.

Military orders—in which the research-development work is bracketed —continued to dominate the dollar volume in the industry. Budget confusion in Washington to the contrary, final military aircraft production figures were ahead of 1948. Late-fall orders created sizable backlogs for some companies in 1950.

Following the industry's rock-bottom, war-end dip, during 1949 it climbed slowly to reach its new peace-time peak. Employment was at a new high of 249,100 persons for the aircraft, engine, propeller, accessory and aircraft parts industries. Exclusive of parts, employment reached a top of 217,404 during the year. At year-end, sales volume for the airframe, engine, and propeller industries reached $1,700 million, well ahead of the Aircraft Industries Association's matching estimate for 1948 of $1,450 million.

Although the number of personal aircraft and civilian transports produced in 1949 were below other post-war years, military research, development, and production orders more than balanced the grand total. Here are the production totals:

| | Personal Aircraft (Number) | Civil Transports (Number) | Military Airframe Weight (millions of pounds) |
|---|---|---|---|
| 1949 | 3,400 | 160 | 28 |
| 1948 | 6,969 | 263 | 25 |
| 1947 | 15,515 | 278 | 11 |
| 1946 | 33,254 | 433 | 13 |

All figures for 1949 are estimates by the Aircraft Industries Association. Personal aircraft figures come from the Personal Aircraft Council of the

Aircraft Industries Association and transport totals are from Series M42A, Facts for Industry, Bureau of the Census. Military airframe figures are partly from the same source, plus the Civil Aeronautics Administration's Office of Aviation Information.

Total plant employment figures as of June in each year, excluding aircraft parts made by other than airframe, engine and propeller manufacturers, show a steady increase during the full peace-time years since World War II. According to Series M42A and M42E, Facts for Industry, Bureau of the Census, they are:

TOTAL PLANT EMPLOYMENT

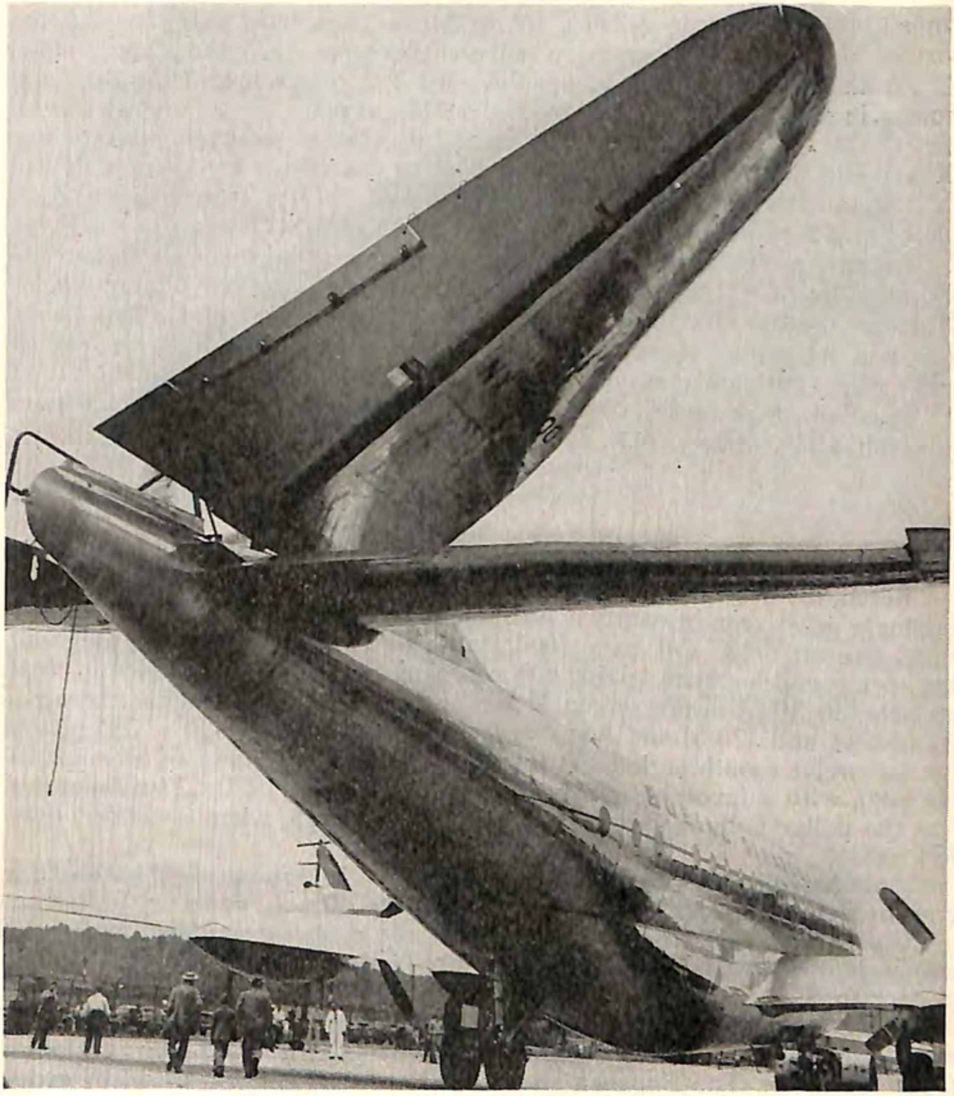
| | TOTAL | Airframe | Engine | Propeller |
|---|---|---|---|---|
| 1949 | 217,404 | 167,441 | 41,180 | 8,783 |
| 1948 | 183,659 | 141,050 | 34,741 | 7,868 |
| 1947 | 179,231 | 145,251 | 33,980 | N.A. |
| 1946 | 196,462 | 163,259 | 33,203 | N.A. |

The 1946 figures are as of December; all others are as of June.

Behind these totals lies the story of a year filled with struggle for the industry. Some companies were staggered by the wholesale military plane cancellations in January. From January to December, the industry was faced with the continuing problem of convincing the nation and the Congress on the need for a strong industrial nucleus to support an adequate air defense and the even more urgent need for developing new equipment. It was a running battle that often bordered perilously on disaster and which took an incessant toll of time and energy. Labor troubles, though not as acute as in other post-war years, nevertheless resulted in additional conflicts, some prolonged. Bell Aircraft Corporation suffered from a nineteen-week strike of production workers, and West Coast airframe plants went through the summer under the threat of similar trouble. Not a few companies, confronted with the tag ends of conversion difficulties, had trouble solving them. Personal aircraft builders had the worst year in their post-war history.

But the year was not half over before evidence was plentiful that, by and large, it was going to have a happy ending. Big and little companies turned up with modest profits, many nurtured by by-product activities. Dramatic financial stories began to appear. Convair turned a $7.5 million loss during the first six months of 1948 into a $1.5 million profit for the same 1949 period. Boeing's mid-year net was $662,349 with a backlog of $359,028,203. Sales more than doubled for Ryan. Douglas reported a net income of more than $5 million for the first nine months of fiscal 1949, compared with a net of less than $2 million for the same period in 1948. By year-end, Fairchild was in a position to declare a thirty-five cent dividend on common stock, the largest single payment ever made to stockholders in the history of that corporation.

By-products, many of them non-aviation, helped balance the books. Beech went in for pie pans and dishwashers, while Cessna did a big busi-



**View of Boeing Stratocruiser Folding Tail Assembly**

ness in tropicalized aluminum-plywood furniture for the Army's world-wide bases. Curtiss-Wright subsidiaries manufactured everything from movie cameras and textile spindles to windshield wipers and clutches. Fairchild sublet a patented process for molecular bonding of aluminum to steel. Northrop designed an artificial arm for handicapped veterans and Bell continued building a thing called a Prime Mover, described as having all the virtues of a giant wheelbarrow, a half-ton platform truck, and a snow plow.

At the other extreme, companies vied for research and development honors in numberless fields, many of them top secret. North American completed the largest supersonic wind tunnel in the industry, and delved deeper into guided missiles. General Electric and Pratt & Whitney delved further into the powerplant field, and United Aircraft Corporation completed a $12 million jet laboratory to speed this work.

Atomic energy research as a possible source of power was under exploration by North American, Curtiss-Wright, and Fairchild, among others. Northrop had several hundred technicians busy in this and allied fields. Jets and jet engine components were top priority in half a dozen plants, and rockets got similar attention throughout the industry.

Detailed, company-by-company samplings of U. S. aviation activities follow in alphabetical order.

### Beech Aircraft Corporation

Beech, for nearly two decades a leader in the lightplane field, had a surprisingly good year in contrast to the general downward trend in the personal aircraft field. Off to a good start, sales continued firm throughout the spring and summer, giving the company a fiscal-year production total on Sept. 30, 1949, of fifty-seven Model 18 Beechcraft twin-engine executive transports, and 328 Model A35 Beechcraft Bonanzas—a total of 385 planes for the twelve-month period. Year-end 1949 estimates indicated a comparable total, with a favorable backlog to carry over into 1950. Also favorable was the dollar volume as compared with fiscal 1948, when it totaled over $24 million.

Cumulative figures on post-war production, beginning in 1946, make a grand total of some 2,500 planes.

Export sales continued good, bringing the post-war number of Beechcraft sold abroad to well over four hundred. Beech models are now in use in over forty countries.

Most dramatic achievement of the Beechcraft Bonanza during the year was the long-distance record flights of William P. (Bill) Odom in January and March. The Bonanza and other Beech models continued to make performance history on scores of fronts. A partial list of activities, industries, products and professions with which Bonanza owners are associated shows nearly a hundred different items, including ambulance service, animal traps, book publishing, burial vaults, florists, dentists and doctors, labor unions and the opera. The Beechcraft executive transport continued to expand its activities along similar lines, figuring as a transport unit in such fields as big league baseball, police activities, oil drilling and production, and journalism. Both models did spectacular work during the 1948-49 blizzard in the West. (See Chapter on Lightplanes.)

**The Navy's Lockheed Constitution**

Beech Aircraft Corporation continued to diversify its production crop with numerous aviation and non-aviation products, including an aluminum alloy jettisonable fuel tank, a four-tank, space-saving shipping crate, sectional pie pans and plastic parts, a navigator's observing dome, metal tubs, dishwashers, and a variety of other parts.

### Bell Aircraft Corporation

Military and commercial helicopters, supersonic aircraft, guided missiles, and a machine combining the virtues of a huge wheelbarrow, a half-ton platform truck, and a snow plow, were among the items manufactured by Bell Aircraft Corporation during 1949. Year-end production totals were good despite a nineteen-week strike of production workers.

Early in 1949 Bell completed delivery of 65 H-13B two-place helicopters to the Army Field Forces, bringing to 105 the number manufactured for the nation's Armed Forces.

At present Bell is working on an order for nine HTL-3 two-place helicopters for the Navy and 11 YH-12 eight-passenger helicopters for the Air Force. Being built for the Army Field Forces are three XH-15 two-place helicopters equipped with a 250-horsepower engine.

On March 24, an XH-12 helicopter, one of two delivered to the Air Force in 1948, made an unofficial helicopter world speed record of 133.9 miles an hour at Niagara Falls airport, adjacent to the Bell plant. Pilot was Owen Q. Niehaus, Bell's chief test pilot, with William J. Gallagher as co-pilot.

An unofficial helicopter altitude record of 18,550 feet was established on March 19 at the Bell plant with a 200-horsepower, two-place helicopter similar to those now being produced for the Navy. The helicopter was flown by Joseph A. Cannon.

The YH-12 helicopter, which has a 600 take-off horsepower Pratt-Whitney 1340 engine, will be used by the Air Force for air-sea rescue, personnel evacuation, cargo transport, observation, liaison and fire adjusting.

It has been designed for use with wheels or twin floats and can carry six passengers in litters, plus pilot and attendant. With a service ceiling of 12,000 feet and a range of 300 miles, the YH-12 can climb vertically at a rate of 300 feet a minute and in forward flight at a rate of 1,000 feet a minute. It will carry a maximum load of 1,630 pounds.

The Bell helicopter during 1949 saw service with five foreign military forces—the French, Chinese National, Philippine, Italian, and Argentine.

An unknown commercial quantity less than four years ago, Bell helicopters have since completed a wide variety of aerial assignments. With over 70,000 flight hours already amassed, their utility is being expanded almost daily.

Since delivery of the first commercial model in December, 1946, nearly 250 Bell helicopters have been purchased by commercial operators and the military throughout the world.

Despite the strike, Bell delivered 24 commercial helicopters during 1949.

Expansion of operations in foreign fields was an important development, with Bell equipment appearing for the first time in France, Italy, China and the Philippines. The company's helicopters already were performing a variety of aerial assignments in England, Sweden, Colombia, Mexico, Argentina, Iraq, Iceland, Brazil, Canada and Alaska.

**U. S. Transport Leadership**

While airlines of the United States lead the world in air transport, U. S. plane manufacturers lead the rest of the world in the number of planes used for transport services. Of the total number of aircraft used by scheduled common carrier airlines of each country, 77 percent are made in America. Planes manufactured in the United Kingdom—some of which are of U. S. design—rank second with 15 percent; planes from other countries account for the remaining 8 percent. The figures are from the Civil Aeronautics Board:

| | Aircraft Total No. | U. S. Mfr. No. | U. S. Mfr. % | U. K. Mfr. No. | U. K. Mfr. % | Others No. | Others % |
|---|---|---|---|---|---|---|---|
| Africa | 207 | 86 | 42 | 108 | 52 | 13 | 6 |
| Asia | 577 | 450 | 78 | 91 | 16 | 36 | 6 |
| Australasia | 215 | 138 | 64 | 75 | 35 | 2 | 1 |
| Europe | 959 | 537 | 56 | 231 | 24 | 191 | 20 |
| Middle America | 257 | 223 | 87 | 32 | 12 | 2 | 1 |
| North America | 1,187 | 1,132 | 95 | 9 | 1 | 46 | 4 |
| South America | 434 | 381 | 88 | 26 | 6 | 27 | 6 |
| Total | 3,836 | 2,947 | 77 | 572 | 15 | 317 | 8 |

**Douglas DC-6A Liftmaster**

This year also saw the introduction of a new Bell commercial model, the fourth since the company received the world's first commercial helicopter license from the Civil Aeronautics Administration in 1946. The latest model is the Bell 47D-1, which, like its predecessors, is equipped with a 178 horsepower engine and employs the two-bladed main rotor and the exclusive Bell stabilizer bar. It carries a pilot and two passengers.

One of the important new features in the Bell 47D-1 is the roller-bearing transmission, which reduces maintenance by more than 300 per cent. For the first time the company also provided a standard and a deluxe model. Designed for utility, rather than streamlined appearance, the standard model was delivered without rear fuselage covering and cowling, giving a payload increase of about 25 percent.

One of the more prominent of 1949's pioneering achievements was the increasing acceptance of the Bell helicopter by the oil industry. Helicopters were teamed with geophysical equipment to explore barren areas, marshlands and impassable swamps in Louisiana and Texas. In addition, exploratory flights over the Gulf of Mexico indicated the adaptability of helicopters for off-shore operations by major oil companies.

Although the oil industry has many uses for helicopters, including personnel transportation, moving of supplies, and pipe line patrol, the Bell operation concentrated on geophysical explorations. This included gravity metering, seismic and radar surveys.

Airborne gravity surveys, using only two helicopters, accomplished

1200-1500 readings every 30 days, as compared to 350-450 readings in the same period by ground methods, employing marsh buggies and boats. In addition to the important time savings, the actual per-station cost of airborne readings is about one-half that of other methods in marsh operations. Helicopter seismic crews usually consist of 18 men. Ground operations use between 30 and 40. Furthermore, helicopters permit readings in areas inaccessible by other means.

In the straight gravity block surveys, marsh buggy crews can establish 300 to 400 new stations a month. The helicopter operation can top that figure by more than 1,500.

Radar survey was successfully conducted in west Texas for eight consecutive months with temperatures ranging from 6 degrees to 120 degrees. The helicopters engaged in gravity and seismic work flew more than 1,800 hours in seven months in all kinds of weather and over all types of terrain without incident.

Important as is the development of this new approach to geophysical survey, it was only one phase of commercial operations in 1949. New operational companies were formed in many sections of the United States and established operators expanded their diversified programs.

A Bell police helicopter in New York City made several dramatic rescues, and "captured" a runaway speedboat in the harbor. New York police added two more helicopters before the end of the year.

Helicopter airmail was introduced to Chicago in 1949 when six Bell helicopters were placed in service to shuttle mail from the airport to the roof of the main postoffice and to suburban communities.

Farmers and growers in increasing numbers chartered helicopters for spraying and dusting orchards and flat crops. Not only did Bell helicopters further entrench themselves as a practicable weapon against insect enemies of plants and crops, but they also influenced greater productivity, increasing the crop yield in many instances 10 percent and more.

For the second consecutive year, a Bell helicopter attacked the blackfly in New York State's Adirondack mountains with highly successful results and far-reaching implications to science and public health.

An operator in California patrolled thousands of miles of high voltage power line for a major utility company, with great savings in time and manpower and an increase in inspection effectiveness.

Aerial mapping work in Alaska, begun in 1948, was expanded in 1949. Forestry re-seeding, newsgathering, aerial and motion picture photography, wildlife and traffic surveys, snow surveys, pipeline patrol, fish planting, and game counting, added to the growing list of helicopter services.

Most noteworthy operation in the foreign field occurred in Sardinia, where two Bell helicopters purchased by the Italian government through the Economic Cooperation Administration were used to combat malaria-bearing mosquitoes. Later they also applied insecticides to the olive groves in central Italy.

The Bell X-1 research airplane, which made 1948 history by exceeding

**Goodyear GA-2B Amphibian**

the speed of sound, continued to figure in the news during 1949. Four more X-1's were under construction in '49 with improved and enlarged fuel systems permitting much higher speeds and longer flights. Bell also is building two X-2's for the Air Force and NACA, designed for even higher speeds, and greater altitudes.

Activities in the guided missile field were also expanded. Although the work is top secret, progress is most satisfactory. Work now underway includes missile design in both the air-to-air and air-to-surface categories, missile guidance, and the development and construction of rocket engines.

For Boeing Aircraft Company, Bell made inboard engine nacelles for the B-47A and B-47B, as well as pilot, co-pilot and navigator seats.

For Consolidated Vultee Aircraft Corporation, Bell manufactured jet engine nacelles for the B-36.

For Grumman Aircraft Engineering Corporation, Bell built the entire empennage for the AF-1 and AF-2 airplanes.

Apart from its aircraft work, Bell continued to produce its Prime Mover, a materials handling machine. Equipped with a three-horsepower engine, it is capable of transporting a 1,000-pound load up a 20 percent grade. Enthusiastically received as a labor-saving tool, it has become firmly established in construction and concrete work, in foundries and the steel industry, in railroads and coal yards, in cemeteries and on farms and estates, in manufacturing and processing operations of all types, in the U. S. Army, Navy and Marine Corps and other government departments, and in a large variety of other applications from oil fields to greenhouses.

Government buying of the Bell Prime Mover indicates a promising and steady market. During the year, trial quantities of Prime Movers were bought by the U. S. Navy in Washington, D. C., Philadelphia, Brooklyn, and Bremerton, Wash. The National Park Service, the Marine Corps, Army Engineers, Quartermaster Corps and National Cemeteries were among other purchasers. Export orders from foreign distributors and users continued steadily throughout the year.

## Boeing Airplane Company

Two outstanding aircraft records and an accelerated program of commercial and military airplane deliveries in 1949 marked Boeing Airplane Company's thirty-third anniversary of aircraft production. In the field of research, two new aircraft accessory items made their debut, while ram-jet and gas turbine engine studies and work on a guided missile program continued in the experimental field.

Six days after the new year began, the first of the 71-ton Boeing Stratocruisers was delivered to the United States Air Force. Utilized as a high density troop transport, the 340-mile-per-hour airliner was assigned to the Pacific Division of the Military Air Transport Service.

Later in January the first commercial Stratocruiser delivery was made to Pan American World Airways and was followed shortly by deliveries which continued throughout the year to four other major world airlines. In all, 56 Stratocruisers were ordered from Boeing.

The Boeing XB-47 Stratojet bomber swept into the headlines early in February when, with two Air Force officers at its controls, it shattered all coast-to-coast speed records in a ferrying flight from Moses Lake Air Force Base in central Washington State to Andrews Air Force Base, Md., at an average speed of 607.8 miles per hour. Most of the flight was made at altitudes of from 32,000 to 40,000 feet, according to Majors R. E. Schleeh and Joseph W. Howell, of the Air Materiel Command, pilots during the flight. Earlier in the year the Air Force revealed that on two occasions the swept-wing Stratojet had outsped jet fighter aircraft in speed calibration tests. The transcontinental hop was the first flight for which an actual speed of the Stratojet had been revealed.

Landing at Andrews Air Force Base, the Stratojet displayed its self-contained ribbon parachute brake. The thirty-foot diameter 'chute was released at touch-down to substitute for the propeller reverse thrust braking action that normally can be utilized in piston-powered aircraft.

Less than a month after the Stratojet set this record another Boeing airplane, the B-50 Superfortress *Lucky Lady II,* made its historic non-stop flight around the world. Manned by an Air Force crew, the fully-armed *Lucky Lady* landed from the west at Carswell Air Force Base, Tex., 94 hours and 1 minute after it had left that same field heading east.

In-flight refueling was done from "tanker" Boeing B-29's at 3,700- to 5,300-mile intervals.

Air Secretary W. Stuart Symington termed the flight "an epochal step in the development of air power. What it actually does is turn our medium bombers into intercontinental bombers."

Steps were promptly taken to install in-flight refueling equipment on B-29's and B-50's at the company's Wichita plant—a program begun in the spring of 1948. Later in the year, it was announced that normal range of the B-50D had been increased by two droppable 700-gallon streamlined external fuel tanks under each wing. The tanks, when not needed for extreme range, may be replaced by two 4,000-pound bombs, giving the new plane a total bomb load of 28,000 pounds. In-flight refueling equipment was also installed on some of these models.

On the *Lucky Lady II* flight the refueling system was built around a flexible hose, but further developments resulted in an improved version.

> Forty-six years ago—December 17, 1903—on a lonely Carolina sand dune at Kitty Hawk, two great Americans, Wilbur and Orville Wright, achieved the first sustained flight of a powered machine, and the air age was born.
>
> The task which faces us today is no less challenging than the task which faced the Wright Brothers on that historic December day. It is for us to use the instrument they gave us as a force for peace; to make the peoples of the world spiritual neighbors as well as physical neighbors.
>
> This is a responsibility which free men the world over owe each other. We Americans and many of our neighbors across the seas stand ready to do our part—to make the world's airways paths of peace—to use our planes for travel, for pleasure, for commerce and for all the peaceful pursuits that make up our daily lives.
>
> When those who would use the airplane as an instrument of aggression are ready to discard their ambition, open their doors and let in the warm light of freedom, then and then only will the airplane truly achieve the goals established by the Wright Brothers at Kitty Hawk.
>
> —HARRY S. TRUMAN
> *December 17, 1949*

This, as announced early in the fall, is made of telescoping pipe and is called the "flying boom." For take-off and landing, it extends almost straight back from under the tanker's tail. Internal pumps, fuel lines and control details are classified, and the device is still classed as experimental.

The bomber receiving fuel has a special fueling socket in its nose just forward of the upper top gun turret. The flying boom itself is equipped with small vee-shape control surfaces, known as "ruddevators," which govern movements of the boom either up or down or to either side. A technician seated in the tail of the tanker "flies" the boom by operating the "ruddevator" controls.

When refueling, the tanker and bomber fly in formation, the tanker above and slightly ahead of the bomber. The boom operator then guides the long telescoping fueling tube nozzle into the socket on the nose of the bomber and fuel is then pumped, under pressure, into the receiving airplane.

The new fueling system has been in flight test status since the summer of 1948. (The Air Force is also experimenting with an aerial refueling system to enable fighter planes to be refueled three at a time from one tanker.)

On May 3, a Boeing YC-97A Stratofreighter arrived at Rhein-Main, Germany, for an extended service test on the Berlin Airlift. The two-deck Boeing got into Tempelhof over a five-story apartment building at the end of the runway and landed on the 5,300-foot strip without the use of brakes. Reverse-thrust stopped the big plane in less than two-thirds of the runway. In its first 27 flights, the plane carried more than a million pounds of cargo.


**JATO-Propelled Martin Mars**

The production version of this Stratofreighter, the Boeing C-97A, made its first flight from Renton, Wash., a month later, the first of fifty on order by the Air Force. The new planes have Hamilton-Standard propellers rather than the Curtiss Electrics of the YC-97A's, and a radar dome jutting from the fuselage under the control cabin nose.

Design projects at Boeing included an airplane brake attachment which automatically prevents wheel skidding. The new device acts as a regulator on the plane's normal hydraulic brakes. Skid detectors in the "hubs" of the landing wheels consist of small flywheels in which electrical contacts act to cut off—by solenoid-operated valves—the brake pressure just short of a skid, and re-apply it when a near-skid condition ends. A valuable safety device, the anti-skid mechanism also minimizes wear on tires. Hydro-Aire, Inc., of Burbank, Cal., was licensed by Boeing to make and sell the new device commercially.

A Boeing-engineered and developed tractor-type landing gear also made its first appearance during the spring of 1949 on a B-50B Superfortress. It was the first such type gear to be designed for use on a heavy or medium bomber.

Purpose of the gear is to enable the Air Force to evaluate the possibilities of using unimproved runways for this type. Consisting of double tractor-like rubber treads for the main landing gear units, and a single tread unit in place of the nose wheel, the new system retracts completely when the airplane is in flight and does not affect the top speed of the 400-mile-an-hour bomber.

The track treads have a "footprint" area three times the size of the usual


**Northrop X-4**

double tire landing gear of the B-50, making it possible to operate the airplane from any soil that will support a light truck. "Footprint" pressure is 41 pounds per square inch.

Another Boeing development applicable to the B-50 is a new single-point high-velocity fueling system which promises to cut 75 percent from the time required to fuel multi-engine airplanes—from more than an hour to 15 minutes.

Basis for the new system is forced feeding—cramming the gas from a single point throughout the entire system. The principal problem was to make sure that fuel lines and their components would function normally under this pressure without excessive pressure loss or internal "drag."

Still in development also are the Boeing Model 500 and 502 gas turbine engines, started in 1943.

Model 502 has a single-stage centrifugal compressor with two outlets, two constant pressure burners, and a compressor-driven turbine. This primary stage, or hot gas producer, has a rated speed of 36,000 rpm and drives the accessories. The secondary, or power output stage, has another turbine with a rated speed of 24,000 rpm and a reduction gear, giving a rated shaft speed of 2,500 rpm. Model 500 basically is the primary stage of this engine.

The 502 weighs approximately 150 pounds and its output is between 100 and 200 brake horsepower, depending upon the endurance life expected. Easy to start, the engine will develop rated power within 15 seconds and can accelerate from an idle speed of 10,000 rpm to full speed in five seconds.

At the end of the first six months of 1949 Boeing Airplane Company reported a net profit of $662,349 and a backlog of orders totaling $359,028,-203. This backlog consisted of orders for 203 B-50 Superfortresses, starting funds for the production of B-47 Stratojets at the Boeing Wichita Division, the order for 50 C-97A military Stratofreighters, and 42 commercial Stratocruisers.

Included in the report was a $5,900,000 write-off of an estimated total loss of $15,400,000 on the Stratocruiser project. Of this total, $13,100,000 had been written off at the end of the period.

Cancellation of B-54 contracts at a backlog value of approximately $85,000,000 early in 1949 caused a gradual decline in employment at the Boeing Seattle Division from a peak of over 25,000 persons. Work load was distributed to produce B-47's at Wichita, Stratocruisers and B-50's in Seattle, and C-97A's in a company-leased plant at Renton, Wash.

### Cessna Aircraft Company

Cessna, one of the world's leaders in building personal aircraft as well as one of the oldest lightplane manufacturers, had an exceptionally sound and successful year. Less upset than most companies by post-war readjustment, the Wichita organization, which had concentrated on trainers, cargo planes and invasion gliders during the war, returned promptly to the lightplane field and has experienced steady peace-time gains since.

Four planes came from the 1949 assembly lines—models 140, 170, 190 and 195. Their price range is from the light, two-place plane at $3,495, the 140, to the deluxe four-to-five place 195 at about $15,000.

The Air Force bought fourteen 195's for liaison and personal transport use during the year, following exhaustive tests under most severe conditions in Alaska. Basically an off-the-shelf plane, the Air Force version is specially fitted for military use with skis, floats or wheels. A large quantity of spare parts and special fittings are included. The 195's (USAF designation LC-126-CE) will be used for rescue work, a job they have already been doing in Alaska.

Cessna's biggest sales volume in non-aircraft products was for U. S. Army aluminum-plywood furniture, going to bases all over the world. The furniture was designed especially for the tropics. Practically indestructible, it will not corrode, warp or mold under the worst climatic conditions.

**Chance Vought's F6U-1 Pirate**

## Chance Vought Aircraft
## Division of United Aircraft Corporation

Having successfully completed one of the most ambitious industrial migrations in post-war history, moving from Connecticut to Texas, Chance Vought settled down in Dallas in 1949 and got on-schedule with its production of Corsairs and Pirates, and further refinements on the Cutlass.

Orders on Corsairs, whose present model carries the Navy designation of F4U-5, stand at a total of 557. The latest model has an improved engine cowl with air intake scoops at four o'clock and eight o'clock positions. Outer panels are now metal covered and a large access door has been built in on the right side of the fuselage aft of the pilot's seat. Use of spring tabs for elevator and rudder control is also a new feature.

Information on the jet-propelled Pirate (F6U-1) and the Cutlass (F7U-1) is more closely guarded. Of the Pirate it is known that its power is a Westinghouse J-34-WE-30A jet and that it was Chance Vought's first entry into the jet field. Metalite, a new structural material that can be molded in large units, is used on the wings, cockpit area of the fuselage, and the stabilizer. First Pirate production model flew from Carswell Air Force Base at Fort Worth, Tex., in July.

The Cutlass, powered with two Westinghouse J-34-22 turbo-jets, has a speed of more than 600 miles an hour. First on the design board in Oct., 1945, it was first test-flown by Chance Vought's Bob Baker on Sept. 29, 1948. It has many unconventional features, including two vertical tails. There is no horizontal tail surface. "Ailavators" give both longitudinal and lateral control. "Slats"—in the leading edge of the wings—replace flaps. All controls are hydraulically operated.

With high speed and high altitude possibilities, the Cutlass seems to figure prominently in future Navy fighter plans.

**Consolidated Vultee Aircraft Corporation**

Civilian and military aviation history was recorded by Consolidated Vultee Aircraft Corporation and the planes produced by Convair at its San Diego, California, and Fort Worth, Texas, plants.

On June 1, 1949, an unusual safety record was established by airlines flying a new-type, twin-engine transport in its first year of operation as Convair-Liners began their second year of scheduled service.

Domestic and foreign airlines, flying more than 150 of the planes and logging approximately 500,000,000 passenger miles and 25,000,000 airplane miles, safely carried all of their more than 2,250,000 passengers.

American Airlines began service with the 40-passenger, 300-mph, pressurized and air-conditioned transports on June 1, 1948. Other domestic airlines operating fleets of Convair-Liners include Pan American World Airways, Western Air Lines, Continental Airlines, and Northeast Airlines.

Foreign-owned airlines operating the transports include KLM Royal Dutch Airlines, Sabena of Belgium, Swissair, Orient Airways, Ltd., of Pakistan, Trans-Australia Airlines, and Central Air Transport Corporation of China.

A modified version of the Convair-Liner, known as the T-29 navigational trainer, is in production at San Diego for the U. S. Air Force. A "flying classroom," the T-29 outwardly is similar to the Convair-Liner, with the addition of four astradomes atop the fuselage. The plane carries desks, radio, and radar equipment for 14 trainees, plus accommodations for pilot, copilot, crew chief, navigational instructor, and instructor-radio operator. The first T-29 flew early in the fall. Thirty-six were ordered.

Production of B-36 bombers for the U. S. Air Force continued steadily. Addition of Pratt & Whitney R4360-41 engines developing 3,500 horsepower has improved the bomber's take-off performance, climbing ability, service ceiling, and speed. First delivery of one of these higher horsepowered B-36's was made Nov. 25, 1948. Still further improvement was obtained later by adding four jet engines, mounted in pairs in a "pod" beneath each outer wing panel, to supplement the reciprocals. This experimental airplane, which made its first flight March 26, 1949, is now undergoing an extensive flight-testing program.

Military utility of the B-36 was further increased the past year by developing cargo carriers which can be suspended in its bomb bay, enabling the plane to operate as a transport with a maximum capacity of 80,000 pounds.

Convair's Ray O. Ryan, R. C. Sebold, and R. H. Widmer won the Air Force Association's 1949 Air Power Award for "their outstanding contribution to the development of the B-36."

Among B-36 operational missions deserving special mention is that flown in July, 1948, when, operating under simulated combat conditions, a B-36 flew approximately 6,000 miles at an average speed of more than 300 miles an hour. The B-36 is believed to be the first airplane ever to fly nonstop at this speed for this distance.

Records made by the big bomber during the year included carrying two 42,000-pound dummy bombs on Jan. 29, the heaviest load of bombs ever carried by one airplane. It also completed one of its longest flights to date, a 9,600-mile non-stop mock bombing mission, on March 12, 1949. Two weeks later, the plane made its first flight equipped with four jet engines in

**Consolidated-Vultee's XC-99**

addition to its six piston engines. Twice in 1949, B-36's operated at 40,000 feet for over twelve hours, the longest high-altitude missions recorded to date.

Convair completed the XC-99 and delivered the airplane to the U. S. Air Force on May 26. On April 15, 1949, the double-decked transport—world's largest land plane—took off with a record-breaking cargo of 100,000 pounds, contrasting to the official 33,435-pound F.A.I. record made on May 11, 1946.

The first of two Convair XP5Y-1 Navy patrol flying boats underwent static tests, followed by flight tests, in the late fall. The 60-ton plane, largest flying boat ever built by Convair, is designed for long-range day and night search of sea areas, rescue operations, and antisubmarine warfare.

The new-type flying boat has a high length-beam ratio hull which provides superior hydrodynamic characteristics over previous aircraft of this type. Its turbo-prop engines are designed to develop at take-off more horsepower per pound of airplane weight than some modern fighter planes, providing exceptionally quick take-off and high speed.

The plane has a high wing and single-fin tail.

Hydrodynamic testing with a radio-controlled flying model saved time in building the first XP5Y-1. A non-powered catapult model was also used to analyze landing characteristics. Both gave advance accurate information on performance of the full-scale flying boat.

Convair completed 300 all-metal L-13's for the U. S. Air Force. The plane can be equipped with ski-wheels for snow operations, floats, or double-wheel landing gears for desert missions.

The Air Force took over flight testing of Convair's XF-92A delta wing research interceptor following flight tests by the company. Announced early in 1949, the XF-92A—formerly designated Convair Model 7002—has flight-proved design predictions for high stability and low drag at high subsonic speeds. The jet-powered plane has a triangle-shaped wing with a 60-degree sweepback in contrast to a maximum of 35 degrees on current interceptor types. The experimental XF-92A has "elevons" for aileron and elevator action, with vertical stabilizer and rudder providing directional control and stability. Wind tunnel and flight tests indicate the delta wing could develop into the standard configuration for transonic and supersonic aircraft. XF-92A was built at San Diego and is being tested at Muroc Air Force Base, Cal.

Although the Convair XSAM-N-4 guided missile made successful initial flight tests as early as December, 1947, it was not until August, 1949, that public announcement was made of the progress on the shipboard-launched guided missile built for the Navy. The XSAM-N-4 is designed to intercept and destroy enemy aircraft before ship or shore target can be attacked.

The missile is powered by a high thrust, liquid fuel, rocket motor. Added momentum for launching is supplied by a twin-rocket booster assembly which separates early in flight. It is operated by remote automatic control from land or shipboard stations. Performance and guidance features are secret.

America's first supersonic self-launched rocket, the Convair MX-774, built for the Air Force and tested at White Sands Proving Ground, N. M., was announced in 1949. The rocket is potentially capable of attaining altitudes of more than 100 miles and speeds far in excess of the velocity of sound.

### Curtiss-Wright Corporation

Curtiss-Wright celebrated the year by claiming two revolutionary "firsts" in the control of flight and a trio of anniversaries—the twentieth for the present corporation, the thirtieth for Wright Aeronautical Corporation, the fortieth for Curtiss airplane companies.

First of the firsts was the reversible pitch propeller, which came out of development stages into full production during the year. Designed to act as a brake both in the air and on the ground, the propeller is playing an increasingly important role, especially in the transport field.

Less known to the general public, but of rivalling importance in the advancement of flying, is the Electronic Flight Simulator, which resembles in every detail the cockpit of an airplane and simulates all flight conditions, including movement, sound, vibration, and the actual "feel" of the controls. Without leaving the ground, entire flight crews can be trained at a fraction of previous cost. The Simulator can train four times the number of pilots in the same time. Since as much as a year often elapses before new planes on order are delivered, the Simulator can save hundreds of thousands of dollars by pre-training. Pan American now uses the Simulator to train Boeing Stratocruiser crews. The Air Force has made a bulk order for the trainers, and the Navy recently doubled the size of its order.

These two devices are practical developments resulting from Curtiss-Wright plane, propeller, engine, rocket and guided missile research. The propeller division alone is now working on approximately forty experimental and development contracts, with some thirty more proposed or pending.

Research covers almost every imaginable aspect of aviation progress, now or in the distant future. Preliminary tests are being run on a new series of rocket engines toward perfecting completely integrated rocket power plants. One of these units, on the top secret list, will power the Air Force's supersonic X-2. A new research laboratory was completed during the year and is now in full operation developing pilotless aircraft components. For the Navy, the corporation is producing a jet-propelled, radio-controlled target plane. In the engine field, one of the priority projects is concentrating on turbo-jets and turbo-props. Another laboratory for basic research in ram jets is nearing completion. In the field of contemporary planes, the corporation has its giant CW-32 Skyway Truck beyond the mock-up stage.

Beyond the developmental stage is the Wright Turbo-Cyclone "compound" engine. Named the Turbo-Cyclone 18, it is in production under a $32 million Navy contract, a substantial portion of which will be spent on the new engine. The Curtiss-Wright engine division is also making components for turbo-jet engines and flight testing an experimental turbo-prop engine, the Wright T-35 Typhoon.

On the production and work-a-day front, activities are concentrated for the most part on production of the Cyclone 18 reciprocal engine, 2,500 horsepower power plant on over 30 leading airlines, notably those flying Constellations. Curtiss-Wright's engine division also is producing seven, nine and eighteen cylinder Cyclones for military and commercial planes. The airplane division also has a large contract to overhaul Army and Navy transports, and during 1949 made 10,000 droppable fuel tanks for the Air Force. Another order for the tanks is a 1950 backlog.

The propeller division, largest commercial and military propeller producer in the world, was kept busy during the year producing three- and four-blade hollow steel props for the military and the latest civilian transports, among them the Boeing Stratocruiser, the Convair 240, the Douglas DC-6, and the Lockheed Constellation. The 19-foot hollow steel propellers on the Air Force's Consolidated B-36—largest aircraft propeller in production in the world—is another Curtiss-Wright product. The corporation is also backlogged on a $15.6 million order for props for the Boeing B-50.

Three non-aviation Curtiss-Wright subsidiaries—the Victor Animatograph Corporation, Marquette Metal Products Company, and L.G.S. Spring Clutch Corporation—reported a successful year manufacturing a score of products, including 16 millimeter movie cameras and projectors, textile spindles, fuel injectors, windshield wipers, and industrial clutches.

## Douglas Aircraft Company, Inc.

Douglas Aircraft Company started production of three modern aircraft derived from the basic design of planes providing the bulk of transport in the Berlin Airlift.

They were the four-engined C-124 Globemaster II, developed from the C-74 Globemaster; the DC-6A cargo transport, a second evolutionary development of the C-54 Skymaster type; and the Super DC-3, modernized version of the "workhorse" C-47 and DC-3 twin-engine transport.

Production was started also on the F3D, a new twin-jet all-weather Navy fighter.

In addition to these new types, Douglas continued production of DC-6 airliners for commercial operators, delivered its 500th airplane of the AD-


**Douglas Super DC-3**

Skyraider series to the U. S. Navy, and continued a number of classified research and development projects on super-speed aircraft and missiles.

Designed to fulfill requirements of "strategic" aircraft support and supply, the C-124 has a gross weight of 175,000 pounds. Although this is two and one-half times greater than the C-54s used in the Berlin Lift, the new military transport will be able to operate from fields of the same length required for the World War II transport. The 50,000-pound payload Globemaster II is intended for long range transportation of heavy and bulky objects as well as general cargo and personnel.

Most noteworthy feature is a built-in nose ramp through which heavy military vehicles may be loaded and unloaded under their own power. Completion of the first production model was scheduled originally for December, 1949, but was ahead of this schedule as we went to press.

For commercial operators, Douglas introduced the DC-6A Liftmaster, cargo version of its deluxe passenger airliner. Five feet longer than the basic DC-6, the Liftmaster has 5,000 cubic feet of cargo space in its pressurized and air-conditioned cabin. Gross weight is 100,000 pounds, permitting 28,800 pounds of payload in civil use. Production tooling was completed when the prototype was successfully test-flown late in September. Although designed specifically for air freight carriers, the DC-6A is available also as a 318-360 mile-an-hour military transport.

Suitable either for commercial or military transport of personnel or cargo, also, is the Super DC-3, or Super C-47, produced by modernizing the sturdy DC-3, including new power plants.

Completely new in conception and design, the F3D Skyknight is a powerful, high-speed fighter in production for the Navy. Although the two-place combat aircraft was designed for operation from aircraft carriers primarily as a fighter, it is good for attack, long-range patrol or reconnaissance and long-range escort missions.

The cockpit of the twin-jet plane is pressurized and provided with temperature controls for heating or cooling.

A post-war production milestone reached by the company during 1949 was the delivery of the 500th unit of the AD-Skyraider series attack plane to the U. S. Navy. It was an AD-3, third modification of the Skyraider series which has been in production since the end of World War II. Fourth in the series, the AD-4 was in production during the final quarter of the year. One of the most versatile combat aircraft ever designed, Skyraiders are produced in twenty-two variations for specialized tactical uses. Skyraiders are powered by a single, reciprocating engine and have rectangular dive brakes on the bottom and sides of the fuselage. A variety of armament may be slung under the folding wings.

On May 16, the Navy permitted announcement of the first flight of the needle-nosed, swept-wing Douglas D-558-2 Skyrocket. This was believed to be the first successful flight of any aircraft with a combination of jet and rocket power. The plane's top speed is a military secret, but on Nov. 22, the Navy announced that it had exceeded the speed of sound at sea level so often that "supersonic speeds are a matter of routine." The plane was first put through the sonic barrier by Gene May, Douglas test pilot.

In the still more classified field of missile research, Douglas participated in the manufacture and design of the Navy Aerobee, which figured in a number of public announcements during the year. Douglas also designed, manufactured and participated in the firing of the WAC Corporal rocket, which set both an altitude and speed record when fired from the nose of a V-2 in flight. A number of other missile research and development projects at Douglas still are on the secret list.

More than two years of research bore fruit in mid-1949 when a nonflammable type hydraulic fluid developed by Douglas Aircraft Company and manufactured by Monsanto Chemical Company was accepted by the Civil Aeronautics Administration for use in the hydraulic systems of Douglas transports. The first transport ever to fly with the new fluid, known as Skydrol, was the prototype Super DC-3. Any purchaser may obtain these aircraft equipped with gaskets, packing material and other components especially engineered for use with Skydrol. Similar changes are available now, for the first time, for other Douglas transports.

In addition to the obvious safety value of the fire-resistant synthetic fluid, it has been proved to extend the service life of pumps, valves and other moving parts because of its greater lubricity.

An anniversary important to the progress of aviation, and particularly to Douglas, was observed on September 24 by the company in conjunction with high military, state, civic and aviation officials. It was the Silver Jubilee observance of the first round-the-world voyage by pilots of the U. S. Army

Air Service flying Douglas World Cruisers. (See Chapter on Historic Planes.)

Accelerated commercial plane sales and prospects, in addition to military business, made the outlook for Douglas extremely favorable as the year drew to a close. Reorders from five DC-6 operators pushed sales of that transport in less than three years to 161. Firm orders and current negotiations for additional aircraft indicate that the DC-6 line will continue to move at a steady rate throughout 1950.

Prospects appear bright, also, for production of the DC-6A cargo plane and for a large volume of Super DC-3 conversions. Employment fluctuated between 14,800 and 18,500 during the year.

**Fairchild C-119 Packet**

## Fairchild Engine and Airplane Corporation

Top Fairchild news for the year was organizational and came on July 7, when control of the corporation changed hands following a proxy vote of some 13,000 stockholders in favor of a new slate of directors. Less than a week later, on July 13, a new board of directors elected Richard S. Boutelle president of the corporation, with James A. Allis as chairman of the board.

A number of economy and efficiency changes followed. The corporation closed its New York offices Sept. 1. All corporation administrative functions were moved to Hagerstown, Md. In October, the new board also authorized the purchase of lands and buildings occupied by Ranger Engines, Al-Fin, Stratos, and Pilotless Planes divisions, at Farmingdale, L. I., N. Y., for $1,125,000 from the War Assets Administration.

In the aircraft field, Fairchild's story for 1949 was one of continuing progress on its current production models and major steps forward into new design fields.

The year was marked by increasing production of C-119 Fairchild Packets, and further development of the C-120 Pack Plane and the T-31 basic military trainer.

First production model of the Fairchild track landing gear, first of eighteen C-82 installations in production at the time, was delivered to the Air Force on Mar. 16. The track gear was developed under a contract with the Air Materiel Command. Thirteen complete track gear installations were made during the year.

The Fairchild T-31 training airplane has been very much in the military procurement spotlight since Mar. 1949. The T-31 is a low wing, all metal, single-engine monoplane. Basically, it is a version of the XNQ, originally designed for the Navy. Built for maximum safety and minimum operational cost, the two-place, all-metal aircraft would provide for both primary and basic training of Air Force and Naval Aviation cadets.

The U. S. Air Force accepted the first production model Fairchild C-119 Packet on Apr. 29. This latest airplane in the Flying Boxcar line succeeds 220 C-82's previously delivered to the Air Force. By the end of the year, Fairchild held contracts with the Air Force for a total of 197 C-119's. Eight of these airplanes, designated R4Q, are scheduled for delivery to the Navy.

Successor to the C-82, the C-119 has ample space for a payload of more than ten tons. It is capable of accommodating 42 fully-equipped combat troops as well as 20 paracans of supplies suspended from an overhead monorail. If used as an ambulance plane, the C-119 could transport 36 litter patients with attendants.

Five C-82's flew the Berlin Airlift during the year, and they made additional news during last winter's "Operation Haylift" by shuttling hay and feed to thousands of starving cattle and sheep isolated on Western ranges by heavy snow.

Fairchild is producing an experimental model of the C-120 Pack Plane for the U. S. Air Force under a development contract. Able to fly with or without its "pack," the C-120 will embody many radical new features. The "pack" will be interchangeable and completely equipped for use as field hospitals, photo intelligence units, GCA units, field command headquarters, repair shops, or radio shacks.

In the engine field, Fairchild's Ranger division worked on major component parts of the J-47 turbojet engine under subcontract to General Electric, research and development for the Air Materiel Command, and the development and production of power units for guided missiles under a U. S. Navy contract. In addition, the Ranger division produced spare parts for an auxiliary engine and small quantities of airframe parts for other aircraft manufacturers.

The Stratos corporation, a wholly-owned Fairchild subsidiary, developed mechanical superchargers and turbine designs. Orders totalling well over half a million dollars for Stratos cabin superchargers to air-condition the entire fleet of American Airlines Convair Flagships was announced in October, with others in prospect.

Operating under a Navy development contract for guided missiles, Fairchild made technical progress on guided missiles during 1949 to fulfill the demands of modern military tactics. It was announced during the year that the Air Force is purchasing, through the Navy, Fairchild Larks, ship-to-air guided missiles, which are to be used specifically for training the first guided missile group of the Air Force.

As primary contractor to the Air Force on the NEPA (Nuclear Energy for the Propulsion of Aircraft) project, Fairchild is well along on its research and development program to develop an atomic powered engine for aircraft. (See Chapter on Government and Aviation.)

Fairchild's Al-Fin division patented process for the molecular bonding of aluminum to steel was adapted to an increasingly wide variety of industrial and consumer products during the year. The process was licensed to a number of companies manufacturing diesel engine pistons, timing gears, bearings, housings, dynamic brakes, brake drums, kitchen cooking utensils and many other products where heat transfer and weight are paramount.

## General Electric Company

General Electric's accomplishments in the aviation and allied fields during the year were many and varied, ranging from new type aircraft ignition and electrical systems for commercial use to defense projects with top priority.

Much of the G-E story carries a classified label and can be told only in outline. It includes development and production of aircraft gas turbines, the first successful firing of a two-step rocket which set new altitude and speed records of 250 miles and 5,000 miles per hour at White Sands, N. M., and basic research.

General Electric's J-47 turbojet, the most powerful aircraft gas turbine being produced in this country, rolled to the Air Force in ever-increasing numbers. To step up production, a new assembly plant was opened at Lockland, O., in February to augment the output at Lynn and Everett, Mass. The engine, which in 1948 powered the North American F-86 to a new world's speed record of 670.981 miles an hour, was selected by the Air Force this year as the powerplant for the B-45, the XF-91 and the

B-47. Four J-47's also are being installed in wing "pods" on the B-36 to augment the huge plane's six piston engines.

The Lockland plant, in which engines are assembled from components supplied by about 120 subcontractors throughout the nation, was hailed at its opening as a tribute to the long-range plan of the Armed Forces to foster and develop emergency production facilities in time of peace.

Meanwhile, development of the J-47, rated at 5,200 pounds' thrust, continued at a fast pace. This has led to improved performance. Water injection has been added to provide increased take-off power. New engineering features were developed to make the J-47 the nation's first "all weather" jet engine, capable of operating successfully under icing conditions. Heated parts at the nose protect the engine from ice and these features, including heated inlet guide vanes, fairings and forward frame struts, will be incorporated in production engines.

Design improvements in compressor and turbine have accounted for greater power without any increase in fuel consumption or the size of the engine.

General Electric disclosed during the year that even more powerful engines are in the design stage.

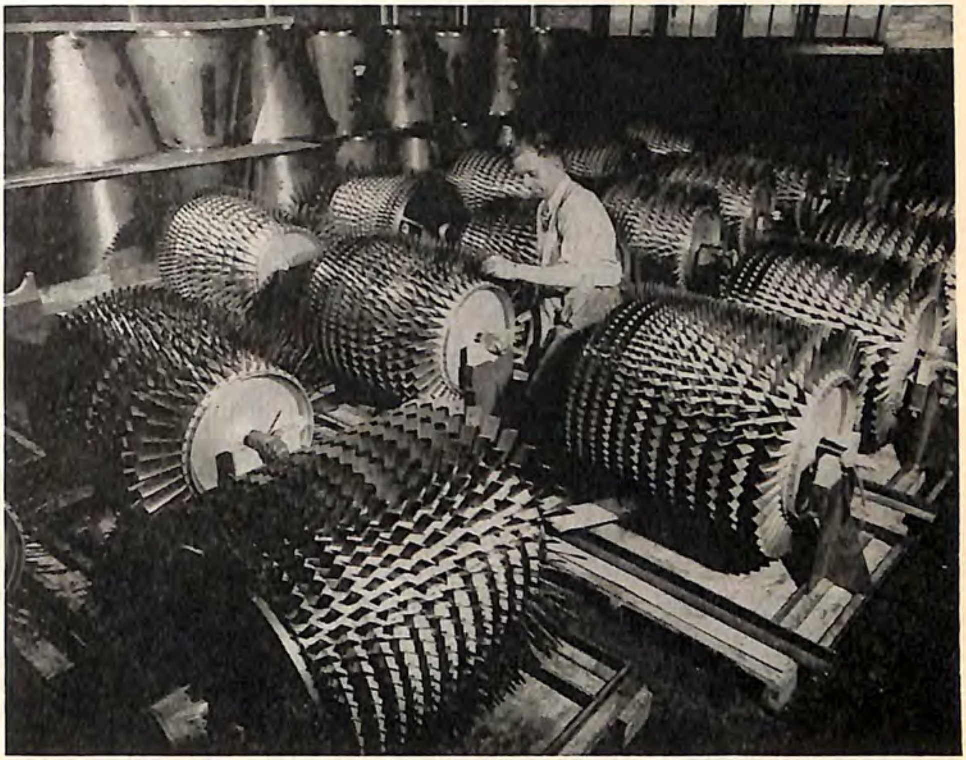
The J-47 (TG-190) is a greatly advanced development of the J-35 (TG-180), which was also designed and developed by General Electric. The J-47 entered the design stage in March, 1946, and went to test in June, 1947. The first flight of the engine was made 11 months later, May 20, 1948, in a North American F-86.

General Electric-built J-35 engines, immediate predecessor of the J-47, powered the XB-47 which in February set a transcontinental record of three hours and 46 minutes. More than 25 percent additional power for the "Stratojet" will be achieved through installation of J-47 engines in production models.

The year marked the successful introduction of an exhaust gas-driven turbosupercharger to the field of commercial airline operation. The Boeing Stratocruiser uses four Pratt & Whitney R-4360 engines. Each engine is equipped with a single General Electric Type BH-4 turbosupercharger. This turbosupercharger, consisting essentially of an air compressor and a turbine which is driven by exhaust gases from the engine, is providing reliable operating experience that may be applied to turbojet applications to the commercial field in the future.

General Electric BH-1 turbosuperchargers are used in parallel with each of the six Pratt & Whitney R-4360 engines on the B-36. They enable the engines to maintain adequate power at altitude, in addition to pressurizing the airplane cabin.

During 1949, the cooperative project between General Electric and Pratt & Whitney on advanced piston engine turbosupercharger cycles continued with the further development of the VDT (Variable Discharge Turbosupercharger) powerplant. G-E developed the type CHM-2 turbosuper-



**General Electric Compressor Rotors for Jets**

charger and variable discharge nozzle to supply full-engine manifold pressures.

In rocket research, General Electric played an important part in the Feb. 24 launching of the first successful two-step rocket at White Sands. As contractor for the Army Ordnance Department, General Electric supervised the firing of the rocket as well as the rebuilt V-2's launched during the year.

The two-step rocket consisted of a German V-2, rebuilt in this country, and an American WAC Corporal. The 250-mile altitude reached was more than twice the previous record of 114 miles reached by a V-2, and the speed was nearly half again greater than the previous mark of 3,500 mph, also established by a V-2. The WAC Corporal, attached to the nose of the V-2, was expelled from the "mother" rocket by remote control at an altitude of 20 miles. It continued upward and at the peak of the flight was outside the earth's atmosphere for all practical purposes.

The transmitter division of the company's Electronics Department announced, in June, a new radio communication unit for private airplanes which features not only the usual low frequency transmitter but also a VHF transmitter with six channels. According to G-E engineers, when one signal fails to establish contract due to atmospheric disturbances, topographic interference or similar hindrances, the signal from the other transmitter has a good chance of getting through.

General Electric also started manufacture of an airport surveillance radar system which will be installed in CAA airport control towers at twenty-seven fields—twenty-two in this country, one in Hawaii and four in Alaska. Delivery will start in 1950 and the first installation is expected in August. This system will give traffic controllers a complete picture of all airplanes within approximately thirty miles regardless of weather conditions.

Even fluorescent lamps began sprouting wings during the year, when several commercial airlines introduced the tubes of light in their new transport planes.

Special G-E circuits made possible the extension of fluorescent lighting to air transportation. Most of the Boeing Stratocruisers, for instance, will use thirty fluorescent lamps.

General Electric also developed special sealed-beam type lamps to guide pilots using the "slope line" approach in poor visibility. The slope line approach lighting system, designed by the Civil Aeronautics Administration, speeds the transition from instrument to contact flying after breaking through an overcast within 3,000 feet of a runway. The special all-glass lamps developed by G-E for the system are the same size and shape as standard automobile sealed beam headlamps but have twice the candlepower. Approximately 600 lamps are used on each approach.

A number of other G-E developments progressed during the year, especially in the instrument and power generation field. These include gas gauges, a new lightweight tachometer generator, a twenty-eight-volt generator control system, circuit breakers, generator and generator-control components, a new low-tension, high-frequency breakerless type ignition system, and an energizer for starting jet engines.

## Lockheed Aircraft Corporation

Announcement of two new fighter aircraft and the sale of forty-one Constellations to major world airlines featured the activities of Lockheed Aircraft Corporation during 1949.

Six lines came to Lockheed for Constellations, either as the start of new fleets or to add to fleets currently in operation. In this country, Chicago and Southern Air Lines, Inc., and Capital Airlines, Inc., both announced plans for Constellation service, while overseas South African Airways ordered four new-type Constellations for service next year. In addition, Trans World Airlines, KLM Royal Dutch Airlines and Air France added to their current fleets.

This increase in Constellation sales brings the total backlog of orders held by the Burbank company to approximately $225,000,000, largest backlog of unfilled orders to be reported by the firm since 1945.

Two startling new military aircraft were announced by Lockheed during 1949, a ghostly, swept-wing fighter, the F-90, and the radar-eyed F-94 night fighter, latest version of the famed F-80 Shooting Star.

The F-90, announced last spring by the U. S. Air Force as the newest jet penetration fighter, is a swift, hard-hitting slugger, designed to fly and fight deep within enemy territory, shooting up targets of opportunity in the air and on the ground. A single-seat fighter, the F-90 uses two Westinghouse axial-flow jet engines to attain high speeds and maximum range.

Even more interesting in some respects is the F-94, newest USAF night fighter. Based on the F-80, with fuselage lengthened to accommodate a radar operator as well as a pilot, the F-94 can find potential enemy aircraft at night or in the thickest weather, shooting him down with radar-directed guns.

The year 1949 proved to be another profitable year for Lockheed, with the company declaring four dividends, bringing stockholder payments to a

**Lockheed XF-90**

total of $2 per share for the year, although indications were that the year's profit would decline somewhat from the 1948 figure of $6,239,380.

Employment by Lockheed and its three wholly owned subsidiaries increased slightly to a year-end total of approximately 18,000. Lockheed subsidiaries are Lockheed Air Terminal, Inc., Lockheed Aircraft Service, Inc., and Airquipment Company.

Among the milestones passed during this year was the certification of the Constellation by the Civil Aeronautics Administration in compliance with the stringent requirements of the International Civil Aviation Organization, the first time any airplane has been so licensed.

Citizens of the South, East and Middlewest were given a chance to see their airborne Navy in action when Lockheed's giant Constitution, on a nationwide recruiting tour, visited nineteen cities in that area. Earlier in the year, the first Constitution was duly commissioned as a fleet unit in formal ceremonies conducted at Alameda Naval Air Station near San Francisco.

An interesting innovation in employee relations was begun by Lockheed during the spring of 1949 when free Constellation rides during working hours were offered to all Lockheed employees. Under a contract with Trans World Airlines, every man and woman at Lockheed will have an opportunity to ride in one of the 300-mile-an-hour transports they help to build.

## The Glenn L. Martin Company

The Glenn L. Martin Company celebrated its fortieth anniversary in 1949 by adding a number of "firsts" to its list, now totaling more than thirty, including the first bomber ever built (1913), first experimental night mail plane (1922), first bomber with an air-cooled engine (1926), and first six-jet bomber, the XB-48.

This year Martin flew its XB-51, the Air Force's first post-war plane specifically designed to destroy surface targets in cooperation with the Army ground forces, and USAF's first three-jet craft.

Glenn L. Martin became chairman of the company's board during the year, announcing that C. C. Pearson, a veteran aviation executive, had succeeded him as president and general manager of the company.

Scores of projects, most of them secret, were under development by Martin in the field of rockets, radio-controlled pilotless planes, and other new jet designs.

One of the newest and most radical designs in the Air Force's jet collection, the XB-51, made its first flight Oct. 28 with O. E. (Pat) Tibbs, Martin's director of flight, soloing at the controls. Two of its three engines, General Electric J-47's, are mounted on pylons on the lower forward sides of the fuselage. The third is carried internally in the rear of the fuselage. Each engine produces 5,200 pounds of thrust.

An unusual feature of the XB-51 is the location of its horizontal stabilizer, mounted T-shape atop the vertical stabilizer and fin in order to be as clear as possible from turbulence created by wing flow and forward engines. The plane can be flown by a two-man crew—pilot and radio operator-navigator. Wings, with a 55-foot span, are swept back at an angle of 35 degrees. No indication of the ultimate speed was released by the Air Force at the time of the first flight, and many of the plane's radical features are classified.

Another Martin plane that figured in the news was the XP5M-1, a new twin-engine patrol flying boat designed for the Navy. The plane was used especially to evaluate a new type hull expected to improve materially the hydrodynamic performance of flying boats.

In October, the Martin company was awarded a bronze "Oscar" for having had the best annual report in the aircraft industry for the previous year.

Mr. Martin revealed in July, 1949, that the company's consolidated net sales for the first six months of the year were $23,032,953, compared with $26,688,328 for the first half of '48. Net income for the first six months of 1949 before special adjustments was $976,974, compared with a net loss of $719,034 for the six months ended June 30, 1948. Special adjustments of $2,178,111, resulting primarily from increases in the amount of renegotiation reserve for 1945, made a net decrease in earned surplus for the first six months, 1949, of $1,201,137.

### McDonnell Aircraft Corporation

The McDonnell Aircraft Corporation, on July 6, 1949, completed its first ten years as a major aircraft manufacturer.

The anniversary was marked by expansion of the company's post-war program, which has included the Phantom, first all-jet Navy carrier-based fighter, and the Navy-Marine Banshee, world's first service-type fighter with an initial rate of climb of 9,000 feet per minute. The company also developed for the Navy the 5-ton XHJD-1, world's first twin-engine helicopter; for the Air Force, Little Henry, world's first ram-jet helicopter; the XF-85, world's first jet parasite fighter; and the XF-88, first penetration twin-jet fighter to be flight-tested by the Air Force.

The company started fiscal 1949 on July 1, 1948, with production line well underway on the largest order for jet fighters in its history. The order totaled 235 twin-jet Banshees for the Navy.

Shortly after fiscal 1949 got underway pay increases totaling over a million dollars for the year were granted employees of the company. The increase amounted to an hourly pay boost of ten cents and was granted to both hourly and salaried employees.

At the beginning of the year also, a west coast detachment of McDonnell was established at Muroc Air Force Base, Muroc, Cal., for extensive flight testing of the XF-85 jet parasite fighter and the XF-88 twin-jet penetration fighter. The Muroc program is under the supervision of J. Harvey Gray.

McDonnell, always active in the development of guided missiles, shortly before the beginning of fiscal 1949 set up a separate division of the company to handle this function, with Wiley P. Montgomery as manager. Later during the year the division took over research operations on propulsion units also.

As McDonnell experimental and production activity broadened in scope the company began to increase research and test facilities. One such major acquisition was a one-sixth interest in the Southern California cooperative wind tunnel at Pasadena. Other participating companies include Douglas Aircraft Company, Lockheed Aircraft Corporation, North American Aviation, Inc., and Consolidated Vultee Aircraft Corp.

First flight of the XF-85 parasite fighter was made at Muroc on August 23. Piloted by Edwin F. Schoch, the XF-85 completed successful launchings and hook-ons.

On Sept. 17, 1948, the sleek, XF-88 penetration fighter was officially unveiled by General Muir S. Fairchild at a west coast Air Force Day dinner. The twin-jet fighter has been flight-tested by both McDonnell and the Air Force. Robert M. Edholm, chief test pilot at McDonnell, flew the XF-88 in all company test phases.

In October, 1948, McDonnell was awarded first place by the National Safety Council as being the aircraft plant with the lowest accident rate in the country. This was the second successive year that this award was received.

A Banshee Service School was established by McDonnell early in 1949 to train picked Navy and Marine students in the operational maintenance of the F2H-1 and F2H-2 Banshees.

During the annual winter maneuvers of the Atlantic Fleet in the Caribbean, FH-1 Phantoms played an important role. A dramatic incident of the war games came when a Marine Phantom of VMF-122 was forced down in a jungle of the Dominican Republic and was "rescued" by use of JATO.

Little Henry, Air Force ram-jet helicopter, went on an aerial tour during April to make flight demonstrations at Wright Field and at Fort Bragg, performing for top military, scientific and government personnel. Charles H. Hurkamp, helicopter chief engineer at McDonnell, is in charge of engineering development of Little Henry as well as for the giant XHJD-1.

In May the F2H-1 Banshee was taken aboard the aircraft carrier *Franklin D. Roosevelt* for carrier trials at sea. The twin-jet fighter showed excellent handling characteristics and wave-off control.

**McDonnell F2H-1 Banshees Ready for Delivery to Navy**

McDonnell put a retirement income plan into effect during May. Adopted by popular vote of almost 95 percent of McDonnell personnel, the plan provides for retirement with pay for employees over the age of 65. The company pays approximately two-thirds of the total cost of the plan; the employee pays one-third by weekly payroll deduction.

On June 26 McDonnell held a Tenth Anniversary Open House celebration which was attended by over 40,000 visitors, and in the same month an agreement was signed between McDonnell and representatives of District Nine of the International Association of Machinists, principal union bargaining unit. The contract was effective July 4 and extends until November 1, 1950.

Shortly after the start of fiscal 1950 (July 1, 1949), important changes were made in McDonnell's top management. Don R. Berlin, formerly vice-president in charge of engineering and contracts, was appointed executive vice-president. C. Warren Drake, formerly administrative vice-president, was appointed vice-president in charge of manufacturing. Kendall Perkins, formerly assistant to Don R. Berlin, was appointed manager of engineering. Those reporting to Perkins include: the airplane chief engineer, helicopter chief engineer and manager of guided missile and propulsion engineering.

The company found itself in rather healthy financial shape at the year's close. For its first nine years and eleven months of operations, beginning on July 6, 1939, through May 31, 1949, work performed totaled $129,330,-370; payroll was $77,520,789; and earnings after income taxes, $3,749,154. Employment now totals over 6,500.

## North American Aviation, Inc.

Entry into atomic energy research and completion of the largest supersonic wind tunnel in the aircraft industry highlighted North American Aviation's technological advance in 1949. Successful flight of the new Air Force T-28 trainer also was a featured event during the year.

While atomic scientists and aerodynamicists were probing into fields formerly foreign to aviation men, North American Aviation's production lines continued to turn out the world's fastest airplane, the F-86 Sabre; the Air Force's first multi-jet bomber, the B-45 Tornado; and the Navy's largest attack airplane, the AJ-1.

First flight of the NATIV, North American guided missile, was announced early in the year by the Air Force after four successful firings were made at remote Holloman Air Force Base in New Mexico.

Two years developing, the NATIV was designed as a test vehicle for aerodynamic research and to gain first-hand experience in supersonic missiles. Radar and telemetering devices for relaying 32 types of information to the ground were carried on each flight. Intricate cameras, which took pictures at the rate of five times per second, followed the NATIV ten miles up in the sky.

Information telemetered to the ground included measurements of missile attitude, altitude, air speed, angle of attack, and operating conditions throughout the propulsion system, including fuel and air pressures, deflections of control surfaces and accelerations.

The NATIV is powered by a liquid fuel rocket motor, has a long, sharp needle nose and four movable control fins. Weighing 1,267 pounds, it was fired from a 125-foot launching tower.

Pushing the never-ending research and development for greater speeds in military aircraft, North American this year completed the second of two supersonic wind tunnels to be built in three years at the Los Angeles plant.

The tunnel, largest operated in this country by an aircraft company, has a 16 x 16 inch test section in which air speeds more than five times faster

**"We believe . . ."**

In line with the growing social consciousness of American business, how does aircraft management reason its place in the national order of things?

We believe in healthy competition on the basis of design, quality, price, delivery, and service. Competition is the first of the conditions that we consider essential to the proper functioning of the aircraft industry.

We believe that adequate incentives are necessary for those aircraft companies which excel in the specified areas of competition, and particularly in the design category. The primary incentive must be profit at a high enough level so that the best engineering and manufacturing resources are constantly brought to bear on the problem, with adequate capital to sustain them.

We believe that the aircraft industry can operate more effectively and at lower cost under the condition of a relatively stabilized total market. Annual juggling of procurement budgets is antithetical to such stability and should be supplanted insofar as possible by establishment of a carefully planned long-range program subject to annual review and adjustment by the Congress. This stabilization of the industry's total market need not in any way work against the competitive function among individual companies within the industry, and indeed will strengthen it by offering more assurance of continuity for the companies which can excel their competitors.

We believe that the aircraft industry should be permitted to operate as a free industry rather than as a Government bureau.

In other words, we believe that the nation's aircraft can be bought most inexpensively and with greatest assurance concerning quality from an industry which is permitted to function pretty much like any other American industry.

For every man there is a deep satisfaction in doing well that which he does best. Those of us who have devoted our lives to the complex and challenging task of designing and building airplanes feel that craftsman's pride rather keenly. Over and above this inherent satisfaction, we have the challenge of national survival today and the hope of vastly expanded peaceful applications tomorrow. Our credo is simple. We believe in aviation as the cornerstone of our security in today's troubled world. We believe in aviation as a principal medium for world commerce and understanding tomorrow.

—J. L. Atwood, President
North American Aviation, Inc.

than sound can be created. Here North American engineers can test rocket and airplane models for speeds over 4,000 mph.

The huge 38-foot vacuum chamber, now a landmark to travelers arriving at the Los Angeles International Airport, can be evacuated to a 99.8 percent complete vacuum and can withstand 12 million pounds' pressure on its outside surface. Other major units of the tunnel include a dry air storage chamber and air drying equipment, the test building which contains the actual tunnel, and the pump and pump buildings.

In March, the Atomic Energy Commission announced the award of a contract to North American Aviation for research and development in the general field of nuclear reactor technology, with particular emphasis on practical application of atomic power. North American's work in this field is coordinated with the AEC National Laboratories throughout the country and other contractors engaged in the development of atomic power.

The company's program involves the study of nuclear power plants as well as nuclear reactor design, and includes a preliminary study of a low-power nuclear reactor that should be a useful tool for research groups throughout the nation.

It is believed that this work at North American Aviation may possibly yield further by-product developments in such widely diversified fields as medicine, biology, agriculture and industrial processes.

Another big step into basic research was taken when North American announced it was building a new $50,000 laboratory to help solve specialized problems encountered in guided missile flight.

The laboratory will be the only one of its kind in the Los Angeles area where study of extreme high altitude, "G" loads, vibration, extremes of heat, cold and humidity, and gyro mechanisms can be concentrated. To simulate a missile in flight, the new facility will have a test chamber with a temperature range from minus 76 to plus 180 degrees Fahrenheit. It can be evacuated to simulate atmospheric pressures found at 100,000 feet altitude.

Early design phase cooperation among designers, engineers and production men paid off as the first T-28 rolled out the door four weeks ahead of schedule. An actual production model, the first plane was complete except for partial electrical and hydraulic equipment. It was quickly shipped to Wright-Patterson Air Force Base aboard a C-82 Packet to undergo static testing.

A few weeks later the second trainer was taken for a forty-five-minute maiden hop by North American test pilot Jean (Skip) Ziegler.

The T-28 was designed to train pilots for the advanced high speed fighters and bombers now in service with the Air Force.

A few months after the first production AJ-1 rolled out the door to flight test, Admiral Louis E. Denfeld, Chief of Naval Operations, officially announced that the twin-engined, jet-boosted attack airplane was the first Navy plane specifically designed to carry the atom bomb.

The Navy's largest and fastest carrier-based attack airplane, the AJ-1 is powered by two conventional Pratt-Whitney Double Wasp engines and a General Electric-Allison turbojet.

Greater power and all-around performance was added to the B-45 Tornado bomber when the General Electric J-47 (TG-190) jet engine was substituted for the J-35 (TG-180). The four jets of the B-45 now develop 20,000 pounds' thrust. The torpedo-shaped J-47 has approximately the same frame size as the earlier powerplant, and is substantially the same weight. It is the same power plant used in the F-86 fighter.

North American also announced a 1950 model of the T-6 which completely modernizes the wartime trainer. Retaining the basic structure of the Six, the new model incorporates about fifty changes to meet present-day training requirements.

Among the most important changes is the addition of a square-tipped propeller which reduces noise 63 percent without affecting the flying efficiency of the airplane; single-pane enclosure windows on the sides of the canopy; metal-covered aileron, elevator and rudder surfaces to reduce maintenance; relocated antenna and pitot mast, and an F-51 Mustang type steerable tail wheel.

North American and the Canadian government announced details of a licensing agreement in which the F-86 Sabre will be manufactured by Canadair, Ltd., for the Royal Canadian Air Force. The Canadian government awarded Canadair a $30 million contract to build 100 Sabres. First delivery is expected to be made to the RCAF by the end of 1950.

Other business with foreign governments included contracts with the Chilean, Venezuelan, and Siamese governments for re-manufactured T-6's. Under the re-manufacturing program, old wartime trainers are completely stripped down and then rebuilt with new parts wherever needed.

On the world's speed fronts, North American aircraft continued to rack up impressive firsts. Major Frank K. Everest flew an F-86 from Dayton, O., to Washington, D. C., in thirty-three minutes and three seconds at an average speed of 710 miles per hour to unofficially crack the world's speed record of 670 mph already held by an F-86.

The fastest closed course record in history was set in the jet division of the Thompson Trophy Race at the Cleveland Air Races when Capt. Bruce Cunningham of the Fourth Fighter Group swung his F-86 around the pylons at an average speed of 586.173 miles per hour.

In Alaska, a B-45 Tornado bomber hopped the 270 miles from Anchorage to Fairbanks at an average speed of 675 mph for another unofficial speed record.

Again making a clean sweep of the Bendix race, North American F-51's roared across the finish line one-two-three. Joe De Bona, the winner, clocked an average speed of 470 miles per hour in his blue Mustang to chop ten miles off the old record. It was the same airplane Joe earlier in the year had flown across the nation in five hours, five seconds for a new transcontinental record.

Two important aviation firsts were established by the 27th Fighter Wing when they took their North American F-82E Twin-Mustangs on a ten-day, 6,350 mile navigational flight across the Caribbean.

The flight marked the first time celestial navigation was used on fighter aircraft on a long-range flight and was the first time a fighter group has flown on an over-water mission without navigational escort.

The company reported an estimated net income of $5,195,044 after taxes for the period between October 1, 1948, and June 30, with total sales and other income reaching $93,300,583. Costs of sales and other expenses were $84,735,539 with provision of $3,370,000 for Federal income taxes.

Unfilled orders at June 30 were $238,012,667. Two dividends of 50 cents each per share were awarded on the 3,435,033 shares of the company's capital stock.

## Northrop Aircraft, Inc.

Northrop Aircraft, Inc., approached 1950 with its manufacturing and research activities at a peace-time peak.

Approximately 7,500 employes were engaged on two major manufacturing projects — production of Scorpion F-89 all-weather fighters and Raider C-125 light assault transports. In addition, a wide range of research projects, many of them of a secret nature, were in progress.

Early in the year, Northrop received an order for 48 Scorpion F-89 all-weather fighters, following outstanding performance of the experimental model.

Described as the modern successor to the Northrop Black Widow F-61 of World War II, the Scorpion is smaller but heavier. Equipped with electronic devices enabling it to penetrate darkness, fog and storms, the F-89 operates at speeds in the 600 mile-per-hour range. It is manned by a crew of two—pilot and radar observer.

By year's end, the F-89 production line was beginning to roll with practically all assembly tooling installed and in use. The first of the production versions are scheduled to be in flight by mid-1950.

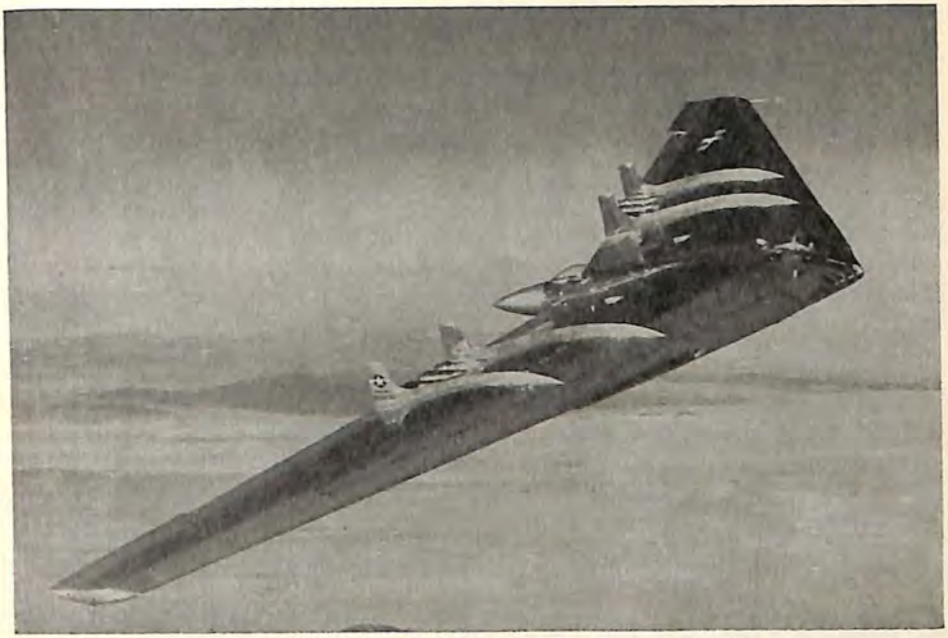
Northrop Raiders began to roll off the production line late in the year. The first of the rugged, three-engined transports made its initial flight on August 1 with Max Stanley, senior test pilot, at the controls.

The Air Force plans to use these versatile transports for Arctic rescue purposes and for assault landings. Three-engined dependability and unusually rugged construction enables them to operate with five-ton loads from rough, unimproved landing strips, A large ramp door at the rear of the fuselage provides straightaway loading of vehicles and heavy bulk cargo. Since the airplane will be expected to operate for extended periods in remote or advanced areas, many features providing ease of maintenance have been included.

Much interest has been displayed in the Raider as a commercial transport for "bush" and feeder-line operations. As a result, Northrop has licensed Canadair, Ltd., of Montreal, Canada, to build the Raider for the world market.

The Flying Wing YB-49 eight-jet bomber continued to demonstrate the performance gains attainable in the all-wing design. The 100-ton chevron-shaped bomber, one of the largest land planes ever built, on Feb. 9 flew across the continent from Muroc Air Force Base to Washington, D. C., in four hours and twenty-five minutes at an average speed of 511.2 mph.

The second of Northrop's tiny X-4 research airplanes was completed early in the year and joined the original model at Muroc Air Force Base for testing. Charles Tucker, Northrop test pilot, flew the X-4's for the company. One of the smallest airplanes ever built for the Air Force, the X-4 is intended to provide detailed data concerning flight conditions at high sub-sonic speeds. Unlike rocket-propelled sonic research aircraft, the X-4's are able to maintain flight at high speeds for sustained periods be-



**213,000 pound Northrop Flying Wing, YB-49**

cause they are powered by gas turbines. Elaborate NACA instrumentation is installed in the airplane for the accumulation of flight data.

Northrop continued its research in the guided missile field and has assigned several hundred technicians to this program. Rapid advances in missile research were recorded during the past year.

Northrop also is engaged in nuclear research and has completed preliminary studies on special radiation shielding for nuclear-powered aircraft. A new mathematical technique, called the "Monte Carlo" method, is being used by the company to evaluate radiation shielding in general.

Northrop recently became the first industrial organization in the United States to acquire one of the new high capacity electronic computers. The "Monte Carlo" process is particularly adapted to solution by use of this equipment. The new computer also has wide application in aircraft design problems.

The prosthesis laboratory at Northrop, operated on a non-profit basis as a service to the nation's amputees, recently completed development of a light-weight, heavy-duty artificial arm known as the "Northrop Simplex Arm." The design has been released for production by other manufacturers. None of the prosthetic devices developed by Northrop are manufactured by that company.

Early in 1949, Oliver P. Echols, formerly president of the Aircraft Industries Association, joined the Northrop organization as chairman of the board, succeeding Richard W. Millar, who had accepted the chairmanship on a temporary basis more than a year before. Mr. Echols, as the chief executive officer, also became general manager of Northrop.

From a financial standpoint, the 1948-49 fiscal year was one of the most difficult in the company's history. Operations for the twelve months ending July 31 resulted in a loss of $3,834,434.35.

This loss occurred after writing off funds spent in development of a three-engined commercial transport and included an estimated loss of $4.4 million on the fixed-price contract for production of C-125 assault transports. A further loss of approximately $2.6 million may be registered in subsequent periods unless expected orders for additional C-125 transports materialize.

### Piasecki Helicopter Corporation

Piasecki Helicopter Corporation, the first company in this country exclusively building helicopters (beginning August, 1940), had a good year in 1949, with promise of further expansion in 1950.

Chief symbol of the promise is the Piasecki Air Force-Navy XH-16. Contract to build it came after a competition in 1946, and its design is now well underway. The new design is hailed as the largest helicopter ever to be built, capable of carrying the biggest load with the longest range ever achieved by a rotary wing aircraft.

Comparable in size to the Douglas DC-4, the all-metal craft will have a radical innovation—a large, quickly-detachable capsule which will almost double the payload of this truck-and-trailer of the air. The capsule, about the size of a Greyhound bus, can be used as shelter at advanced or emergency bases or, completely equipped, be dropped as a ready-to-function radio, hospital, supply, or other type of unit. It is expected that two prototypes of the XH-16 will be ready before the end of 1950.

To the production level in the Piasecki plant during 1949 came the HRP-2, all-metal version of the familiar "Flying Banana"—Piasecki's HRP-1.

A junior version of the giant XH-16, the HRP-1 is already performing innumerable services on active duty with the Navy, Marines, and Coast Guard.

Also in production during '49 was the HUP-1 Retriever, another of the tandem-rotor models for which Piasecki has become famous.

A fleet of Piasecki helicopters were again stars at the National Air Races in Cleveland early in September, and demonstrations were made of the HRP-1 as an assault carrier lifting and flying a thirty-seven millimeter anti-tank gun, complete with crew.

**Republic F84-D's thunder over San Francisco**

### Republic Aviation Corporation

Although a number of secret projects were underway at Republic, only two were released for news coverage during the year—production of the F84-E Thunderjet, and first flights of the XF-91.

Deliveries of the F84-D were completed in April, when change-over was made to production of the F84-E. The E, powered by a jet engine with a 25 percent increase in thrust, has a greatly increased range, faster speeds and higher altitude performance. Production was accelerated during the fall and early winter, making deliveries for the last six months ahead of the first six.

The new E model Thunderjet was introduced to the public in June. It performed at a top speed of considerably more than 600 mph, its combat radius of action going to 850 miles with a fly-and-fight ceiling above 45,000 feet.

The E is powered by the Allison J-35A-17 engine, developing a dry thrust of 5,000 pounds, and representing a substantial increase in power over previous models, which developed 4,000 pounds thrust. Corresponding improvements have been made in armament loads, maintenance and servicing operations.

The plane is the one jet fighter in operational service with the Air Force which can carry combinations of HVAR rockets and bombs, ammunition for its six fixed .50-calibre machine guns, and two 230-gallon wing tip tanks. Up to 32 HVAR rockets have been fired in flight from a single F84-E.

More than 180 access doors have been provided on the E to provide for quick and easy maintenance.

First production planes of this model were delivered to the 31st Fighter Group, Turner Air Force Base, Albany, Ga. The Air Force has announced that this new fighter will see service in Germany in the late spring of 1950.

The new Thunderjet broke into the headlines on Sept. 3, when four of them set new speed records for the jet division in the Bendix cross-country race. Fastest speed for the 2,010-mile dash from Muroc to Cleveland was made by Major Vernon Ford of Middletown, Pa., who averaged 529.6 mph. He completed the flight in three hours, forty-five minutes and fifty-one seconds, including one stop for refueling. Previous jet record for the event was only 497.77 mph, made by Col. Leon W. Gray in 1946.

The XF-91 interceptor made its first test flight at Muroc late in the spring. The inteceptor is powered by a J-47 General Electric turbo-jet engine, producing 5,200 pounds of thrust, plus rocket motors for accelerated take-off and climb, and for operations at high altitudes. It is notable for swept-back wings tapering inversely. They appear wider at the tip than at the fuselage. The plane is forty-five feet long and has a wing span of about thirty feet.

By year-end, the high altitude interceptor had completed its Phase One experimental flight tests at Muroc, where two of the planes completed approximately thirty-five flights with company test pilots and crews in charge. Following spectacular results, it was turned over to the Air Force for Phase Two performance tests, to be flown by Maj. Richard Johnson, Air Materiel Command, holder of the world's official speed record.

Carl Bellinger, Republic's chief experimental test pilot, was at the controls for all but three of the Phase One tests, while Republic's Jack McGuyrt made the others. Bellinger and Republic's flight test crew described the Phase One tests as comparable to existing production fighter aircraft performance, despite that the XF-91 is larger and heavier than today's fighters and is being flown at limited power.

Before building flight models, Republic made a series of tests with scaled rocket models at the pilotless aircraft division of the National Advisory Committee for Aeronautics, as well as other tests at the Republiic plant. Result was that the plane was able to make its first flights with a wealth of research and testing knowledge already proved and available.

The high altitude interceptor was designed by Alexander Kartvelli, vice president in charge of engineering for Republic. Assisting him were R. G. Bowman, W. O'Donnell and C. E. Pappas, plus Republic's project engineer, Edwin Eddy.

Republic continued to devote its engineering research and design talent to other experimental work for the Air Force. During the year it completed studies and test flights on a flush-duct type F-84. This was an independent study carried on by Republic in cooperation with NACA. The new arrangement equalled or excelled performance of F-84's using the conventional type circular duct in the nose. Rate of climb was improved and the design helped provide more space for airborne radar.

The company is also working on other experiments in the fighter field, as well as certain classified Government experimental contracts.

Republic showed a six-month net income, after Federal and State income taxes, of $317,883. This amount is also after provision for contingency reserve of $120,000.

Net income included reimbursement of claims previously disallowed under cost-plus-fixed-fee contracts ended in previous years amounting to $301,680 after applicable Federal and State taxes.

Sales for the period totalled $17,779,302, and the backlog stood at $56,500,000. A sizable backlog was also indicated at the end of the year.

## Ryan Aeronautical Company

The past year brought important changes along the production lines of the Ryan Aeronautical Company at its San Diego plant, largely as a result of the country's switch to newer types of commercial and military aircraft, particularly jet-power planes, and the development of guided missiles. The metal products division of the organization, for the first time in the company's 27-year history, tooled up for high-volume production of jet engine components as well as somewhat smaller quantity manufacture of stainless steel parts for missiles, establishing the company firmly as one of the leaders in the fabrication of these products.

In addition to the new work the company took on for jet engines and rocket-powered pilotless aircraft, it continued its production of stainless exhaust manifolds for most of the major reciprocating engine planes in use commercially or by the military.

The production of the Ryan Navion, four-place, personal-business plane, continued as a dominant factor in the ariplane division, as was the building of 50 rear fuselage sections for the Boeing C-97 Stratofreighters and transport Stratocruisers, under a contract secured at the end of 1948.

The Experimental Department successfully completed the first of the Ryan XQ-2 pilotless target planes under a two million dollar Air Force contract of 1948 and results of preliminary evaluations were so satisfactory that an additional million dollar increase was ordered in August. Another experimental project on which Ryan had been working since 1948, the

Firebird air-to-air guided missile, was completed in late summer of 1949 after successful evaluation and testing by the Air Force.

Possibly the most unusual use to which the Navion was put during last year was as a flying laboratory for the testing of Aerojet Engineering Corporation's JATO Junior. The small, 50-pound rocket engine, little larger than a big thermos bottle, with one-fourth the power of the original JATO units used with military aircraft during the last war, gets the Aerojet Navion into the air at express elevator speeds. During tests held this year a JATO Junior-powered Navion was 184 feet in the air, 600 feet from the point it started its take-off, while a sister plane, using conventional power, was just getting off the runway, 500 feet from its starting point.

This smaller version of jet assisted take-off is currently undergoing service tests by the Army Field Forces and Army Ordnance. JATO Junior is not commercially available now, but should restrictions be relaxed, the Aerojet Corporation expects to make the rocket available to Navion and other personal-business plane owners.

Two years' work in guided missiles was climaxed with the flight testing this year of the rocket-propelled Firebird. It is virtually a fragmentation shell with human intelligence. Extremely small, fast, and difficult to track even on radar scopes, it is the Air Force's first air-to-air missile. It was designed by Ryan engineers to be as effective for night or inclement weather interception as in clear skies since visual sighting is not required. Launched from a "mother" jet fighter plane, it has all the speed first generated by the parent fighter, plus the added power of its own booster rocket and its flight rockets.

Because it is a pilotless projectile, it is capable of maneuvers beyond human endurance, making it extremely effective against piloted aircraft. Little more than half a foot in diameter, it is about ten feet long, and seven and one-half feet long after dropping its booster rocket.

Flight tests were made with the Firebird at Alamogordo, N. M. The "birds" were slung beneath the wings of a North American F-82 Twin Mustang fighter, two beneath each wing. During other tests, a Douglas B-26 served as the launch plane.

The project is still in the experimental phase. Although it is not planned to put the Firebird into production, the research and development work has provided the Air Force and industrial technicians with valuable engineering information which is being used in designing improved air-to-air missiles. Cost of the two-year development project was approximately two million dollars.

Biggest job the metal products division contracted was for major components of the General Electric J-47 engine, which powers such well-known planes as the F-86, B-45, B-47 and jet pods for the B-36. Ryan production got into full swing in March.

In July, work also began on the stainless tailpipe assemblies for the J-47 engines installed in the Boeing B-47 jet pods, mounted under the wings of the fast bomber. The contract has been increased since tooling up and production began on the original order.

Ryan completed the largest thermal jet engine tailpipe assembly ever built. It was designed specifically to carry off exhaust gases of the Wright Aeronautical Corporation's T-35 Typhoon gas turbine-propeller engine. The exhaust system proved exceptionally satisfactory in test flights made with the Typhoon mounted in the nose of a B-17.

Production figures were high during 1949 for the building of Ryan exhaust manifolds used on reciprocating engine planes. Large orders were placed during the year for collector systems on the Boeing B-50 as well as that company's C-97. Both the Douglas C-124 and C-74 cargo planes flew with Ryan exhaust stacks, and most of the planes on the Berlin Airlift were equipped with Ryan manifolds.

Fairchild C-82 and C-119B cargo carriers used Ryan collector sets, as did the large commercial airliners represented by Convair 240, Douglas DC-6, C-54 and C-47 and the Boeing 377.

The record-making Lockheed Neptunes used exhaust systems built by Ryan Aeronautical, as did the Piasecki HRP-1 helicopter. The Piasecki HUP-1 and the experimental HRP-2 also used the company's collector systems. For the Martin AM-1 Mauler the company produced a large quantity of exhaust systems as well as modifications for older types of military aircraft like the B-25 and AT-6.

Experimental exhaust stacks were built by Ryan for Pratt & Whitney and for the majority of airframe companies during the year.

Completed in late 1949 was a contract Ryan had with the Aerojet Engineering Corporation for an undisclosed number of assemblies for the Aerobee high altitude sounding rocket, capable of 3,000 mph. For the past two years the company has been building most of component assemblies for the pencil-thin rockets, for which Aerojet has furnished the propulsion unit and fuel tank. Beginning in September, the Air Force has been using the Aerobees for high-altitude study of cosmic rays, meteorology, radio characteristics and other unknown facts about the upper atmosphere. Scientific assistance and instruments are being supplied by some 15 colleges and research institutions which will help the Air Force technicians evaluate the information recorded during the two years of proposed testing.

In March, two Aerobees were fired from the deck of the *USS Norton Sound,* a Navy seaplane tender fitted especially for launching missiles at sea. Principal data gained at the time of these firings, to an altitude of 65 miles, concerned cosmic ray intensity.

The Aerobee was developed originally for the Navy's Bureau of Ordnance by Aerojet. Ryan received its contracts from Aerojet for the missile's nose section, the tail cone, booster and main rocket body fins, shrouds, fairings and other components.

For the first nine months of its fiscal year, Ryan sales were reported as \$10,678,249. During the same period in 1948, Ryan reported less than half that amount, a total of \$5,270,224.

**United Aircraft Corporation**

Two major achievements marked activities of United Aircraft Corporation during 1949.

One was the late-fall production of the 4,000 Wasp Major engine, world's most powerful aircraft piston powerplant, by the corporation's Pratt & Whitney Aircraft Division. Completion of the 4,000 brought to 14 million the total Wasp Major horsepower to leave the Pratt & Whitney factory. This one was for a pusher installation on a Consolidated-Vultee B-36.

Second was completion of the $12 million Andrew Willgoos Turbine laboratory at East Hartford, Conn. Finest jet lab to be built by an aircraft firm, the new research center will go into operation early in 1950. Windowless, six stories high, and 400 feet long, it will be the main unit for a jet development program in which Pratt & Whitney has spent $15 million in laboratories alone since the end of the war.

The Wasp Major engine was conceived in late 1940. The first one built (Old X-101) was first tested on April 28, 1941. Within four and a half months—after 172 hours of running time—X-101 was delivering 3,000 horsepower. Engineering development work is still continuing. An advanced model of the Wasp Major has passed an official 150-hour qualification test at considerably more than 4,000 horsepower.

Wasp Majors powered the Boeing B-50, *Lucky Lady II*, only plane to fly non-stop around the world. Others using Wasp Majors include Boeing Stratocruisers and Stratofreighters, the Douglas C-74 and C-124, the Lockheed Constitution, the Republic XR-12, Martin's AM-1 Mauler and P4M-1 Mercator, the Fairchild C-119, the twin-engine Hughes F-11, and Hughes' flying boat, the H-4 Hercules.

Speeding Wasp Major production during 1949 was a new method of test cell mounting and dismounting. Once requiring eight hours, the work is now reduced to an hour and a quarter. Since each of the big, four-row engines undergoes two test runs prior to shipment, and several men work on the mounting and dismounting, the saving in man-hours is substantial.

Both the complete preparation of the engine before delivery to the test cell and the use of quick mounting facilities are instrumental in cutting the mount and dismount time. The men who do the test cell and preparatory work are responsible for many of the ideas that have led to reducing engine test cell time. A recommendation by a foreman was a new hinged shroud attached to the test stand for testing the pusher type engines used in the B-36. This shroud is a large sheet metal cylinder which serves the same purpose as the cowling of an aircraft installation. It directs cooling air to the engine. Due to the awkwardness of the old type shroud it was difficult to handle and was subject to much handling damage. Besides, in the event work had to be done on the engine, the shroud was difficult to remove. The new hinged shroud eliminated handling damage and saved time.

**Tomorrow**

The promise of atomic power, the emergence of jet and rocket propulsion, the application of electronics to control of flight, the changing shape of metals and materials were already (at the end of World War II) outlining the greatly expanded field of future flight that lay within reach of these new scientific advances.

In the next ten years the development of these new power sources can advance both the form and effect of aviation farther than any progress we have achieved in nearly half a century's development to date. This is the challenge the aviation industry faces today.

—From An American Heritage,
Published by the Curtiss-Wright Corporation, 1949

Quick mounting of an engine for test is facilitated by the use of an overhead electrified monorail system to transport the engine from the preparation line into the test cell and to support it in position while it is being secured to the test stand; test stands designed for testing either tractor or pusher engines; toggle bolts for securing the engine; quick connectors for gauge, hydraulic, fuel and oil lines; retractable work platforms which allow easy access to all parts of the engine and propeller, and cooling ducts which can be quickly swung into place.

A new turbine laboratory was dedicated to the memory of the late Andrew Willgoos, chief engineer of Pratt & Whitney Aircraft for twenty-three years.

The saving of a large sum in the Willgoos Laboratory was accomplished chiefly through the purchase of the power generating equipment. Four boilers, built for navy cruisers, were on their way to a Philadelphia junkyard to be cut up for scrap after the war when the Pratt & Whitney Aircraft purchasers found them. The boilers were purchased at a small fraction of the cost of building new boilers. Six returned lend-lease destroyer escort vessels, declared war surplus, yielded similar discounts on twelve turbo-generator sets.

The new turbine laboratory has four test cells in which engines or engine components will be tried. The four boilers built for the Navy cruisers stand in line on the service floor near four of the turbo-generators from the war surplus destroyer escorts. Each of the four generators turn out 4,600 kilowatts each, a total of 18,400 kilowatts—enough to supply a city of 70,000 with light and power.

Through a steel pipe six feet in diameter and 190 feet long, the laboratory will take in 120,000 gallons of water a minute from the Connecticut River. The rate of flow is nine times greater than the normal consumption of Hartford. Warmed, but otherwise unchanged by its brief part in jet engine testing, the water will cascade back into the river through a concrete sluiceway. A 94-foot-high pump house at the river's edge will circulate the water.

The air used in the engines and engine parts has the noise strained out of it before it is sent outside the building. The exhaust gases pass through one of three underground silencing chambers. They are built of heavy concrete faced with a sound absorbing material. More of the remaining jet sound is lost in a labyrinth before the gas is passed into the outer air through slots set in concrete bunkers. The solid blank walls of the building were also designed to hold in the noises.

Boards of compressed glass fibers are used for silencing the air taken in and out of the building for ventilation. The vertical boards form a series of baffles which are set in the intake and exhaust labyrinths on the laboratory's roof.

At the south side of the laboratory is a tank farm with three tanks of 1,090 barrels each for jet fuels and five tanks of 18,000 barrels each to supply the heavy crude oil for the boiler fires of the entire Pratt & Whitney Aircraft plant. From the tanks a supply line runs to a river dock where seagoing barges can unload 17,000 barrels at a time into the fuel tanks.

# CHAPTER TWO

## Department of Defense

Military aviation in 1949—aside from the sound and fury of Washington—was outstanding for both accomplishment and development.

Certainly one of the greatest achievements of aviation's history was the Berlin Airlift, which ground to a halt on September 30.

Equally certain was the impact of the continued development of jet aircraft. In 1949 the newer type of jets proved themselves and forecast massive and radical changes in virtually every field of aircraft operation and utilization. Only in the field of cargo transports is there a void in development of jets.

The Air Force marked its second year of autonomy, and was slowly growing into its new uniform—blue shade 84—in which all airmen are to be clothed by September, 1950.

The Naval Air Arm placed jets aboard carriers, and in an operation given little recognition, even by the Navy itself, greatly assisted in stabilizing conditions in the Mediterranean without establishing a permanent base in the area. The Sixth Task Fleet, assigned to that area, operated with one fleet carrier, three or four cruisers and one and a half destroyer squadrons plus amphibious and auxiliary forces. On occasion this force was doubled for periods of a month or more while units were being relieved by ships from the Atlantic fleet.

New type planes for anti-submarine warfare were proceeding through the prototype and service test stages.

Another long-range element that attained some degree of focus during the year was that of guided missiles. The Air Force established its first operational guided missile squadron, in effect taking these missiles from the experimental category, while the Navy established its first guided missiles school. It was a small beginning, but its implications are already measurable.

The greatest peacetime problem was a basic one: Housing. It was particularly acute for the Air Force and was receiving concentrated attention in an effort to alleviate it.

Little-mentioned was another Air Force problem: maintenance and reconstruction of its bases, largely inherited from days of war-temporary or war-compromise construction. It promised to be an expensive undertaking, particularly in vital areas such as Alaska and in the more or less isolated bases better adapted to operations of the larger bombers and strategically located bases used by the fighter groups.

Personnel policies, integration of functions within the Department of Defense, and re-alignment of forces to meet budgetary limitations were among the more pressing administrative headaches that had to be solved both by the Air Force and the Navy.

Budget reductions imposed for the current fiscal year and planned reductions in the 1951 fiscal year starting July 1, 1950, forced cuts in both the Air Force and Naval Air Arms and supporting structures.

The Air Force had reached 60 groups in its build-up toward a 70-group force. One was a special Airlift group. The readjustments left the following group structure (not all completely activated):

| 1949 | Group Type | 1950 |
|---|---|---|
| 2 | Heavy Bomber* | 4 |
| 13 | Medium Bomber | 11 |
| 3 | Light Bomber | 1 |
| 22 | Day Fighter | 17 |
| 3 | All-weather Fighter | 3 |
| 4 | Tactical Reconnaissance | 1 |
| 4 | Strategic Reconnaissance | 5 |
| 9 | Troop Carrier | 6 |
| — | | — |
| 60 | | 48 |

(*It should be noted that the plane complement of heavy bomber groups has been increased from 18 to 30. This increase will follow activation of all four groups and their equipment with 18. Only three had been activated at the end of 1949. New production orders indicated that the fourth would be activated and maintained even under the adjusted budget.)

The Navy has announced that it will mothball two Essex carriers and three light carriers as well as supporting vessels to bring its air arm within limitations. In operation on July 1, 1950 are scheduled to be three Midway class heavy carriers, three Essex class, four Independence class light carriers and four jeep carriers. The Far Eastern situation might revise this program.

It was disclosed that appropriated and released funds will permit purchase of approximately 1,000 planes, although indications were that additional fund releases would bring the total to 1,300, perhaps a few more, by the Air Force, while the Navy will be able to order somewhere between 600 and 800 planes with its appropriations.

Another adjustment that had to be made was in balancing forces of the

Tactical Air Command, USAF, with requirements of the Army Field Forces within the limitations of available finances.

It cannot be said that any of these problems had been completely settled—they are primarily outstanding because of their long-range nature.

On the other hand, not a few problems of short range character were ironed smooth during the year. Operational efficiency of individual units continued to climb from the demobilization-hysteria low of 1946-47. Operational efficiency, although classified, can be said to have increased more than 35 percent over 1948 by the end of 1949.

This increase in efficiency is particularly true in operational jet fighter squadrons.

The volume of sheer work poured on the operating units of both the Air Force and the Naval Air Arm continued at levels seldom before seen in peacetime, with maneuvers extending from points as far away as England and Japan occupying men and officers in almost constant operations. When it is considered that staging for these maneuvers proceeds over a period of months it can be said that there was hardly a gap during the year in which all forces were not engaged in some form of active service condition.

### The Airlift

On June 26, 1948, West Berlin became an island surrounded by Russian-controlled land. By September 30, 1949, the USAF had delivered 1,783,826 tons of supplies onto this island. Of this tonnage perhaps one-third was food, the balance being raw materials needed to keep the factories of West Berlin operating at minimal levels and coal necessary to sustain this industry and to provide the chill minimum of fuel for the two and three quarter million residents of the West Berlin areas. The British, with their own Operation Vittles named with English neatness of language, Operation Plainfare, delivered 538,416 tons. The American planes alone amassed 591,347 flying hours in the 15 months of operations.

But no cold figures can tell the enthralling story of achievement, of improvisation, of heroism and stamina strung across the 20-mile corridors stretching from the West German fields—notably, Rhein-Main—into Tempelhof, Gatow and Tegel airfields in West Berlin. They cannot tell the implications for national policy, both today and in years to come, that stem directly from the undertaking of the Airlift.

Genesis of the Airlift was on June 24, 1948, when all surface transportation with the exception of the waterways was barred by the Russians. Water transport soon was shut off. On June 25th two B-17 courier planes flew in ten tons of food and medical supplies, and the following day General Lucius D. Clay ordered the USAF European Command to establish an airlift. Twenty five Douglas C-47's flew that day. The next day, June 27, crews and planes were leaving bases around the world—from Ladd Field, Alaska, from the Canal Zone, and from the Far East—for the concentrated airline being set up across less than 300 miles of Germany.

That was in the beginning. At its peak, the Military Air Transport Service had marshalled from its own routes and from other USAF and Navy units some 319 Douglas C-54's, of which 225 were kept in active service over the vital corridors. In addition, to lug in heavy equipment that could not be loaded into C-54's, five Fairchild C-82 Packets were in regular service. One Boeing YC-97 was put in service for operational test purposes. The RAF operated 121 aircraft—60 of them the faithful C-47's, most of the balance converted four-engined bombers.

Several weeks after the start of Vittles, and barely a month after organization of MATS, the USAF called upon MATS to add its support in airlifting vital supplies into beleaguered Berlin. At the same time USAF requested MATS to establish an airlift task force headquarters in Germany to operate under the Air Force commander in Europe. To head the airlift task force MATS chose Maj. Gen. William H. Tunner, Deputy Commander for Air Transport, and well-known as the commander of ATC's war-time air support of China over the Hump. General Tunner took to Germany a substantial segment of the transport staff from MATS headquarters.

Meanwhile, MATS had sent to Germany an initial complement of 72 C-54's (Douglas Skymaster) and 2,500 personnel to assist in organizing the airlift task force. Later an additional 73 C-54's were dispatched. Two MATS Navy Squadrons, VR-6 and VR-8, were included in this increment. Transport aircraft diverted from other USAF commands raised the total number of four-engine transports to 319. Nineteen of these were utilized in a pilot and air crew replacement training program at Great Falls Air Force Base, Mont. Seventy-five C-54's usually were required in the maintenance pipe line and the remaining 225 were utilized at all times in Europe for the airlift task force.

The Berlin Airlift thus received from MATS approximately 70 percent of the C-54 aircraft and 62 percent of its assigned Navy R5D (C-54) aircraft. While MATS was thus participating in the strategic air support, it also continued to fulfill its assigned transport mission, although on a curtailed basis in some areas.

The Berlin Airlift underscored the strategic support capable of being delivered at a moment's notice by an integrated air route command. Said Maj. Gen. Laurence S. Kuter, MATS commander, on this subject at the height of the Airlift:

"In a military sense, Operation 'Vittles' is graphically demonstrating two salient facts—the vital importance of strategic air transport, the sustained, round-the-clock mass movement of cargo by air; and the importance and feasibility of unification such as MATS typifies. Air Force and Navy personnel and planes of MATS operating under a single system, are accomplishing a job that would be impossible if each employed different methods of training, operations and maintenance.

"Operationally speaking, and of likely interest to the air carrier indus-

**Airlift planes left Rhein Main AFB like clockwork**

try, 'Vittles' has demonstrated the desirability—rather, necessity—for large transport aircraft, and the added productivity and efficiency of cycled reconditioning in maintaining aircraft in sustained mass operation."

Many lessons were learned. As a proving ground, the Berlin Airlift could not be bettered. More than 3,000 GCA landings a month were made in several periods. Maj. Gen. Tunner and his MATS staff completely departed from normal air traffic control methods and in good weather landed a plane every three minutes at each of the three available airfields. In bad weather—and it was 70 percent bad in winter—the time per plane landed climbed to perhaps five minutes. There was no "stacking" such as is commonplace in the United States. Planes went out from the Western Germany fields and climbed at a religiously-followed pace of 400 to 500 feet per minute at 155 mph to an assigned cruising altitude on a predetermined heading, then cruising at this altitude at 170 mph indicated. This system permitted increase in flight schedules to three-minute intervals with 500 feet vertical separation—always at 2,000 feet, 2,500 feet or 3,000 feet. There was no missed approached procedure other than "gear and flaps up" and out the center, or westbound, corridor back to home base. Yet there was only one mid-air collision, that in the early days. And as many as three C-54's would be under GCA control at one time on final approach. Only one modern-type GCA was in service late in the Airlift.

There was nothing more than normal American airways radio equipment, and only a single micro-wave early warning unit giving indications more than 100 miles away. The safety record compared well with domestic scheduled air carriers in the same period and was better than the safety record of the USAF as a whole. The major answer was rigorous air discipline, meticulously enforced.

Ground time other than for maintenance was limited to less than 50 minutes—if it was longer someone got chewed. Some 325,040 gallons of gasoline a day had to be fed into the Airlift planes in addition to the tons of supplies.

Back of the Airlift was an organization flying 600,000 pounds of maintenance equipment a month into the area. Douglas C-74 Globemasters, normally assigned to the Caribbean area, were used in the support operation, together with C-54's being ferried back to the Airlift after 1,000-hour checks in the United States. For high speed personnel and hospital evacuation service across the North Atlantic, a fleet of Lockheed C-121 Constellations was in service. As noted, two of the MATS squadrons were Navy units, others were Troop Carrier units from Tactical Air Command, while a few isolated C-54's were pulled from other units.

Beyond that, back of the Airlift was something else that can only be described as inimitably and indubitably the American youngster. Perhaps some of the pilots were desk-jockeying oldsters yanked out to do a job, but they were just as much youngsters as the kids from transition school. It was the kind of spirit that led to the "Candy Lift," started by pilots dropping goodies of one kind and another to German kids who, no different from our own youngsters, loved to watch the planes coming and going from the safe vantage point of surrounding fences. It was the kind of spirit that led the USAF European Command and MATS to call in help from those best able to provide technical assistance in a hurry and to get it in a hurry and without question and often without credit—the Civil Aeronautics Administration men, for example, who went in to set up airways and air navigation facilities and to operate them until MATS could take over. CAA men later found, somewhat to their amazement, that the necessities of the Airlift had forced some of their highly-vaunted and tested procedures out in favor of procedures that could be utilized under conditions of rigid air-discipline.

There was something of this same American touch in the coffee and doughnut wagons that visited planes in their hardstands during the quick turn-arounds so that crews wouldn't miss the relaxation they'd been done out of by the speed of refueling, off-loading and loading. And in the feature of these wagons reported with great glee by the *New Yorker* magazine—a mobile trash receptacle.

There was some ingeniousness, too, in the 8,000 tons a day flown into the city. The normal surface transport of 15,000 tons didn't reflect the actual comparison in calories flown in, since the Airlift staff substituted lighter weight and small bulk material wherever possible: dehydrated potatoes instead of fresh; dried milk, dehydrated vegetables, etc. Not as tasty, but just as filling.

Personnel involved in the Airlift shaped up roughly as follows: 12,000 USAF personnel in direct Airlift operation; 800 U. S. Navy personnel; 2,000 men of the U. S. Army Airlift Support Unit, who directed about 50,000 Germans and DP's in cargo loading and other support operations; 1,000 USAF personnel assigned at Burtonwood in England, where 200-hour checks of the Airlift planes were made.

The cost can only be estimated—it was close to three hundred million dollars. Thirty service personnel were killed.

It was, in peacetime, a major military victory won by air power.

## Jet

In jet aircraft came the greatest development during 1949. It became evident as operational experience was gained that the word "jet" would be welded into virtually every military compartment, whether strategic, tactical, interception, ground support, penetration, logistics or production.

As with any relatively new aircraft, the military services are constantly experimenting to determine the operational characteristics, logistic requirements and the strategic and tactical flexibility of their jet aircraft.

Until 1949, the jet was largely a plane with tremendous advantages in speed; until 1949 it had, by and large, complications in high fuel consumption, maintenance, combat loads and limited operational techniques. The pioneer jet types were being used to determine the methods of combatting these problems and complications, to work out new tactics and techniques of use possible with the new speeds, new types of gun platform and bomb arrangements and new maneuverability attainable.

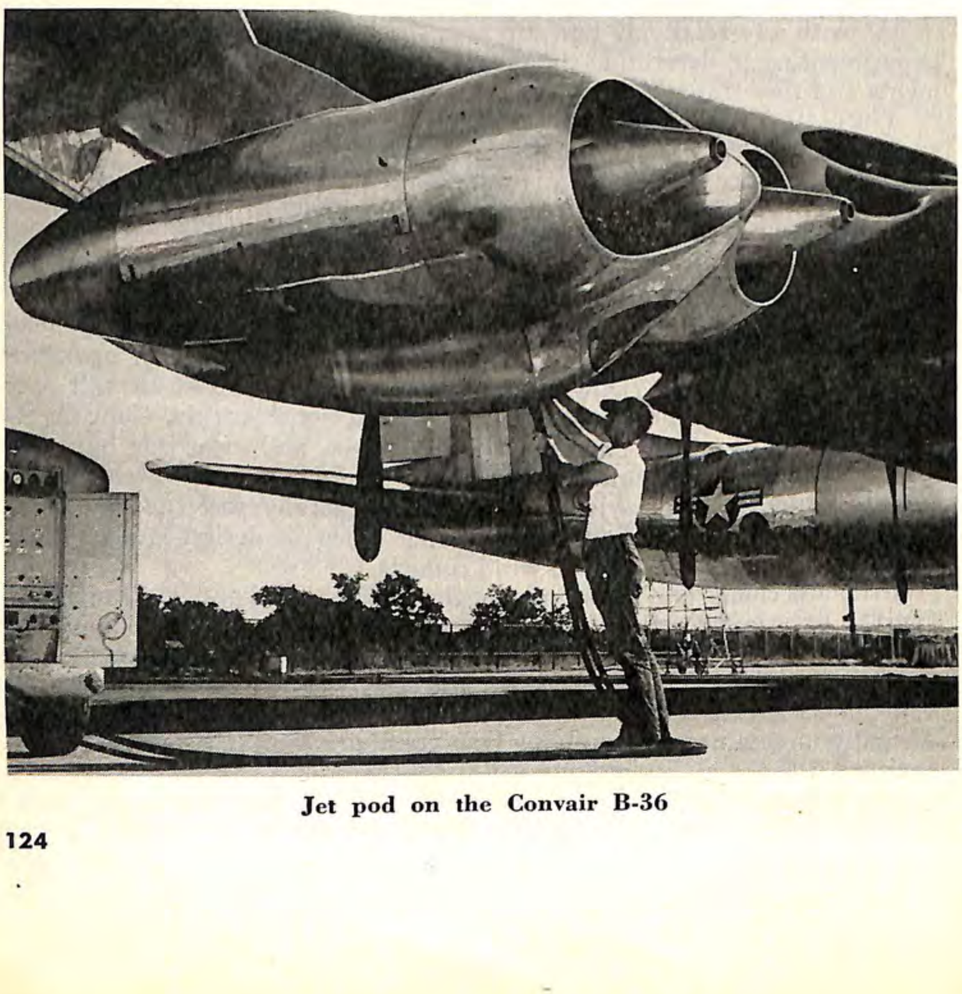
In 1949, with many of these experimental and developmental problems behind, the newer types of jet aircraft proved themselves in operational units and forecast vast changes to be made in every field of aircraft operation and use. The Air Force disclosed that it considers the Convair B-36 the last of conventional-engined heavy bombers, and even this huge plane was modified to carry four jet engines in addition to its six conventional types. Behind it the heavies of the future, generally patterned on lines of the jet bombers now flying, were moving along in design studies and on the drawing boards and in the wind tunnels.

Announcement late in the year of the Allison T-38 and T-40 turbo-prop engines presaged a number of disclosures of new American engines with wide implications for future aircraft design. These axial-flow engines were developed under Navy sponsorship, and the T-40 will be used in the Convair XP5Y flying boat to attain speeds of close to 400 miles an hour—virtually undreamed of in a flying boat configuration. It is a safe prediction that the Allisons and others not yet announced, but of turbo-prop type, will power transport aircraft within the very near future. They may also be said to end threatened British domination of this field.

The cargo and personnel transport field is the one which the jet had not invaded in 1949. It was by year-end under study by every transport manufacturer. Experimental models in the next design cycle unquestionably will be built with jet or turbo-prop engines. Newer transports currently in production will probably be converted at least to experimental use of jets or turbo-props, possibly flying by the end of 1950.

Jets almost literally flashed into the headlines early in 1949 when a Boeing XB-47 Stratojet medium bomber left Moses Lake Air Force Base in the state of Washington on the morning of February 8 and three hours and 46 minutes later touched down at Andrews AFB outside of Washington, D.C. It had averaged 607 mph on the long trip. The B-47 is comparable in size and bombload to the B-29 and B-50.

The following day, the Northrop XB-49 Flying Wing heavy bomber cruised across country from Muroc AFB in California's desert country to Washington, D. C. in 4 hours and 25 minutes, at an average speed of 511 mph.



**Jet pod on the Convair B-36**

Slightly less dramatic to the general public was the May flight of 11 USAF Lockheed F-80B Shooting Star fighters and four TF-80C's from Selfridge AFB in Michigan to Germany as replacements for the 36th Fighter Group at Furstenfeldbruck. It was the second such flight, a previous mission of 16 planes having been flown in 1948. The difference was that the 1948 flight was an operational test of the F-80 jets, while the 1949 flight was virtually a routine replacement flight. Later in the year, two Republic F-84 Thunderjets were flown to England for tests of air refueling techniques. Even more dramatic mass flights may be anticipated.

These flights of jet fighters, indicating the feasibility of mass movements to England or the Continent in the event of a future emergency, would automatically wipe out requirements for the hundreds of cargo ships needed to ferry fighter replacements to England during World War II. Newly posed were problems of spares and other logistic changes on the ferrying routes. It also meant readjustment of strategic and tactical mobility schedules, with intercontinental transfers possible within days rather than weeks. It meant some dramatic adjustments of war plans around the world.

The most striking addition to operational jet aircraft in 1949 was firepower for use in ground support and other tactical operations. One jet fighter, the Republic F-84E, was proved out carrying 32 five-inch high velocity aircraft rockets in addition to its normal complement of six .50 caliber machine guns. In doing this, one fighter packed the firepower of a cruiser or several batteries of field artillery. Utilizing the planes of a fighter group in this manner would attain for aircraft the rate of fire possible from these surface units, with added advantage of stability as a gun platform and ability to fire at targets brought into sight.

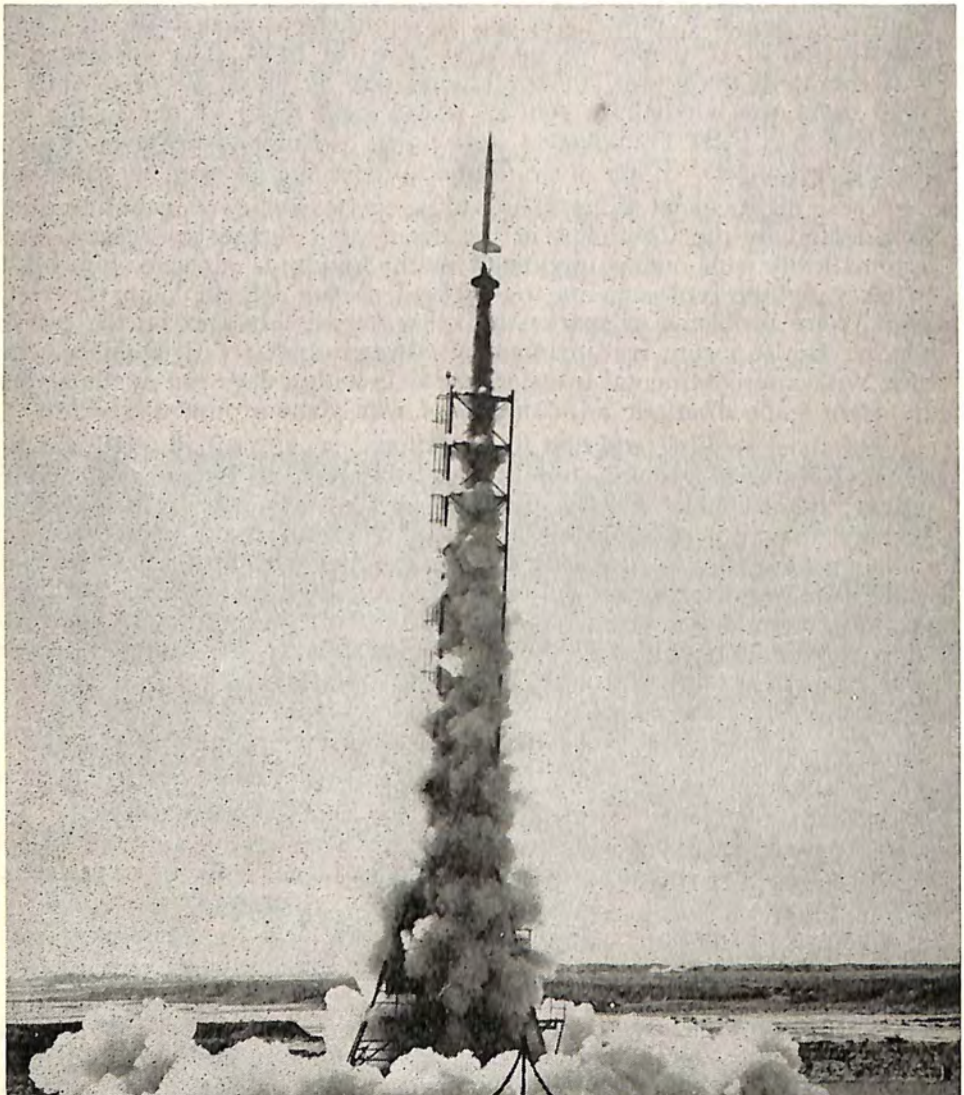
### Guided Missiles

Probably the most highly classified of all military projects were the guided missiles under development by the three Armed Services. Few have been cleared for publication, although there were indications of considerable activity and informed groups talked guardedly of experimental operations.

Perhaps the most revealing disclosure of the year was announcement of the organization of the first Guided Missiles squadron by the Air Force. Attached to the 550th Guided Missiles Wing, it is an operational unit rather than an experimental unit—and its training indicated that it would be used as cadre for further training of other officers and men.

The Navy continued experimental work at Point Mugu, Cal., the Air Force at the Holloman Air Forces Base at Alamogordo, N. M.

Congress in May approved establishment of a Joint Long-Range proving ground—with a 3,000-mile range—at Banana River, Fla. It will be under executive control of the USAF and is expected to be in operation for extensive tests by July 1, 1951. Limited experiments may be made




**An AF Aerobee rocket leaves its launching cradle**

there before that date, and development of observation stations in the Bahama Islands will proceed simultaneously.

From the offensive standpoint informed opinion leads to the belief that the development of air-to-ground missiles will loom larger and larger in military thinking under the assumption that true intercontinental missiles are years away, if they ever are fully developed. It is felt that the greatest offensive use of missiles will be in such vehicles launched from heavy-bomber-type aircraft perhaps a hundred miles from the target area. It is pointed out that it would be virtually impossible to set up ground defenses against this type of attack, since it could be launched from any point on the perimeter of the target area against selected targets within a several hundred mile area.

Air-to-air missiles, especially the homing variety, are particularly important with the advent of speedy jet aircraft, swinging the pendulum back in favor of defensive fighters. While they may prove equally valuable to a jet bomber in defense infighting, many difficult problems remain to be worked out, primarily the basic one of proper deflection launching into the slipstream, as opposed to the relatively simple problem of a fighter firing dead ahead at a target it is approaching.

Ground-to-air missiles and ground-to-ground missiles have had the greatest attention because of the German experience with V-1 and V-2 missiles and because this country took over quantities of these weapons at the end of the war, together with many of the German scientists responsible for their development. They have been improved upon in this country, and stemming from the research with these devices have been American types of far-advanced design, about which considerable will be heard in the next few years.

The Navy also conducted experiments in launching of both high-altitude missiles and high-altitude balloons, sending the converted jeep carrier USS *Norton Sound* off the west coast of South America for tests during which three Aerobee missiles were fired. Loon and Lark missiles also were successfully used from the *Norton Sound* and submarines were tested in firings of the V-1 type missile.

### Airborne Troops

Two of the five divisions in the mobile striking force of Army Field Forces are airborne units. They are the 82nd and 11th Airborne Divisions. Two others are infantry regiments, partly air-transportable, one other an armored division. Some are not at full strength, but the 82nd is rated as combat-ready at all times. General J. Lawton Collins, Army Chief of Staff, told the House Armed Services Committee on October 20 that "the 82nd Airborne Division is ready to fight anywhere, at any time, RIGHT NOW."

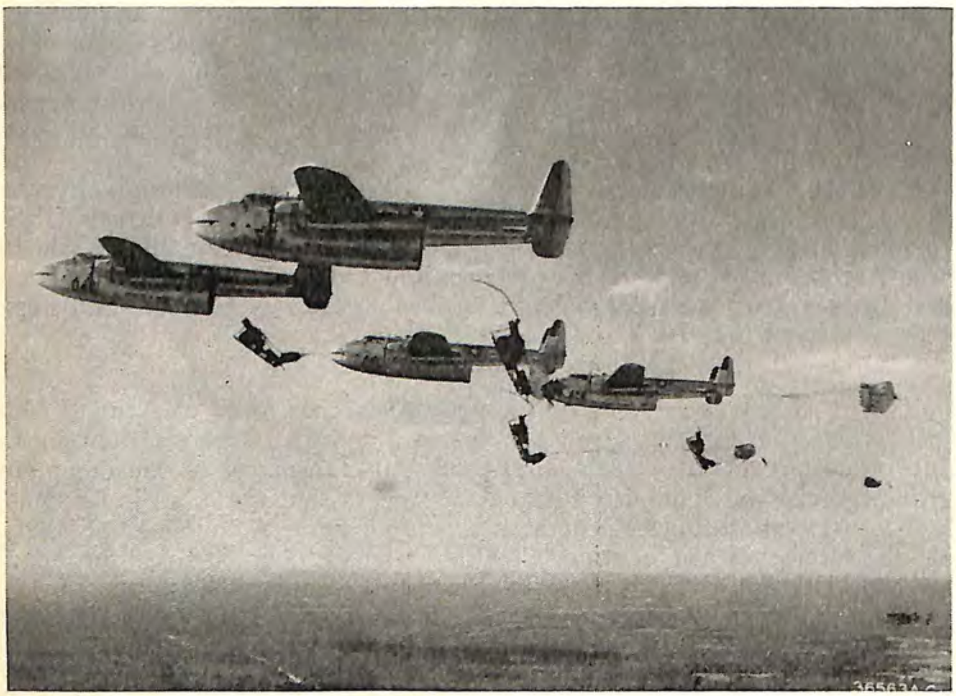
This alignment of active troops indicates the weight given airborne units in current U. S. Army thinking, and furnishes a groundwork for a too little understood phase of the total aviation potential of the United States.

The two divisions are fully trained and equipped airborne units, approximating 17,500 men (4,500 more than World War II airborne divisions), with personnel trained in both parachute and glider landing techniques. Each division includes three infantry regiments, two medium tank battalions (not now air-transportable), one 155-mm howitzer battalion, one reconnaissance company and one antiaircraft artillery automatic weapons battalion plus service units. A battery of fully assembled 105-mm howitzers were publicly parachuted for the first time on maneuvers in October. Single unit drops had been made earlier in the year.

But aside from the purely parachute and glider units, special courses are given in virtually all Army instruction designed to make all units air-transportable. This instruction extends to loading and unloading, lashing of equipment for flight, flight procedures for lower echelon troops and officers; and to planning, logistics and other phases for higher-ranking officers.

Another factor entering into this Air Force-Army relationship lies in antiaircraft operations. The fire power of the normal infantry division has been increased 68 percent over the World War II division.

Of four field exercises scheduled in late 1949 and early 1950, three involve use of airborne or air-transported troops.



**105 mm howitzers leave Fairchild C-82's**

The problem of air-ground coordination received detailed study and operational tests. The Air Force and Army established, late in 1949, a joint group at Fort Bragg, N. C., to work on the development of tactical doctrine of airborne and close support operations, development of equipment and other phases of this work.

Largely disregarded in the Washington controversy over strategic bombing is the fact that 28 groups of the 48 group Air Force could be utilized for ground support, and that in the 58 group Air Force 38 groups could fulfill this same mission. These groups might be termed dual purpose, partly available for air defense and partly for ground support. Concentration on fighter-bombers is even heavier than it was in the closing days of World War II, when the Ninth Air Force had 46 groups of tactical craft available for support of the 12th Army Group with its up to 30 divisions engaged in combat. Virtually all of this class aircraft today is concentrated in the 17 fighter groups of the Air Force, with only one light bomber group in the program. Tactical Air Command thinking today leans toward use of bombers of the B-29 and B-50 class in tactical operations when needed—11 groups can be drawn upon if needed.

There are six troop carrier groups assigned by the Air Force primarily for Army cooperation duties although they can be utilized in a variety of roles—such as during the Berlin Airlift.

## Naval Aviation

In 1949, a reorganization of the Office of Deputy Chief of Naval Operations for Air concentrated all planning functions within one unit, including materiel, aircraft, bases, and ships. Greater emphasis was placed on air logistics and better provisions for coordinating naval aviation with other phases of naval operations were made. A closer union between the Fleet and Washington was established by the formation of an Air Board, which included with DCNO(Air) and ACNO(Air), the Chief of the Bureau of Aeronautics, Commander Air Force, Atlantic Fleet, and Commander Air Force, Pacific Fleet.

During the year, Naval aviation was in process of sharp cutbacks, which fiscal 1950 appropriations indicated will be continued—down to as little as one-half the present operating establishment.

The final months of 1948 made it apparent that earlier estimates for expansion authorized by Congress had been optimistic. When President Truman placed a ceiling on aircraft, it became obvious that the budget of the National Military Establishment would not support the expansion planned. A July, 1948, plan for 10,700 operating and 3,080 supporting aircraft was first pared down to 8,183 operating aircraft—6,000 regular and 2,183 reserve—and 2,894 supporting aircraft. A second adjustment reduced the total to 10,483 planes—7,765 operating and 2,718 support—a figure being reached at the end of the fiscal year.

**Carriers kept the peace in the Mediterranean**

In June 1949, exclusive of aircraft awaiting disposition and experimental types, the distribution of naval aircraft was as follows:

| Operating* | *Planes* | *Airships* |
|---|---|---|
| Regular—Fleet, Combat (in fighter, attack and patrol units) | 2,258 | 10 |
| Fleet, Combat Support (utility, transport, and service units) | 1,109 | 0 |
| Shore Establishments (at Naval Air Bases, in Training Command, Research Development and Engineering, and misc.) | 2,223 | 7 |
| Naval Air Reserve | 2,142 | 2 |
| Non-operational Support Units (overhaul, repair, modification and pools) | 4,813 | 14 |
| In Storage | 1,511 | 27 |
| TOTAL | 14,056 | 60 |

*Includes 1,212 Combat First Line Aircraft.

Plans for expanding naval aviation were paralleled by a planned expansion of the aviation shore establishment calling for reactivation of nine continental stations, three for the Naval Air Reserve.

Plans were revised before action could be completed. An executive order imposed lower operating ceilings and the budget approved by the Secretary of Defense did not support the contemplated expansion. New strategic emphasis required a shift in strength from the Pacific to the Atlantic, and largely balanced the reactivation of eastern bases by the closing of western facilities. At the close of fiscal 1949, the picture had changed from 51 active stations, 7 in maintenance status, and 44 inactivated stations in the continental United States in July 1948, to 60 active, 1 in maintenance, and 46 inactivated. The increase in active stations came from the establishment of four reserve stations and from the reactivation of unused fields made necessary by the concentration of flight and ground training schools. There was a reduction in overseas bases during the same period from 21 active, 3 in maintenance, and 4 inactivated, to 13 active, 4 in maintenance, and 8 inactivated at the end of the fiscal year.

The number of naval aviation officers on active duty rose from 10,890 in July, 1948, to 12,205 by June, 1949. This number included 7,737 permanently commissioned regulars, 2,106 regulars with temporary commissions, 2,314 reserves, and 48 officers on limited duty. While the end of the year figure represented an increase for the whole year, it actually marked a decline from the peak of 12,278 reached in April 1949. This decline has continued and was required by the lower allowances for the 1950 fiscal year, which calls for the return to inactive duty of a group of reserve officers. The number of enlisted men holding or striking for aviation rates increased from 52,481 to 63,493.

The program of providing additional professional training for ex-reserve officers and enlisted men who had been commissioned in the regular Navy was continued. Some officers were sent to civilian colleges and universities for a minimum of five semesters. During the last three fiscal years, 862 naval aviators completed this basic academic education. Others, whose college training had been sufficient, attended General Line School to study naval subjects. To date, 1,089 naval aviators have completed Line School courses at Newport or at Monterey. There remains a backlog of 1,725 naval aviators who have not completed the five semester college program, and 4,339 naval aviators who have not finished the Line School course. Present schedules call for the completion of this work by 1954.

The end of fiscal 1949 marked the third year of the Naval Air Reserve Program. The program, expanded in all of its phases, continued to emphasize the maintenance of a trained unit, ready to take its place among the active combatant forces of the Navy with a minimum of time.

Four new air stations, located at Birmingham, Lincoln, Niagara Falls, and Spokane, were commissioned during the year and brought the total under the reserve command to 21. Six Naval Air Reserve Training Units based on regular Naval Air Stations continued in operation. Although a planned strength of 8,711 officers and 29,817 men for the Organized Reserve was not reached by the end of the year, steady growth characterized the program, and personnel increased from 6,925 officers and 18,196 men in July to 7,884 officers and 21,597 men by June, 1949.

The Volunteer Reserve was also expanded. Non-flying aviation personnel, organized into volunteer aviation units, was provided with aviation training equipment and lectures on late developments in aeronautical equipment. At the close of fiscal 1949, 97 of these units were in operation—most of them formed within the year. The experiment of sending naval aircraft to civil airports for the use of reserve pilots in the vicinity proved so successful that 39 such units are now in operation.

The aircraft complement assigned to the Naval Air Reserve was maintained at 2,185 aircraft. Most of these are World War II types, but newer aircraft are steadily being introduced. F8F's are replacing F6F's, and new jet aircraft of the FJ (Fury) and FH (Phantom) types are available in limited numbers.

If provision for the replacement of personnel is not made, time will cause any reserve program to deteriorate and lose its value for rapid mobilization. This is especially true in aviation where pilot age is basic and where complex equipment continuously becomes more so. It is necessary to introduce new blood into the organization, preferably at the lower age level. A plan was devised in April, 1949, to train recruits on some basis other than week-end periods, and was authorized for 2,100 men in an 8-week active duty period. Emphasis in recruitment was placed on young men, and particularly on high school graduates. The aviation cadet program was also expected to provide new pilots for the reserve, but the number authorized was not sufficient to meet requirements. The present training rate provides approximately 320 pilots (Navy and Marine) for the Organized Reserve, but 920 are needed to keep it a youthful, alert organization.

The Organized Reserve program of the Marine Corps is composed of 28 fighter and 8 ground control intercept squadrons supported by 23 air detachments. During the past year two additional air detachments were commissioned for the support of two fighter squadrons to be commissioned in July. Personnel strength is 95 per cent of the authorized complement of 1,200 aviators, 420 ground officers, and 5,070 enlisted men. In the past year 1,150 organized and 661 volunteer reserve aviators logged over 99,000 hours of flight time, 87 per cent of which was in fighter aircraft.

The second annual Marine reserve squadron maneuvers took place in the summer of 1948 for which a total of 3,346 reserve personnel and 380 aircraft were mobilized. Twelve fighter and 3 ground control intercept squadrons from points east of the Mississippi gathered at MCAS Cherry Point in July and a similar number from west of the Mississippi gathered at MCAS El Toro in August. The entire movement of these units to the maneuver point and return to home base in both exercises was carried out by air in one day, demonstrating the possibilities for a rapid mobilization of the Organized Reserves.

Training maneuvers covered all phases of the fighter syllabus including the use of live ammunition, bombs, and rockets in the close support of ground troops. The maneuvers culminated in a combined field exercise with Marine reserve ground units.

In addition to the scheduled drills and maneuvers of the Organized Reserves, 661 aviators, 274 ground officers, and 153 enlisted men, all assigned to volunteer reserve units, attended active duty for training during the year.

Marine aviation followed Navy expansion plans for the fiscal year. When later revisions became necessary, the levelling-off was followed by a downward trend. In spite of this movement, the personnel assigned to Marine Corps aviation increased slightly, the number of officers going from 2,171 to 2,280, of which 1,938 were naval aviators. The number of enlisted men increased from 11,995 to 14,503, of which 574 were one-year enlistees.

A vigorous program emphasized the development of new techniques in amphibious operations and close support of ground troops. As a result, combat readiness of Marine Corps aviation is now substantially improved. Jet aircraft, available for the first time in numbers, participated in exercises in support of Fleet Marine Forces.

### Air National Guard

The Air National Guard under command of Maj. Gen. George Finch, USAF, completed its basic organization during 1949, with 514 units organized into 12 Wings. Personnel stood at 40,997 officers and airmen at the time the basic organization was completed, 69 percent of the authorized strength of 59,274. Target date for attainment of authorized strength is June 30, 1951.

Headquarters of the twelve Wings of the Air National Guard are at Spokane, Wash.; Alameda and Burbank, Cal.; Denver, Col.; Houston, Tex.; Chicago, Ill.; Marietta, Ga.; Columbus, O.; Harrisburg, Pa.; Boston, Mass.; St. Louis, Mo., and White Plains, N. Y.

Seventy-two fighter squadrons and twelve light bombardment squad-

**MATS and the Future**

By Maj. Gen. Laurence S. Kuter
*Commander, Military Air Transport Service*

"Leading executives of the Government and private industry concerned with civil aviation are cooperating closely with MATS to reach a satisfactory solution to the problem of meeting the national-security requirements for strategic airlift facilities. These individuals by virtue of distinguished service in World War II appreciate the importance of a proper solution to the problem. That the Air Force recognizes its importance and the need for big transport planes able to satisfy the strategic airlift requirements of any future emergency is reflected in its orders for the C-97 and C-124 aircraft. In MATS is being maintained the military nucleus around which can be built the force required to meet an emergency situation.

In view of these facts, I believe that the American people can feel confident that the air power—and by air power I mean transport air power as well as combat air power—necessary to insure our national security in time of emergency will not be found wanting."

rons of the Air Guard are now operating from seventy-eight municipal, state or federally owned installations. Also:

24 Fighter Group Headquarters
3 Light Bombardment Group Headquarters
12 Aircraft Control and Warning Group Headquarters
12 Aircraft Control Squadrons
24 Aircraft Control and Warning Squadrons
12 Communication Squadrons
27 Air Service Group Headquarters
84 Air Service Detachments
12 Signal Light Construction Companies
84 Weather Stations
84 Utility Flights
4 Engineer Aviation Battalion Headquarters
12 Engineer Aviation Companies
12 Radar Calibration Detachments
12 USAF Bands

The Air Guard includes 3,300 rated pilots, more than 5,600 air technicians, and mechanics and specialists in other fields. The air technicians are 90 per cent World War II veterans. They are full-time civilians, in addition to their National Guard status, who are used to train new Air Guard recruits. A total of 6,273 air technicians is authorized the Air Guard.

The Air Guard trains under the supervision of the Air Force and according to standards set by the Air Force. Training is given in 48 air base training sessions during the year, plus a 15-day encampment. Participants are paid at regular Air Force rates according to grade and service.

Most of the regular service schools are open to members of the Air Guard, in addition to unit and State schools and extension courses. Since 1947 some 2,500 officers and men of the Air Guard have attended various Air Force service schools, and the number of applicants is increasing.

Pilots must fly a minimum of 100 hours a year of specific types of proficiency flying in order to retain their ratings. Most of these pilots are veterans of World War II. Planes used include the Republic F-47 Thunderbolts, Douglas C-47 Transports, North American F-51 Mustangs, Douglas B-36 Invaders, North American T-6 and Beech T-11 Trainers and the jet-propelled Lockheed F-80 Shooting Stars. Five Air Guard fighter squadrons have been converted to jets.

At the end of the year the relationship of the Air National Guard and the National Guard Bureau (Army) was under study because of command difficulties between Maj. Gen. Finch and ranking National Guard officers who have tended in their publicity and other activities to subordinate the Air National Guard to the overall National Guard picture. This has been done despite the supposedly clear line of demarcation, and is an outgrowth of the basic state-federal controversy over the role of the National Guard in a modern defense establishment.

"The rivers, once the chief lines of intercourse on the earth's surface were made to give up their prestige to the railway, but the new champion of travel, the perfected flying-machine, will bring back to the rivers, in the near future, the credit of being the highways of commerce and travel. Their flowing expanses of smooth water will offer to passenger- and burden-carrying flying-machines surfaces from which to rise and upon which they may descend in safety. And the ocean itself may yet prove to be the scene of the greatest exploits of the aviator. Something beside his wings sustains the flying man; it is his confidence backed by the confidence of the people. Crowds used to gather to see him fall; now they come to see him fly."

*The Century Magazine*
November, 1910

**Radar Network**

One of the major steps in establishing an air defense of the United States is to build a radar warning and interception network. Congress during 1949 authorized an $85,000,000 program which got under way in December. Approval was given for expenditure of $50,000,000 in fiscal 1950, funds that had to be taken from other Air Force appropriations. The Navy will provide picket ships to supplement ground installations and fill gaps in the permanent set-up.

High ranking officers in the defense set-up cautioned in connection with the radar network that it would not supply full coverage of the country, and that such coverage would be prohibitively expensive. The network is so designed as to give early warning of attack along the most logical invasion routes and then is concentrated on major potential targets. Stations will be set up in Alaska, and, by agreement with the Canadian government, in far northern areas of that country to supplement the Canadian system. Details of the program are highly secret for obvious reasons.

Conduct during the year of Operation Lookout, using civilian observers in a program similar to that used by Britain and the United States in World War II, indicated that defense officials felt there would be a role for an observer corps despite the advent of high-altitude bombers. The Operation covered the northeastern states and enlisted something like 25,000 civilians. Not pointed out by anyone was the possibility that they could be spotting, in the event of trouble, submarine-launched guided missiles aimed at industrial targets in the northeast and not necessarily high-flying instruments of attack.

**Military Air Transport Service**

Opening of 1949 brought the Military Air Transport Service into the final half of its first year as an integrated air route command. Seven months earlier, the unprecedented merger of Air Force and Navy air transport operations had been accomplished, marking for the first time in United

**Fodder for the hungry maw of a Boeing C-97 Superfreighter**

States military history the integration of two separate services into one permanent organization.

Close on the heels of integration came consolidation of terminals and other facilities and the elimination of duplicating functions of the former Air Transport Command and Naval Air Transport Service. Techniques and regulations combining the best features of both were made official MATS procedure. As a result MATS today provides efficient and economical air transportation for the entire Department of Defense.

The pattern of MATS routes stretches 79,000 miles from its feeder lines serving supply depots and other establishments in the United States to every corner of the globe where American forces are stationed. In the operation of this vast military air transportation system MATS relies upon the indispensable facilities of the Airways and Air Communications Service, Air Weather Service, Air Rescue Service, and Flight Service. Without these highly professional and experienced services, which are available to all United States and allied agencies, air traffic volume, safety and dependability would be difficult, if not impossible. The four services have been placed under MATS in order to produce a cohesive, compact and economical administrative and operational package.

The 11-year-old MATS-AACS is built around a nucleus of air communications specialists who serve fliers of the Air Force, Navy, and at times pilots of civil airlines and military aircraft of other nations. From more than 200 strategically placed operating locations around the globe, its 15,000 men and their electronic devices provide 1,100 facilities with 19 different kinds of necessary communication and navigational services.

Fifty-three per cent of its personnel and equipment are overseas. They are stationed about the Arctic Circle and along the Equator. They are in Tripoli and Trinidad, Berlin and Barking Sands, Hawaii. Wherever United States military pilots fly, they require communication and aids to navigation, and these make up the AACS mission.

The Air Weather Service, which provides global meteorological service for the Air Force and the Army, is an integrated organization of about 9,500 officers and airmen, comprising 200 weather stations, 6 aerial reconnaissance squadrons and 25 mobile units, situated over the world.

The basic framework consists of: an operational network to observe and record weather data; an analysis and forecast network to assemble the data in usable form; and a communications network, operated by AACS, to collect the weather information and deliver it where needed.

Special activities include hurricane and typhoon reconnaissance in the Atlantic and Pacific areas; and collaboration with other federal agencies in various scientific projects designed to develop new and improved meteorological techniques. Close liaison is maintained with the Navy, U. S. Weather Bureau and the meteorological agencies of foreign nations.

Flight Service's basic function is the furtherance of flying safety. Its nine operational centers are located in the United States. At these centers flight following of military aircraft is accomplished and flight advisories are issued to aircraft when necessary. Flight Service's facilities are used by the Navy, Coast Guard, Army and Marine Corps, as well as Air Force.

Flight Service is devoted entirely to the safety of military airplanes and the crews who fly them. A lost or missing plane immediately brings all four of MATS supporting services into the picture—Airways and Air Communications Service, Air Weather Service, Flight Service and Air Rescue Service.

Air Rescue Service was born out of rescue problems arising during World War II. Its major mission is saving the lives of military airmen who fail to reach an established field. When notified by Flight Service through Airways and Air Communications Service that a plane is missing or overdue, Air Rescue Service immediately attempts to establish the last known position of the lost aircraft. Weather data then is relayed to the search and rescue units. When a lost plane is located, aid is given the ground crew by dropping medical attendants, supplies and other necessities as needed until survivors are returned, as quickly as possible, to safety.

The Military Air Transport Service's system of progressive maintenance insures that each aircraft will receive standard, adequate, and high quality maintenance. It is based on consensus of the available knowledge and experience from all branches of the services, and the civilian aviation industry.

MATS progressive maintenance program is divided into two categories. The first is organizational maintenance, which includes all inspections performed while the aircraft is in an operational status between regular engine changes or 1,000-hour maintenance inspection periods. This category is based on (1) maintenance scheduling for maximum flight hours, thereby generating maximum lift capacity, and (2) regular progressive maintenance periods, based on the known operational life of certain component parts of the aircraft or engine.

In this category the MATS organization performs all maintenance work on the aircraft, including intermediate and major inspections, and such other minor inspections as required by MATS high safety standards.

The second category, 1,000-hour maintenance inspections, includes all maintenance while the aircraft is undergoing a regularly scheduled reconditioning.

One thousand hour maintenance inspection requirements and approved modifications are accomplished, as necessary concurrent with engine replacement, or at a specified reconditioning period. First of these specified periods is the 1000-hour inspection, performed by the MATS Division. The second 1000-hour maintenance inspection period, at 2000 hours' flying time, is performed by the Air Materiel Command. Thereafter, maintenance inspections are performed at alternate 1000-hour intervals by MATS and AMC respectively.

This pattern is continued with 1,000-hour maintenance inspections increasing in their scope at each 1,000-hour period. Upon reaching 8,000 hours' flying time a major maintenance cycle is considered to have been completed; the entire aircraft and all of its components will have been overhauled or replaced.

As 1949 drew to a close, MATS was completing the re-establishment of activities curtailed by Vittles. At the same time, MATS was working toward a second objective of vital importance to the future of military air transportation—the composition of its future air fleet. To that end it was seeking to develop a minimum number of types consistent with efficiency, economy and the accomplishment of its mission.

An increase of 14 per cent average passenger movement was recorded during the first eight months of 1949 over 1948. This increase is attributed to the acquisition of the C-121 (Lockheed Constellation) aircraft operating over the Atlantic routes and the lift made available by the Navy JRM-Martin Mars flying boats in the Pacific Division.

During rotation periods of Strategic Air Command units between the United Kingdom and the United States, 81 persons were airlifted on each C-74 trip between Mobile, Ala., and England and return. Even during the "all out" Vittles operation, passenger movement in other areas was not allowed to fall below minimum requirements of foreign theaters.

Consistent with budgetary limitations, MATS has channeled considerable effort into the improvement of passenger service within its system.

Ports of aerial embarkation process passengers more rapidly by utilizing a production line technique. Customs clearances have been simplified.

The Air Safety Division, under the Director of Operations, emphasizes air safety on a preventive basis. It was realized that pilots who had been flying the Berlin Airlift under precision control second to none might relax and even become careless when they returned to routine flying in the United States. Therefore, as a preventive measure, a special indoctrination was prepared and presented to each Vittles pilot returning to "line" flying.

This program reduced MATS accident frequency to a new low point during September, 1949.

That progressive maintenance is effective was proven during Operation Vittles, where MATS-assigned C-54's were in better mechanical condition than when originally delivered.

Equipment added to the MATS air route command in 1949 included: Boeing C-97A's; a C-97B; Lockheed C-121A's; Grumman SA-16's; and Northrop C-125B's.

Manifesting unusually humanitarian achievement by providing underfed German children with candy bars tied to handkerchief parachutes, a MATS Berlin Airlift pilot, 1st Lt. Gail S. Halvorsen, received the Cheney Award on May 17, 1949, for outstanding sacrifice and extreme fortitude in the performance of military duty.

Known as "Little Vittles," the idea originated by Halvorsen began in July, 1948. More than 90,000 "candychutes" were dropped by pilots while flying their regular airlift missions.

**Operation Haylift**

A 24-day emergency airlift to supply snowbound ranchers and their cattle in the Nevada area ended in February after 1,879 tons of cattle feed, regular food rations, medical supplies, and emergency medical equipment were delivered.

Twenty-seven USAF Fairchild C-82 Packets and 10 Douglas C-47s shuttled the supplies between Fallon and Ely, Nev., dropping most of the cargoes to snowbound ranchers and their cattle and sheep. The airdrops were made as the planes flew at low altitudes, and several missions supplied points in western Utah.

Forty-three tons of emergency food rations, 19 tons of miscellaneous equipment including blankets, medicines, heaters, coal and oil, and 1,817 tons of hay and alfalfa concentrate pellets, were delivered. Ranchers in the snowbound Nevada area accompanied most of the flights, guiding the planes to the correct "drop zones" where crew members jettisoned the supplies out the rear doors of the "Flying Boxcars" as the planes skimmed above the snow at altitudes as low as 50 feet.

The emergency airlift began January 24 when President Truman de-

**Operation Haylift saw rugged flying in rugged country**

clared the western snowbound states a "disaster area." Seventeen C-82s from the 62nd Troop Carrier Wing, McChord Air Force Base, Tacoma, Wash., arrived at Fallon, Nev., on Jan. 23, and the relief flights began the next day.

Cattlemen gathered feed at Fallon, where it was loaded into the planes for shipment to the airfield at Ely, Nev., or to be dropped at ranches en route. From Ely, 210 miles east of Fallon, the planes took off again with local ranchers aboard and flew to the snowbound herds or ranches. Then they returned to Fallon for fresh loads of supplies.

Extremely cold weather and blizzard conditions hindered the operations frequently, and pilots were forced to fly missions of several hundred miles at altitudes of only 100 to 200 feet in order to stay within sight of the ground.

An average of 50 to 80 tons of supplies was carried each day by the planes.

More than 100 officers and airmen took part in the haylift flights. In addition to the 37 USAF planes active in the Nevada area, transport, reconnaissance and liaison planes of the Navy, the Air National Guard, and the Civil Air Patrol took part in the relief flights.

Approximately 115 USAF planes were active in the five-state snowbound western areas during the three weeks, carrying on similar air supply operations. The aircraft made relief flights in Arizona, Idaho, Wyoming, Utah, Nebraska, and North and South Dakota.

Helicopters, special air rescue equipment, and ground snow-removal and automotive equipment of the Air Force were also used.

### Bases and Housing

Constant shifting in requirements make it impossible to detail USAF bases and naval air establishments. The number and location were changing rapidly throughout the year with the build-up and subsequent cutback of the Air Force and the Navy, and with shifts in strategic emphasis from the Pacific to the Atlantic area.

For the Air Force the pressing problem is to make war-constructed bases and housing livable and replace temporary with permanent structures. A good case in point is the Rapid City Air Force Base in South Dakota, where the 28th Bombardment Wing is being equipped with B-36 heavy bombers. It is, by this token alone, one of the crack outfits of the Air Force. Yet the most modern structure, and virtually the only permanent structure on the base, is a mammoth hangar for repair work on the B-36's. Everything else on the base, from operations office to housing, is war-temporary construction. Maintenance alone is serious and will be more so as the Dakota elements take their toll.

Some progress was made toward solution of the housing situation with

**Aviation Headlines**

"Professor Alexander Graham Bell thinks he is a step nearer the attainment of his ambition to perfect a flying machine based on the tetrahedral kite principle. He has been experimenting in this direction for several years on his estate of Beinn Bhreagh, Cape Breton. On Wednesday he succeeded in getting his latest designed kite, which he has named the Frost King, to lift a man named Neill McDearmid, weighing 165 pounds, to a height of thirty feet and support him there as steadily as if glued to the sky.

"The kite, which is constructed of 1300 tetrahedral cells, having a total area of 752 square feet of silk, making a supporting surface of 440 square feet, carried aloft not only its own weight of 61 pounds, but also a load comprising flying lines, dangling ropes, and a rope ladder, making 62 pounds more, together with McDearmid, making a total altogether of 288 pounds.

". . . Its descent was as graceful as its ascent, slow and steady, and it alighted gently upon the ground without perceptible damage to any of its fragile cells. While not the largest tetrahedral kite to be successfully launched at Beinn Bhreagh, it is the largest that has supported itself at such an altitude and carried such weight.

"Professor Bell left for Washington greatly pleased with the result of the experiment, and convinced that he had passed another milestone on the road toward complete success in his attempt to solve the problem of aerial navigation with bodies heavier than air."

*New York Herald*
December 30, 1905

passage during the year of a $500,000,000 program to be developed by private capital on either government land at the various installations or on adjacent privately-owned land. The program will provide 60,000 family housing units for the three services—at about 35 bases for the Air Force, which has some 114,000 families in need of adequate housing.

The Air Force building program will be conducted only at bases which would be operated by the USAF despite any conceivable future reduction in strength in the United States and Alaska. These housing developments will be privately-owned and managed, with FHA-insured mortgages provided approved builders.

Meanwhile, improvised quarters are being utilized, ranging from converted temporary barracks to trailers such as the 300 shipped to Alaska in the fall to meet critical needs at Elmendorf, Ladd and Eielson Air Force Bases. Ladd AFB at Fairbanks is typical: only 13 percent of officers and 13 percent of enlisted men are assigned government quarters; 30 percent of the officers and 25 percent of the enlisted men have quarters off post; leaving 57 percent of officers and 62 percent of enlisted men unable to have dependents with them. The situation is so serious throughout Alaska that deployment of troops is based on housing capacity rather than the size force considered necessary for adequate defense.

Strong representations are being made by the Joint Chiefs of Staff to alleviate the situation, colored somewhat by the fact that Congress in 1949 seriously questioned construction costs in Alaska.

## Flying Saucers

Generally taken with a huge dose of disbelief were the flying saucers that made their "appearance" on the national scene in 1947. They were reported spasmodically in 1948 and again in 1949. But they acquired some small degree of dignity through the medium of a story in the *Saturday Evening Post* the spring of 1949 and were the subject of a full-dress, 22-page report on "preliminary studies" made by the Air Materiel Command at Wright Field, issued April 22.

With true military preciseness the file on the flood of flying saucer reports was tagged "unidentified aerial phenomena." The undertaking became Project Saucer, and AMC's Technical Intelligence Division beavered into 240 domestic and 30 foreign incidents to eliminate 30 percent of the "sightings" as conventional aerial objects.

Answers were drawn from factors such as guided missile research activity, weather and other atmospheric sounding balloons, astronomical phenomena, commercial and military aircraft flights, flights of migratory birds, shots from flare guns, practical jokers, victims of optical illusion, the phenomena of mass hallucination, etc.

But, AMC admits, there are still question marks in the "Saucer Story."

For that reason, these excerpts from the report itself are given for the record even though the Air Force has officially cancelled the project.

"While Project 'Saucer' evaluation teams report that no 'definite and conclusive evidence is yet available to either prove or disprove the existence of at least some of the remaining unidentified objects as real aircraft of unknown and unconventional configuration,' exhaustive investigations have turned up no alarming probabilities.

"The question marks in Project 'Saucer' are not dangerous ones.

"Nor are reports of unidentified flying objects peculiar to the present day. In 'The Books of Charles Fort' by Tiffany Thayer, published in 1941 by Henry Holt and Company, N. Y., similar phenomena are described as having been sighted at various times throughout past centuries.

"But this is the Saucer Story of 1947-49.

"Although occasional sightings of strange aerial objects were reported as far back as January, 1947, it was the Mt. Ranier incident that touched off the saucer sensation late the following June.

"Kenneth Arnold, representative of a fire control equipment firm in Boise, Idaho, was en route from Chehalis to Yakima, Wash., on June 24 in a privately-owned plane when he saw the reflection of a bright flash on his wing. Arnold said he looked around and observed a chain of nine peculiar aircraft approaching Mt. Ranier.

" 'I could see their outline quite plainly against the snow as they approached the mountain,' he reported. 'They flew very close to the mountain tops, directly south to southeast down the hog's back of the range, flying like geese in a diagonal chain-like line, as if they were linked together.'

"Arnold observed that the objects seemed smaller than a DC-4 on his left, but he judged their wing span to be as wide as the furthest engines on either side of the DC-4's fuselage.

" 'They were approximately 20 or 25 miles away, and I couldn't see a tail on them,' he declared. 'I watched for about three minutes . . . a chain of saucer-like things at least five miles long, swerving in and out of the high mountain peaks. They were flat like a pie pan and so shiny they reflected the sun like a mirror.

" 'I never saw anything so fast,' he told investigators.

"Arnold said he clocked the 'saucers' ' speed at about 1,200 miles an hour. Later, however, Aero-Medical Laboratory men stated that an object travelling that fast would not have been visible to the naked eye.

"Arnold's story, when it broke in the newspapers, was treated mainly with amusement and disbelief.

"Resentful of what he termed 'press ridicule,' Arnold retorted 'They can call me Einstein, Flash Gordon or just a screwball, but I am absolutely certain of what I saw.'

"Today, no one knows just what Arnold did see on Mt. Ranier. But the objects have been judged to be of non-astronomical origin according to an interim report submitted recently by Professor Joseph A. Hynek, Ohio

State University astro-physicist and head of the O.S.U. Observatory. Dr. Hynek is working under contract with AMC on an independent investigation of saucer incidents to determine what percentage may definitely be attributed to astronomical phenomena.

"'It appears probable,' Hynek reports, 'that whatever objects were observed were travelling at sub-sonic speeds and may therefore have been some sort of known aircraft.' . . .

"While the vast majority of saucers reported to Air Force Intelligence have been seen over the continental United States, they have also appeared around the globe. Sightings have been reported, for example, over Newfoundland, Alaska, Asuncion, Paraguay, Gadbjerg, Denmark; Lake Dorian (at the Yugoslav-Greek frontier), Sweden, Norway, Denmark, Holland, Turkey, Hawaii, and elsewhere.

"In April, 1948, Lt. Robert W. Meyers of the 67th Fighter Wing, 18th Fighter Group, Philippine Islands, was leading a flight of four F-47's when he sighted an unidentified aerial object about three miles away. As Meyers wheeled his fighter around, the object made a simultaneous 90° turn left and disappeared in about five seconds. No exhaust trails were observed. Meyers said the object appeared to be a flying wing type of aircraft, silver in color and resembling a half moon with what seemed to be a dorsal fin barely perceptible. . . .

"Perhaps the most fantastic saucer sighting in Technical Intelligence records was the widely-publicized 'space ship' which two Eastern Air Lines pilots reported encountering in the skies around Montgomery, Ala., last July. Presumably the same object was seen by ground observers at Robbins Air Force Base, Macon, Ga., about an hour before. All reports agreed it was going in a southerly direction, trailing vari-colored flames and that it behaved like a normal aircraft insofar as disappearing from the line of sight was concerned.

"The EAL pilots, Capt. C. S. Chiles and John B. Whitte, described the phenomena as a 'wingless aircraft, 100 feet long, cigar shaped and about twice the diameter of a B-29 with no protruding surfaces.'

"'We saw it at the same time and asked each other "What in the world is this?"' Chiles told investigators. 'Whatever it was, it flashed down toward us and we veered to the left. It veered to its left and passed us about 700 feet to our right and above us. Then, as if the pilot had seen us and wanted to avoid us, it pulled up with a tremendous burst of flame from the rear and zoomed into the clouds, its prop wash or jet wash rocking our DC-3.'

"In their investigation of the incident, project personnel screened 225 civilian and military flight schedules and found that the only other aircraft in the vicinity at the time was an Air Force C-47. Application of the Prandtl theory of lift to the incident indicated that a fuselage of the dimensions reported by Chiles and Whitte could support a load comparable to the weight of an aircraft of this size at flying speeds in the sub-sonic range.

"The object is still considered 'Unidentified.'

"All of the information so far presented in Project Saucer on the possible existence of space ships from another planet or of aircraft propelled by an advanced type of atomic power plant have been largely conjecture.

"To sum up, no definite conclusive evidence is yet available that would prove or disprove the possibility that a portion of the unidentified objects are real aircraft of unknown or unconventional configuration.

"Many sightings by qualified and apparently reliable witnesses have been reported. However, each incident has unsatisfactory features, such as the shortness of time the object was under observation, the great distance from the observer, vagueness of description or photographs, inconsistencies between individual observers, and lack of descriptive data."

**Research Horizons**

The introduction in the past few years of many new aircraft engine types has increased so greatly the scope of propulsion system researches that frequent assessments must be made of the problems and goals and the direction determined for the most fruitful application of a limited research effort.

Intensive research effort should be directed toward increasing the compression ratios of gas-turbine engines, the cycle temperatures of gas-turbine engines, combustion efficiencies and intensities, and the operating temperatures of heat-resistant materials.

The future increases in propulsion-system performance may be brought about by the development of:

(1) Turbine-propeller engines with high cycle pressures and temperatures for aircraft application at speeds up to 500 mph and perhaps somewhat above.

(2) Turbo-jet engines with high cycle pressures for aircraft application at speeds up to and perhaps in the transonic speed range.

(3) Turbo-jet engines with high cycle temperatures for aircraft application at transonic speeds and at supersonic speeds up to perhaps somewhat above 1,500 miles per hour.

These objectives will be accomplished only by a well-oriented research and development program.

—Abe Silverstein, National Advisory Committee for Aeronautics, in the Twelfth Wright Brothers Lecture, 1949.

There were other noteworthy developments, capsuled here:

Refueling continued to get concentrated attention, both on the ground and in the air. The non-stop round-the-world flight of a Boeing B-50 Superfortress in February was accomplished by refueling from tanker B-29's using an older method of air-to-air refueling, while later in the year it was announced that a new "flying boom" system had been worked out by the Boeing Company through which pressure refueling eliminates some of the difficulties of the gravity-feed process. The Air Force also is experimenting with other systems, and two Republic F-84 Thunderjets were flown to England in the fall to operate with the British system. Under development in this country is a refueling system permitting three fighters to refuel at the same time from a B-29 tanker. Other experiments are under way for single-point high-pressure refueling for heavy and medium bombers on the ground.

The first seat-ejection, bail-out tests were carried out during the first half of the year, with Captain Vincent Mazza and Staff Sergeant Victor A. James making successful bail-outs from Lockheed TF-80 jet trainers. The first emergency use of the equipment followed in August when Navy Lieutenant J. L. (Pappy) Fruin, attached to VF 171 at Jacksonville, Fla., successfully fired himself from a McDonnell F2H-1 Banshee over the Carolina swamps near Cherry Point, N. C.

In January, a Convair B-36 dropped two 42,000-pound bombs over the Muroc AFB bombing range—the largest bomb load ever carried aloft. First bomb was dropped from 35,000 feet, second from 40,000 feet.

All who have had inflicted upon them the various combat food combinations will look askance at this, but the USAF during the year announced a new unit for in-flight feeding. One million units were ordered. Each is packed in a cardboard container with four small cans and an accessory packet included. One can contains meat, others fruit, crackers and dessert. The accessory includes can opener, sugar, soluble coffee, tea, milk, salt, pepper, chewing gum, plastic spoon, paper towel and napkin. Seven meat courses are provided: chicken, hamburger, beef and pork loaf, pork and apple sauce, ground meat and spaghetti, beef and corn, and ham and eggs. There are four types of fruit: peaches, cherries, fruit cocktails and apricots. The bread can contains five crackers and the dessert can contains cookies and candy discs. Somehow or another it all sounded like a reminiscent distaste.

The final transfer of functions order establishing the Air Force as a separate service was signed July 22.

On May 20, the USAF announced organization of its own Medical Service, with Maj. Gen. Malcolm C. Grow as Surgeon General.

The Air Force and the Navy began a pilot exchange program on October 1, under which 25 flying officers up to major and lieutenant commander will be shifted for periods of one year. The exchange officers will undertake full-time operational and administrative status in the aviation unit to which they are assigned.

Track tread landing gear was tested on a Boeing B-50 during May. The 164,000-pound plane was the first of its weight to use the gear, an experiment to investigate possibilities of using the medium bombers on unimproved, unpaved runways.

# CHAPTER THREE

## The Government and Aviation

WHILE most Federal aviation activities were unspectacular during 1949, five major probes of the industry by U. S. officialdom brought a steady barrage of headline news. House Armed Services Committee hearings of the defense procurement program led the parade of sensational probes. Rivaling it at times, but more subdued, was the Senate Interstate and Foreign Commerce Committee investigation of the airlines. Less headlined, but equally important to the industry, was the U. S. Labor Department's minimum wage hearings, while Congressional hearings on Federal aviation spending, particularly for defense, took a prize for sustained interest.

### B-36—and Procurement

The procurement hearings, begun as half-mystery, half-farce late in the spring, lost the spotlight when scandalous charges against the B-36 blew up, and regained it for a time during the fall when procurement high policy was debated pro and con with special emphasis on unification and special tension among friends of the Air Force versus friends of the Naval air arm.

The B-36 hearings were first sparked by Rep. James E. Van Zandt, a former Naval officer and a member of the Armed Services Committee. He based his attack on a mysterious "Black Paper" which raised questions about both the plane's performance and how it had been ordered.

These and others were answered in sometimes ringing testimony before the Committee during hearings in August. So reluctant to release data that many newspapermen had become as skeptical of the B-36 as had Van Zandt, Air Force leadership flooded the Committee with a deluge of facts that vindicated the plane and their choice of it. It was brought out that the big bomber, dogged in early models by engine trouble and its full share of bugs, had benefited by improvements.

"It was a lucky freak," testified Gen. George Churchill Kenney, commander of the Air University, who had once recommended that the plane be converted into a tanker. "It went higher, faster and farther than anybody thought it would, and the pilots liked it."

Some of the things they liked, the testimony revealed, was a top speed of more than 435 mph, altitude capacity of 50,000 ft., ability to go 10,000 mi. non-stop with a 10,000-lb. bomb load to the halfway mark, a 6,000-mi. flight above 40,000 ft. averaging 300 mph, and a potential 12,000-mi. range "well within reason."

General H. H. Arnold, wartime air chief, declared:

"The B-36 is a fine airplane and the country should be proud of it. No other country in the world has a bomber that can compare with it in range, bomb load and speed."

Contract skullduggery was refuted by industrial rivals of Floyd B. Odlum, chairman of the board of Consolidated Vultee Aircraft Corporation, who designed and built the plane, and Secretary of the Air Force W. Stuart Symington was completely cleared. West Coast aircraft manufacturers, in hearings held in Los Angeles in mid-August, added their voices to those heard in Washington hearings. Among the West Coasters who testified were J. H. Kindelberger, chairman of the board and top executive of North American Aviation, Inc.; William M. Allen, president of the Boeing Airplane Co.; Donald W. Douglas, president and chairman of the board of Douglas Aircraft Co.; Oliver P. Echols, chairman of the board, and J. K. Northrop, president of Northrop Aircraft, Inc., and Robert Gross, president of Lockheed Aircraft Corp.

At Washington hearings, Secretary Symington first put the B-36 orders in their proper perspective by showing that on July 20, 1948, "the Air Force plan under consideration provided for the procurement of 5,309 planes during fiscal years 1949, 1950, and 1951. Of these 5,309 planes, only 154, or 2.9 percent, are B-36's."

He then took the offensive from Rep. Van Zandt, dared him to make charges outside Congressional immunity "so we can have proper recourse," and smoked out the answer to the jack-pot mystery—who had made the charges in the first place. It was Cedric Worth, special assistant to Navy Undersecretary Dan A. Kimball, and a former Hollywood writer. Even he said that the hearings had changed his attitude to favor the B-36.

Said Mr. Odlum:

"There is not one rivet of politics in the B-36; there is not one ounce of special favoritism in its more than 300,000 lbs. of loaded weight. The innuendoes and insinuations concerning the B-36 order that caused this investigation by your committee are completely baseless."

Late August brought a ringing statement by Chairman Vinson:

"There has not been, in the judgment of the committee, one iota, not one scintilla, of evidence offered thus far in these hearings that would support charges or insinuations that collusion, fraud, corruption, influence or favoritism played any part whatsoever in the procurement of the B-36 bomber.

"As of this time, I feel that the nation should know that the Secretary of the Air Force, Mr. Symington, the military leaders of the Air Force, and the Secretary of Defense have come through this inquiry without the slightest blemish."

The statement was approved by the full Armed Services Committee—including Rep. Van Zandt.

Less conclusive were further procurement hearings before the same committee in October. During these, Navy, Army and Air Force high commands debated top defense policies and strategic problems, sometimes bitterly. The use of the atom bomb, the B-36, carriers, and several other weapons were analyzed pro and con by such top military experts as General Omar N. Bradley, chairman of the Joint Chiefs of Staff, General Dwight D. Eisenhower, Secretary of Defense Louis A. Johnson, Secretary of the Navy Francis P. Matthews, Admiral Louis E. Denfeld, Chief of Naval Operations, Secretary Symington, Air Force Chief of Staff General Hoyt S. Vandenberg, General George C. Marshall and Herbert Hoover.

The former President's testimony indicates the trend of the discussions: weapons and strategy regardless, the major question was whether unification of the armed forces was working out to the best interests of the nation and its defense.

The House Armed Services committee closed the hearings late in October without giving an answer. It might, members said, come up with a report on the hearings to be finished early in 1950. On the other hand, more hearings might be called at that time. Possibility of a civilian survey of the entire defense problem was also hinted. What final conclusions would result, if any, became a question for the top of 1950's crowded schedule.

Best summary of the basic unification question before the House committee was perhaps made jointly by General Eisenhower and Mr. Hoover. "We are expecting perfection too quickly," said the General. "It requires," Mr. Hoover elaborated, "a year for newly wedded couples to get used to each other."

### Airline Probe

The airline hearings were led by Senator Edwin C. Johnson, chairman of the Senate Interstate and Foreign Commerce Committee, and inspired by the poor financial showing of the lines when the books were balanced for 1948.

Started with a resolution on April 12, by mid-summer the probe was hailed by Chairman Johnson as "the longest and most comprehensive aviation hearings in Congressional history." Subsequent witnesses made the investigation even more lengthy and so voluminous that the committee announced at year-end that a summary and conclusions would not be published till the spring of 1950.

What these findings will be is debatable, but 1949 statements by Senator Johnson charted the trends. While stating that his views do not necessarily represent the views of his committee, observers both inside and outside the Senate group were agreed as this goes to press that, barring minor changes, the 1950 full-committee findings will follow the 1949 views of the chairman.

Senator Johnson was generally optimistic and, in light of the progress made by scheduled airlines during the year, prophetic.

"There are far more problems than answers," he stated. "Nevertheless, I am confident that the airline industry, the CAB, the CAA, and the Congress, working as a team, can make American aviation safe, certain, and solvent. Air transportation is about to become the most attractive and economic transportation in history. Eventually, it is also likely to be the safest."

To the degree that the industry is ahead of him in many of his recommendations, his final committee report will be dated. But as outlined by Senator Johnson in 1949, it became a significant landmark for future discussions of air transport policies and progress.

Johnson quotes:

"The combined (ticket) office plan . . . can be used without injuring sales to a far greater extent than now practiced."

Loading and other services can be combined for both economy and efficiency. "It is obvious that tremendous savings could be realized if ramps and loading equipment . . . were pooled as one unit instead of maintaining a separate system for each carrier. The same applies with equal force to gasoline and oil and to air-ground communication systems.

"If CAB eliminated some of these lone wolf duplication of operations as legitimate expenses in determining mail pay, we would have a very different story, as I see it.

"Interchange of equipment provides another way to save money.

"No matter how you view these proposals, they all simmer down to reducing fares as an inducement to the public to use air transportation so that the carriers might build higher load factors, increase utilization of equipment and augment their badly needed revenues.

"Of the three, no one will deny the fact that air coach service has had the most spectacular effect on the development of real mass air transportation."

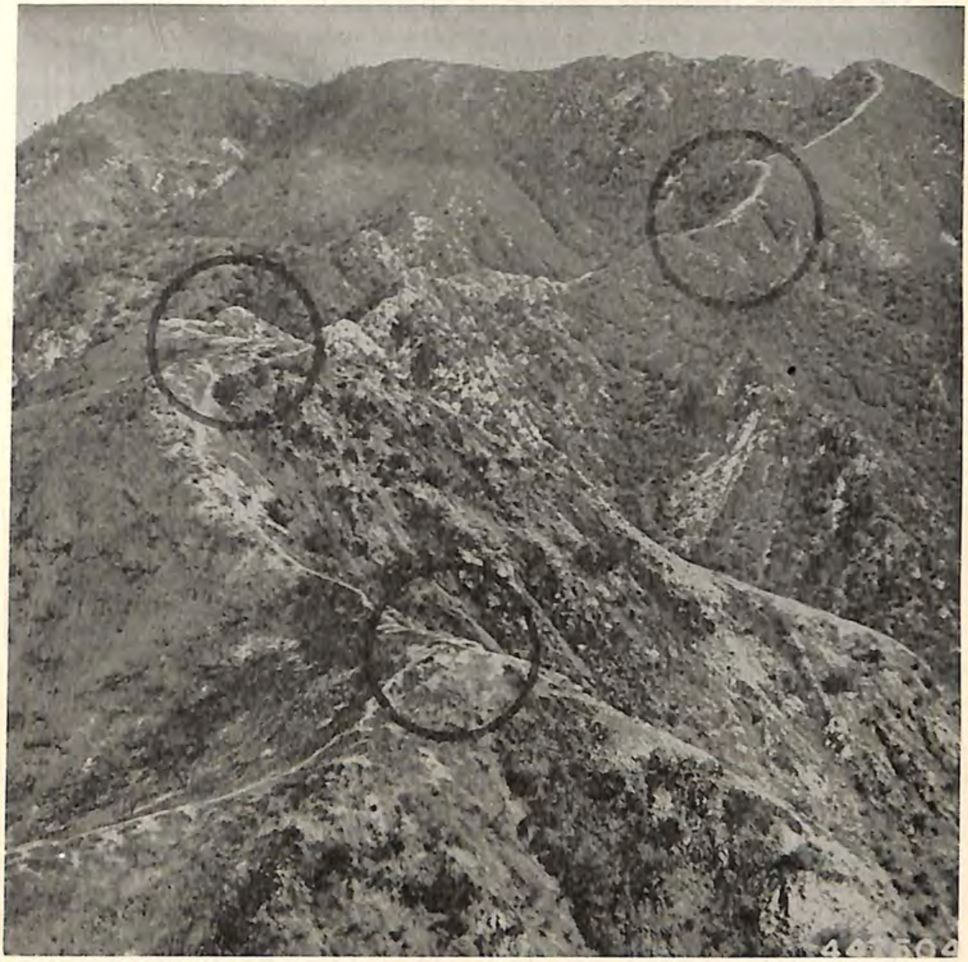
Pointing out that Pan American Airways was the first scheduled air carrier to pioneer coach service, between Puerto Rico and New York beginning in September 1948, followed by Capital Airlines, between New York and Chicago beginning in November 1948, Senator Johnson said that "a new market of mass air transportation was opened up."

Senator Johnson also favored separation of mail pay and subsidies.

He was critical of costly CAB hearing and decision delays. "Perhaps it would be helpful to require the CAB to report to Congress the status of all applications periodically that are over six months old."

Board policy on making route patterns was censured. "The CAB has had neither format nor conception of a national route structure which would generally prove to be economically sound for carriers to operate." He added:

"Congress will do its best to help the CAB provide wise regulation. The rest, the heavy part of the load, rests squarely on the broad shoulders of the airline industry itself."



**Ridge top helicopter landing spots**

## Labor

A three-sided minimum wage battle involving the aircraft industry, its unions, and the government, highlighted the 1949 Department of Labor probe of minimum aircraft wages. By year end, no decision was released.

According to the Walsh-Healey Act, any manufacturer or contractor supplying material or equipment to the government must pay at least "the prevailing" minimum wage. It falls to the Secretary of Labor to determine that minimum. In the case of the aircraft industry, it had remained at 50 cents per hour since 1938.

The Aircraft Industries Association, speaking for the aircraft industry, felt strongly that this was no time for change but if a change must be made, it shouldn't exceed 80-95 cents an hour, adding that 77 percent of the industry's common laborers would have to get a raise. The Association further pointed out that with other industries, sales to the government were optional. A company not wanting to have Walsh-Healey minimum rates simply need not apply for government business. In the aircraft business, however, the ratio of government to commercial business is nine to one.

Unions wanted a minimum of $1.15, claiming that only 10 percent of the aircraft workers make less than that figure. They believed the prevailing minimum should be based on the overall distribution of wages, industry-wide.

Industry insisted it should be figured on the entrance rates for unskilled workers.

Industry experts cited that a wage change could ultimately: add $40 million annually to industry wage costs, throw 10,000 out of jobs, drive some companies out of business, and impair defense production.

Summarizing its case, AIA argued that one part of the government, the National Military Establishment, was attempting to reduce prices of aircraft, while another part was considering a new minimum wage which might increase costs and prices considerably—costs that would necessarily be passed on to the customer, in this case, the government.

In late September, the Association submitted its final brief to the Department of Labor, not expecting a decision until early 1950.

### The Civil Aeronautics Administration

Forward strides by the Civil Aeronautics Administration in 1949 were in step with aviation progress in a number of vital fields at home and abroad. Revamping of home and regional offices featured a number of top-level organization changes. Progress was made in the 15-year airway program, matched by a marked rise in radio use by lightplane pilots. CAA was particularly active in the lightplane field. Suffering from post-war declines in trainees and sales, notable advances were nevertheless made in safety development, dramatic rescue work, and expansion of industrial and farm flying. CAA supported these advances, particularly with the airport program, widespread promotional activities in the field, and a series of research projects.

Nature gave personal aircraft a boost when, through thousands of mercy flights, the small plane proved itself useful during the severe winter of 1948-49 in the west and northwest. In hundreds of cases, lives and property were saved and in thousands of cases human suffering was lessened.

The little planes were owned and operated by ranchers, fixed base operators, Civil Air Patrol, private fliers, and the CAA.

CAA safety agents and radiomen went on round-the-clock duty with fixed base operators, who converted their fields into rescue centers. Reported Preston Kirk, midwest CAA safety agent:

**Helicopter scouting fire in Bear Canyon**

"Best estimate I was able to make indicated that from twelve bases reporting, 3,000 flights were made. It's safe to estimate that rescue flights in Nebraska alone totalled nearly 10,000." He cites as an individual example the case of a rancher from Whitman, near Ogalalla, Neb., who made fifty flights carrying 1,800 pounds of supplies to neighbors in his lightplane.

Relief work at Chadron, Nebr., was typical. The Red Cross, personal plane owners, airport operators, the Army, members of the Civil Air Patrol and CAA radioman C. B. Colburn joined forces, with Colburn as the nerve center of the operations. He moved his amateur radio station to the airport, loaned another receiver to the state police, and set up a converted military receiver at another airport to keep it informed on Chadron flights. CAA men had a similar radio set-up at Rapid City, S. D.

Within the first few days of the blizzard, 350 drops of food and emergency supplies were made at Chadron. A baby was flown to the field and delivered into a doctor's hands 38 minutes after a call for help from a nearby ranch. Location of snow plows, repair crews, stalled cars and busses occupied much of the time. The aerial rescue of an injured pilot was also featured in Chadron's blizzard history. . . .

Less dramatic, but at times more significant, were other CAA activities in the lightplane field.

The Administration contracted with the National Aeronautical Corporation for ten VHF lightplane receivers, at $1,970 each. An estimated price of $400 each was made for mass production. Using the NAC sets as models, the radio industry came out with VHF sets for less than the $400 figure during 1949.

CAA-developed crosswind landing gear graduated from the experimental to the production stage. CAA followed this by approving crosswind gear use on Pipers, Stinsons, Cessnas, Aeroncas and Luscombes in the lightplane field, as well as on DC-3's under less-than-40-mph crosswind conditions.

Paralleling this work was the CAA sponsored landing-strip program. CAA findings indicate that strips are usable, even by fixed-gear planes, an average of 85% of the time, coast-to-coast. They are, of course, much less costly than all-weather fields. At year-end, a total of 412 strips had been programmed under CAA airport funds, with more to come in 1950. In addition, 824 small airports were programmed.

Another significant CAA activity in the lightplane airport field was designed to meet community objections to plane noise near small airports. CAA backed a noise-reduction campaign and dozens of airport traffic patterns were changed as a result.

Lightplane accident hazards were given a body blow as the result of a contract with the National Research Council. The contract was supervised by Dr. Dean R. Brimhall, CAA assistant to the administrator for research. Findings indicated that too many lightplane accidents result from stalls, that pilots too often cannot recognize a stall's approach, that the plane itself gives poor warning—but that an inexpensive stall-warner would nearly eliminate the danger.

Practical results of these findings were that several lightplanes, among them Cessna, Piper, Aeronca, and Beechcraft, began installing stall-warners as standard equipment. In July, the spin test was eliminated from the private pilot exam in line with a suggestion by the Non-Scheduled Flying Advisory Committee. Further stall research is planned for 1950.

CAA personal flying assistants continued active throughout the country, gathering and dispersing information of interest to fixed base operators and personal pilots. This work was backed up by the national home office with pamphlets and new releases, typified by "Terrain Flying," issued by the CAA Office of Aviation Information. The booklet reported from veteran pilots interviewed at widespread points how to fly over all kinds of terrain, from mid-western plains to the Rockies. CAA also continued to publish the Flight Information Manual.

CAA reorganization was begun under Administrator Delos W. Rentzel toward "streamlining through the grouping of like activities." Two major trends were noted—to bring CAA domestic services still closer to the grassroots by decentralization, and at the same time to centralize CAA foreign work. Added under the program were an international region, headed by CAA veteran A. S. Koch, and an office of aviation development in charge of another veteran, Wiley B. Wright.

The international region immediately became occupied with foreign work, some in cooperation with the State Department, other exclusively CAA. Long-term missions were sent to Venezuela under the leadership of Lake Littlejohn, to Colombia under Royce G. Kunze, to Peru under George S. Clark, and to Bolivia under Clarence G. Benson. Short-term missions went to Chile under Charles E. Cox, to Panama under John I. Leron, to Cuba under Phillips Moore, and to Mexico under Harry Aaron. Francis J. Rody went to Ceylon to make an airport survey, Hiram Brooks headed a group to Turkey, and Kenneth Matucha led another to Greece.

From abroad came hundreds of aviation experts during the year, including a large ICAO delegation to visit the CAA experimental station at Indianapolis. Reciprocal was a complete exposition of CAA operations at the aviation salon in Paris. This was set up by Ben Stern, CAA Director of the Office of Aviation Information.

CAA participation continued at International Civil Aviation Organization meetings at Montreal. Many U. S. airway aids, developed by the Administration, were accepted by ICAO as standard for world-wide use.

"CAA," said Administrator Rentzel, "wants its rules to be as few and simple as possible to insure safety."

This policy statement, coupled with the domestic decentralization program, led to numerous 1949 changes. A total of 9,500 non-CAA aviation inspectors are now designated to approve aircraft overhauls and licensing in the field. The campaign to reduce the number of regulations continued.

Local authorities were encouraged to enforce rules. The National Association of State Aviation Officials cooperated with Richard Elwell, CAA general counsel, leaving CAA responsible for rules and licenses and the CAA office of safety regulation free to emphasize educational, rather than police, activities. CAA inspectors have accordingly changed their titles to aviation safety agents and safety regulation has been renamed the office of aviation safety.

This did not preclude crack-downs by CAA agents when structural failures appeared in the transport field, nor stringent inspection efforts among non-scheduled transport carriers following an alarming increase in non-sked fatal accidents. Spot checking was stepped up, and a total of approximately 75 violations were reported during the year.

Counselor Elwell reported that during 1949, 2,600 violations were charged against airmen in nonscheduled flying and 150 against scheduled air carriers. These resulted in 45 revocations of licenses, 110 suspensions, and a total of $40,000 accepted in compromise settlements.

Full-throttle, big-budget activities continued in the airport-airways field.

With a total of $39,500,000 of the $500 million Federal airport program appropriated, $90 million projects were contracted by the end of fiscal 1950. During calendar 1949, there was a loss of 12 airports. During the year, 444 airports were closed, leaving a grand total of 6,402 U. S. civil and military fields as of Jan. 1, 1950.

The CAA airport advisory service continued active, with special emphasis on booklets and clinics aimed at increasing airport revenue. Research was done on raising money crops on unused parts of airfields, including hay, grains, peanuts, and turkeys. Airport advisory work was strengthened by a twelve-man civilian airport advisory committee, appointed in July.

In Alaska, where Congress sent more funds for improved CAA worker living conditions and for airways, airport work got a shot in the arm with money for two big fields at Anchorage and Fairbanks. Work was begun with an opening appropriation of $5 million under one of the outstanding authorities on Alaskan air bases, Chris Lample.

The world's most ambitious airways program continued under CAA, closely cooperating with the Radio Technical Commission for Aeronautics and the Air Navigation Development Board. John E. Sommers, CAA airways expert, serves on the Board.

The program calls for an interim system, to be finished in five years, and a final system, costing over $1.1 billion, with a fifteen-year deadline.

The five-year program is already well under way. During 1949, development work by CAA engineers continued on distance measuring equipment (DME), the parallel course computer, and very high frequency omnidirectional range (VOR). These are the three principal elements of the new system. Meanwhile, crews across the country were installing ground equipment. By the end of the year, 375 VORs were in, and 70 were operating on a test basis.

In 1949, CAA engineers of the development center at Indianapolis under Don M. Stuart arrived close to their goals in several studies to prevent fire in the air. An intensely practical program directed by Al S. Morse showed that a "flame-proof" hydraulic fluid now is available. Acceptable fire detectors have also been developed and safe extinguishing agents are available. Tests in all these departments continued, plus work toward a rupture-proof fuel tank, a more fire-resisting coating for fabric covering on airplanes, fire-proof lubricating oil and methods of stopping fires in aircraft baggage compartments.

The center's major work, as in the past, was in air navigation aids.

By the end of the year, 96 of a projected 300 instrument landing systems (ILS) were commissioned. Three ground controlled approach systems (GCA) were working at Washington, Chicago, and New York, and others were on the way at Los Angeles, Atlanta, St. Louis, Cleveland and Boston.

In medical research, studies were made toward designing safer cockpits and shoulder-straps. Progress was also registered in studying the effects of high altitude flying on airline passengers.

**The Civil Aeronautics Board**

Highlights of Civil Aeronautics Board activities in 1949 included a reorganization resulting in six major bureaus and two offices. The bureaus are law, economic, regulation, safety investigation, safety regulation, and hearing examiners. The Office of Enforcement and of Public Information were added to the Office of Members.

Board membership, which had three changes in 1948, stabilized in 1949 under Chairman Joseph J. O'Connell, Jr., who succeeded James M. Landis in April, 1948. Mr. O'Connell, born in New York and a lawyer, brought with him considerable government experience, notably with the Public Works Administration and the Treasury Department.

Vice-Chairman and only original member of the Board was Oswald Ryan, of Indiana, a Harvard Law School graduate and former general counsel of the Federal Power Commission.

Other members were Josh Lee, former U. S. Senator from Oklahoma, first appointed to the Board in 1943, Harold A. Jones, a former U. S. Marine Corps pilot and California attorney, who succeeded Col. Clarence M. Young in March, 1948, and Russell B. Adams of West Virginia, a CAB career man, who succeeded Harllee Branch in May of the same year.

With few exceptions, these men were in agreement on actions taken by the Board during 1949.

Board policy was basically optimistic:

"I believe that we will succeed in recreating an atmosphere and a legislative framework in which air transport can move forward on sound economic lines," said Chairman Joseph J. O'Connell, Jr., early in 1949. "The (post-war expansion) mistakes which were made were not numerous. If traffic were to catch up with existing capacity, many of the so-called mistakes would again become merely segments over which there was a desirable and healthy degree of competition." He added: "The year 1949 constitutes a kind of crossroads in the development and evolution of air transportation. I believe that the carriers will end the year in a much stronger position than at any time since the war, due partly to increased mail pay and final mail rates and partly because of new and more efficient equipment and a general shake-down of post-war problems."

Putting the words into action, the Board made a major economic policy statement on February 21, which resulted in new economic standards and widespread increases in mail pay.

First move under the economic program concerned grounded carriers, a 1948 ruling that had proved disastrously costly to a number of the lines. "We believe these costs are developmental in nature," the Board ruled, and ordered special mail rates to cover airline losses. Sums totalling more than $8 million were awarded to the airlines concerned—American, United, TWA, Northwest, National, Northeast and Challenger. Upward revision of other mail rates was recommended to insure future sound economic operation.

Other Board action paralleled this program. Show cause orders were issued to seven of the sixteen trunk lines and to six of the thirteen operating feeders toward establishing final mail rates. Almost without exception, rate schedules were revised upward. Comprehensive analyses of route patterns and airmail handling costs led to elimination of some economically unsound routes and to operating economies. Hearings were held toward establishing mail rates for the Big Four—the three large transcontinental systems, and Eastern Air Lines—on a strictly business, subsidy-free basis.

The Board's economic policy also favored separating subsidies from service mail pay, as well as a crackdown on poor economic and safety practices among non-scheduled airlines. Sky coach, family plan and other rates were encouraged to increase traffic. A move was begun toward bolstering feeder airlines by approving use of single-engine planes under contact flight conditions and by shifting small-population stops from big airlines to feeders. Giving wider police powers to states was also promoted throughout the year.

The Board supported Congressional measures favoring these policies in a letter-memorandum to Senator Edwin C. Johnson, chairman of the Interstate and Foreign Commerce Committee, on May 24. Opposition was at the same time voiced to drastic proposals to reorganize Federal aviation groups, as well as to a one-flag U. S. airline abroad.

"We have initiated an investigation into the economies" of the airlines, the CAB reported, but "the Board contemplates that there will be vigorous action by the industry itself to strengthen its operating positions."

How vigorous—and effective—that action was, is told in detail in the Year Book chapter on airlines. Deficits were converted into some of the most sizeable gains in history before the year ended.

Long forward strides were also made in safety, as indicated by the accident records for the year. Contributing heavily were Federally-operated GCA and ILS bad-weather landing systems, and omni-directional beams.

Significant was the Board's move to standardize all transport cockpits to conform with the Air Force—a security as well as a safety measure.

The Board pointed out "that an agreement on a standardized cockpit now having been reached by the largest purchaser of aircraft in the United States (the armed services), it would appear to be an appropriate time to propose the same type of cockpit for all purchasers of equipment." The Board added "that variation in cockpit arrangements not only increased the cost of aircraft to the civil carrier, but also rendered more difficult the integration of such aircraft into the military program in a national emergency."

Agreement was reached to standardize cockpits still on the drawing boards, but change of models now in use was held up until a decision could be made on how the cost could be defrayed.

Another safety step was to tighten regulation of non-scheduled and intra-state airline operations.

**Standardization**

It is my opinion, and one of my most anxious concerns, that some means can be found to make possible the fullest standardization of transport aircraft, whenever and however they may be employed in this country. In our past experience and in our plans as we know them now, I see the most compelling evidence that such a course of action is both practicable and imperative.

For the military operator, standardization holds the key to effective training, crew efficiency, high fleet utilization, load flexibility, and economy of operation.

For the commercial operator, standardization brings all these advantages, too—adding up to greater payloads, lower costs, and bigger profits.

For the nation, standardization of its transport fleet means insurance against inefficiency, waste and delay in our airlift should it be called upon in another major emergency.

These are the principal agencies most interested in standardization. They can have no alternative but to work with common purpose at a problem whose solution will mean so much to them all.

—MAJ. GEN. LAURENCE S. KUTER, USAF
Commander, Military Air Transport Service

More rigid enforcement was begun in January, when the Board served notice of hearings beginning February 15. Following the hearings, rules were strengthened all along the line.

A crack-down came in June, when the Board revoked Standard Airlines' franchise in one of the most outspoken rulings in CAB history. The line had, the Board stated, "failed to offer even the color of compliance" to the rules, and had been guilty of "flagrant violations." The Board followed up its revocation with a request to the Department of Justice to institute criminal proceedings.

Beginning the year with skepticism toward coach-fare service, the Board nevertheless approved five lines to operate in this field. A mid-summer Board survey, however, indicated that the cut-rate, off-hour flights might prove economically sound. Survey was based on questions asked 7,000 passengers on 252 coach flights and 30,000 passengers on 1,120 paralleling regular-fare flights. Coach-service lines were Capital, Mid-Continent, Continental, TWA, and Northwest. Spring air coach travel accounted for almost a fourth of Capital's total passenger mileage and over a fifth of Northwest's. Some 21 percent of the air coach passengers questioned were making their first airline flight against about 11 percent "firsters" on the regular-fare schedules, and about two-thirds of the coach passengers would not have flown at regular rates.

Further study of the economics of the operations led to an early-fall Board policy statement favoring coach service over heavily traveled routes with planes having a large number of seats. Odd-hour schedules and no special services like meals and extra stewardesses were also recommended.

These findings led to some cancellations by the Board, but extended coach services for nine months over specific routes by Capital, TWA, Northwest, and Western. Douglas DC-4's were favored for the services.

The Board, in a series of decisions, gave route extensions to feeder lines during the year. Also helpful to the feeders was a decision in June approving use of single-engine aircraft and small non-transport multi-engine aircraft. The single-engine planes were limited to visual flight rules. Flight of small multi-engine planes was banned on long over-water routes.

To assure more rapid development, the Board ruled that feeders which had not taken advantage of their franchises by beginning operations before July 1, 1949, must forfeit permits. Most lines met the deadline.

Four irregular cargo carriers were given five-year franchises over specified routes to fly freight only—the Flying Tiger Line, Inc., Slick Airways, U. S. Airlines, Inc., and Airnews, Inc.

A series of decisions limited operations and economic and safety practices of irregular carriers and intra-state operators. Notable among these was the Board ruling on July 13 requiring scheduled intra-state operators to "comply with the same safety regulations as those which apply to scheduled interstate air carriers."

Two important problems put over till 1950 made news during 1949. These were the separation of mail pay from subsidy mail funds, and more extensive transport of first-class mail by air.

Early in 1949, Robert Heller and Associates, Cleveland management engineers, serving as a task force for the Hoover Commission to recommend changes toward more efficient government, came out strongly favoring separation of mail pay and subsidy mail funds. The task force also made a favorable report on increased use of airmail.

"There is reason to believe that broad economic studies might show . . . that certain volumes of mail moving regularly in certain directions between certain points of the country could be transported at lower cost by air than by rail if all factors were considered, including payment for return of empty cars required under present railway pay rates."

The Board continued studies toward extending use of airmail in line with the Hoover report, and separation of mail pay became a top policy issue.

"I believe that the advantages of separating the subsidy outweighs the disadvantages and dangers," Chairman O'Connell summed up for the Board.

Board member Harold A. Jones followed with a speech in May in California. Using the word "subsidy" for Federal airmail funds to the airlines is often a misnomer and always a handicap, he said. Billions, he pointed out, are paid annually to farmers. Publishers get cut rates on newspapers and magazines. Railroads got land grants without being tarred with the subsidy stick. Added Chairman O'Connell drily: "A hundred million dollars (for air mail) is not small change by any means, but it is considerably less than we are spending to support the price of Irish potatoes." And both members pointed out that the bulk of the funds labeled subsidy were actually in payment for services rendered by the airlines in delivering the mails.

Mr. Jones stated that he believed "there is a cure for this disease," and lined CAB policy up with a proposal by Senator Edwin C. Johnson that mail pay be separated from straight subsidy funds. He proposed further that subsidy funds be carefully studied to find where they are going and whether Uncle Sam is getting his money's worth.

This Board policy led to opposition of Congressional bills proposing an immediate solution of the mail-pay problem. The Board favored, rather, a study of mail carrying costs before a final decision, citing a "current lack of adequate facts" on which to fix final rates and separate subsidy from service fees. Funds for the study were not forthcoming from the Congress, so solution of the problem was postponed till 1950.

### National Advisory Committee for Aeronautics

Supersonic planes and power plants—experimental yesterday, tactical tomorrow—occupied most of the 1949 National Advisory Committee for Aeronautics time of the 17-man, President-appointed, unpaid board. Twenty-two subcommittees, representative of the brainpower of U. S. aviation, worked with NACA's 7,000 paid scientists and laboratory personnel. Scores of private companies and universities made major contributions to the research, which was concentrated at NACA's $100,000,000 research centers—Lewis Laboratory at Cleveland, Ames at Moffett Field, Cal., and Langley in Virginia.

One of the most difficult scientific tasks ever attempted, the NACA transonic-supersonic program concentrated, during 1949, on new tools and expanded research.

Strides were made in developing supersonic tools, notably three new wind tunnels, all operating in 1949. One is a 4x4 footer at Langley for velocities up to M (speed-of-sound) 2.2, second is the 6x6 foot tunnel at Ames for speeds up to M2, and the third is 8x6 feet, at Lewis, also permitting M2 speeds.

Data from the new tunnels is proving more accurate, giving designers invaluable information before building planes.

A battery of other scientific tools were developed. Samplings:

1. A set of instruments designed to clock supersonic reactions of planes and power plants in flight. These instruments can record increasingly accurate data under changing altitude and temperature conditions and transmit it to the ground by telemeter from free-fall and rocket models. Instruments to record tunnel data have also been improved.

2. A combined-loads testing machine, which simultaneously can apply bending, shear, twist, tension and compression.

3. An acceleration-speed-time altitude recording instrument for measuring gust loads.

Major projects in the 1949 research program include work on new air foils, high life devices, wings, engines and engine fuels, structural material, boundary layer control, the high-speed flutter problem, aircraft gust and maneuver loads, stability and control, spins, means of escape when a supersonic plane threatens to crack up, hydrodynamics and numerous other problems, many top secret.

To detail all of them would fill a chapter in this book, if not the book. Space permits coverage of only a few of the typical problems and findings.

The problem of better lift for supersonic sharp-edged wings at low speeds was attacked, with varying results.

Nose slots on thin airfoils with split trailing edge flaps were found helpful. A combination of leading and trailing edge flaps doubled lift. Most lift with least drag was achieved with increased chord on nose flaps.

Certain triangular and swept-back wings seemed to give enough control and greater lift at high speeds. (Practical use of these last findings is found in the Convair XF-92 and the North American F-86.)

Retractable spoiler ailerons have been found good over a wide range of speeds, allowing use of full span flaps to provide increased lift and lower landing speed.

In a parallel field of research, the whole problem of boundary layer control is under continuing study. Suction-slot control has been found effective. Suction is applied through a slot a short distance from the leading edge. This keeps the boundary layer from thickening and increases the lift as much as a third above the basic section lift. With thicker airfoils, suction applied through a slot near the trailing edge makes possible high angles of attack and high maximum lifts. Also, thicker airfoils can be used, which is important where longer spans entailing thicker root sections are desired for the high aspect ratio involved in long-range considerations.

While research in boundary layer control continues, the first and most simple practical application of findings to date, ironically, may result in improved trailing edge flaps on moderate-speed, long-range transports, rather than in the supersonic field.

Closely related to the lift problem is the problem of stability and control at high and low speeds. Various types of wings were examined, as well as tail designs, at transonic speeds.

Leading and trailing edge flaps, installed to improve lift, often caused instability. It was found that trailing edge flaps of more than 60 percent span on a swept wing, for instance, made it unstable whether leading edge flaps were used or discarded. Roughness of the wing made the condition worse.

The swept-wing "Dutch roll"—wallowing at low speeds—was cut down by increased tail length, reduced dihedral and reduced wing incident. All proved helpful, but were not always effective in combination. A rate gyro also helped in control because it is sensitive to the yaw but not the angle, so that rudder and ailerons are moved only in response to a change in heading and will not disturb a steady intentional yaw, such as a side slip.

No sooner do the NACA scientists lick one problem than a swarm of others rise to haunt them. Vibration and flutter at subsonic speeds were attacked by using uniform, untapered wings of moderate aspect ratio. At trans- and supersonic speeds, rockets, free-fall bodies and wind tunnel models developed wing-aileron trouble. Altitude may also be a factor, but no solution to the problem has been found.

End-over-end spinning is a characteristic of tailless aircraft, and controlling factors have been isolated and correlated. Chief among these are locations of the center of gravity, and weight distribution along the fuselage. Rearward weights tend to promote tumbling, while forward locations prevent it.

One way for a pilot to escape at high speeds is with a detachable nose section in the airplane. Research has been carried out in the spin tunnel and with rocket propelled models to determine the possibilities of this approach.

In light aircraft, a simple cure for spiral instability or tendency to fall into a spiral when turned loose has been found. This quality seems to be due to lack of positive centering of control surfaces due to friction in the control system, even though the stick may appear to be centered. A positive centering spring, which insures accurate return of controls to neutral, maintains the aircraft in steady level flight.

Jet engines burn up to ten times as much air as reciprocating engines, imposing a severe problem on the design of jet intakes. Recent studies have provided details on external drag, influence of different rates of internal flow on critical Mach number, and drag rise due to compressibility. Wing root inlets have been successfully applied, but generally applicable data has been lacking, and a systematic survey is underway.

NACA icing research continues on meteorological aspects and protection of jet engines. Three methods have been found effective. One is inertia separation of water at the air inlet by curving the airflow sharply. Another is warming the incoming air by hot gas jets taken from the combustion chambers and injected into the airstream. A third is warming the air inlet surfaces by internal hot gas circulation.

Research on light airplane induction systems has shown ways for automatic protection of carburetor and intakes. Pressure fuel injection, inertia air separators and heated throttle parts are recommended.

Research on the reduction of aircraft noise has progressed to a point where systematic design data on engine mufflers is being compiled showing that they can be made smaller and more efficient.

Engine research followed two broad approaches: study of fundamental processes and materials common to all engines, and more specific study of existing engines. Among the basic studies are combustion, general cycle analyses, cascade flows in compressors and turbines, heat transfer, supersonic engine aerodynamics, basic properties of materials, and lubrication and wear.

Five types of existing engines are being studied—turbo-jet, ram-jet, and rocket for high-speed flight; and turbo-propeller and compound engines for lower speeds. Goals are to obtain a maximum of thrust for a minimum of frontal area, weight, fuel consumption and manufacturing effort.

One of the foremost problems confronting performance is the effect of high altitude, where turbo- and ram-jets more easily stall, and rockets may explode. Variable area fuel nozzles which maintain good fuel spray at the low flow rates and pressures used at altitude have been helpful to turbos in this connection. Improved combustion resulting from better fuel spray also contributes to higher thrust. Improvement of flame holders, fuel injection methods and combustion chamber design aided ram-jets. Possible solutions to the rocket "stall" problem are: (1) keeping the engines and fuels sufficiently warm to insure prompt, safe starting, and (2) use of additives to the fuel to shorten the ignition lag. Problem of thrust increase for rockets is being attacked through research on new fuels and cooling to offset the attendant higher heat release rates.

Fuels research toward something better and more plentiful than kerosene resulted in specification of a new blend (JP-3) of gasoline, kerosene and Diesel fuel. Study of its composition and performance shows it to be equal to or better than kerosene.

Investigation of rocket fuels is directed chiefly toward finding propellants of higher specific impulse, or thrust for unit of fuel expended per second. New fuels have been investigated which provide more than twice the range of present gasoline-acid and alcohol-oxygen combinations. Two such fuels are hydrogen and fluorine and hydrogen and oxygen.

Research on materials is going forward to find high temperature resistant compounds which use a minimum of domestically scarce elements like cobalt, molybdenum and tungsten. Approximately 85 percent of the critical material used in a typical jet engine is in the turbine, where the highest temperatures are located. The weight of the turbine elements may run to 15 percent of the total engine weight, and critical elements often constitute 90 percent of the turbine weight. Evaluations were made of more plentiful materials with promising results.

## NEPA

Closely coordinated with NACA's research, as well as with the military and the Atomic Energy Commission, is work on nuclear energy for the propulsion of aircraft (NEPA) at the Federal atomic energy center in Oak Ridge, Tenn. The project began in 1947. Fairchild Engine and Airplane Corporation is the prime contractor to the Air Force on the project, and has

**Smokejumper drops from Ford Tri-motor in Montana**

a large staff devoting full time to it under Andrew Kalitinsky, who sums up the goal of the project:

"If an atom-powered airplane can be built, its range will be practically limitless. It would be able to fly around the world at high speed, and the fuel consumed on such a flight would be negligible."

Taking the "if" out of that statement is the goal of NEPA. Experiments are going forward with ram-jets, turbo-jets, and the closed-cycle turbine.

Fuel used for the atomic aircraft engine will probably be U-235 if the research is successful. Chances are that the nuclear plane of the future will be a big one, since the reactor in nuclear fission can be reduced in size only to a certain degree.

Progress on the work has been understandably slow, but went forward steadily during 1949. Definite findings were at least a possibility during 1950.

### Air Navigation Development Board

"One of the most complex and comprehensive systems of electronic and electro-mechanical units whose complete integration has ever been attempted" is the way one Board member sums up the work facing the Air Navigation Development Board.

Created November 2, 1948, the Board is headed by Ralph S. Damon, president of Trans World Airline, and has as members Col. W. B. Larew (Army), Col. S. A. Mundell (Air Force), Captain W. P. Cogswell (Navy), and John E. Sommers (CAA). Bert A. Denicke is the executive secretary. The Board acts as a steering group for the programs' research and development activities.

The ANDB technical staff is responsible for directing a common system technical program in accordance with Board policies. The staff is directed by Dr. Douglas H. Ewing. His staff are Dr. Maxwell K. Goldstein, Norman Caplan, J. Wesley Leas, Henry R. Senf, and Dr. LaVerne R. Philpott.

ANDB was organized as the result of five key reports made by various groups of experts, including Special Committee Thirty-One, during 1947 and 1948. Special Committee Thirty-One, set up under the Radio Technical Commission for Aeronautics, issued its report in February, 1948, offering a specific plan for meeting both military and civil needs.

ANDB was established under the joint auspices of Departments of Defense and Commerce. So far as the military is concerned, most of the work will be approached from the non-tactical angle, but with provisions allowing development to be channeled toward defense requirements in case of emergency.

ANDB spent 1949 getting organized, analyzing current research and development, establishing a program, and getting initial developments started on some of the projects.

The program as it stands now is two-fold: transition and ultimate. Under the transition program, to be completed by 1954, the work of the Board will be concentrated on the refinements and technical evaluation of navigational and air traffic control aids, some of which are already in operation. These include: the VHF omni-range (VOR), instrument landing system

(ILS), precision approach radar (PAR, formerly part of GCA), ground VHF/DF, high-intensity approach lights, traffic control towers and centers, and communications stations. Distance measuring equipment (DME) and course computer also fall in this category. By using these together, a pilot can fly an omni without going direct to the station. The computer accepts the coordinates of the destination-point in bearing and distance from the VOR-DME station, as set manually by the pilot, plus the information received automatically from the VOR-DME and furnishes bearing and distance to the destination. The deviation indicator is used to show displacement from the selected course (the course is inserted manually), the distance indicator is used to show distance from the destination.

Airport surveillance radar (ASR) is another phase of the transition program that is about developed. The present equipment does not permit the ground operator conveniently to identify aircraft without using VHF/DF and/or radio telephone, and is also subject to loss of signal from small aircraft, especially at long ranges; the use of secondary radar and transpondors will be a great help in eliminating these shortcomings.

With most of this equipment completed or well under way, the major ANDB emphasis in the transition period will be on secondary radar, airport time utilization equipment (ATUE), and airport surface detection equipment (ASDE).

The secondary radar-transpondor operation depends on the principle used in identification, friend or foe (IFF) during the war. The ground station transmission is automatically picked up and returned by equipment in the aircraft with no cooperation needed from the crew. This tells the position of the aircraft. Also considered is a project for the display of aircraft in accordance with their altitudes and identity. By setting predetermined electronic answers in the aircraft's transpondor and by use of an automatic connection to the altimeter, altitude and identification will be made available to the ground controller. This is all planned as a push-button affair for the ground operator, and the obvious advantage is the time-saving element over the present voice method.

The transition period doesn't come close to touching the complications that will be found in the ultimate program. With over $70 million to spend on development alone (subject to appropriations—total program including production and installation calls for over $1 billion), the Board is faced with finding a solution to current radio navigation and traffic control problems. Most of the work in this program is planned for completion by 1964, and naturally new devices will have to be built around 1964 aircraft speeds and characteristics. Cornell Aeronautical Laboratory is conducting a study to predict what may be expected "evolution-wise" in the way of aircraft. This work will tap the information already available to the military and CAA.

Another basic study will be that on "channel multiplexing." In order to take complete advantage of the radio spectrum it is desirable to transmit several types of information on the same channel. If a combination of transpondor, voice, and telemetering functions could be put on one channel, possibly through some time-sharing method, there would be more space left for other equipment.

Another phase of the basic studies calls for getting an antenna system that works independently of the aircraft's attitude.

The Board has proceeded with caution. The next step in the ultimate program will be spent in applying the basic studies to the end that existing equipment can be extended and new equipment for additional functions provided. The main emphasis will be on traffic control.

For the ultimate system, the ground controller must know the position, altitude, identity, and track of all aircraft in the area even though they aren't equipped with transpondors (or if the transpondor is inoperative). This calls for a highly developed volumetric scan radar.

The pilot should also know his position accurately and the position of aircraft near him. For this function ANDB will stress the development of "universal, simple, and light-weight airborne equipment which places a minimum burden upon pilot and traffic controller, and which can be produced at minimum cost to the user and the government." Ground equipment to work with this unit must be developed and will represent an extension of the present VOR and DME facilities.

A study will also be started to outline methods leading to a reliable all-weather landing and take-off system.

Other projects in the program include psychological studies both from the pilot's and operator's points of view, new integrated display equipment, new test equipment, and an evaluation of current air traffic control developments, including RCA's Teleran project, the Facsimile Plan Position Indicator work done by Haller, Raymond, and Brown, Navar and Navascreen development by the Federal Telecommunications Laboratory, Hazeltine Electronic's Lanac project, General Radio Signal Company's Block Signaling System, and Sperry's work with their Microwave Air Traffic Control System.

## Post Office

Long-awaited legislation authorizing air star routes for the Post Office —a boon to lightplane makers—was passed by Congress on August 19. Postal officials expected to set up a network of twelve routes over the following year. By the end of 1949, two were already established.

Selection of local operators is open for competitive bidding. Subsidies as such are out. The department specifies that service must be performed at a cost not too far out of line with those of surface transportation, and the proposed route must not conflict with development of a feeder or trunk line. Type of plane is not a major factor, but bid invitations must specify poundage. Post Office officials emphasized that need for a route must be proven.

Two routes in operation prior to passage of the bill gave a good idea of possible income. One in Ohio, flying a Ford tri-motor over a distance of 22.8 mi. and return, revenued 92 cents per plane mile for a base load of 250 lb. with an additional 1 cent per 20 lb. over base. The other, operating in Michigan with a Cessna twin-engine over a 35-mile distance, made 40 cents per plane mile for a 250 lb. base load plus 4 cents for each 20 lb. in excess.

Scheduled airlines have "not less than 30 days" to protest a proposed route to CAB. Fear that this might slow star route okays seemed unfounded when the first two under the bill were established in October. After deciding the routes were feasible, the Post Office submitted them to CAB. The thirty-day period expired on October 19 without protest or comment, and the routes were offered for bidding.

The first covers a 50-mile distance from Honolulu to Kalautapa, in Hawaii. The second is a 35-mile run from Charlevoix, Mich., to St. James, Mich.

A department spokesman stated that other routes are planned in the United States in the Great Lakes region.

Airlines benefited in October when a bill releasing $16 million in back mail pay was signed by the President. Airline payments followed immediately.

### The Air Coordinating Committee

The Air Coordinating Committee, established in 1946 by the President to coordinate Federal policy in the field of aviation, has members from seven agencies most interested in aviation.

Chairman is Joseph J. O'Connell, Jr., also chairman of the Civil Aeronautics Board. Other members include: E. H. Foley, Jr., Under Secretary of the Treasury; James E. Webb, Under Secretary of State; Stephen Early, Deputy Secretary of Defense; Paul Aiken, Second Assistant Postmaster General; C. V. Whitney, Under Secretary of Commerce; and J. Weldon Jones, Assistant Director, Bureau of the Budget. Executive Secretary is Charles O. Cary.

Chief among 1949 activities was the preparation for the National Security Resources Board of aviation mobilization plans and plans implementing an all-weather flying system. Other areas where significant achievements were realized in 1949 included approval of Standards and Recommended Practices of the International Civil Aviation Organization; airspace, facilitation of entry of air commerce into this country, aviation policy for occupied areas, and the revision of present international law applying to aviation.

### Aeronautics Division, Library of Congress

At the end of 1949, the aeronautical collections of the Library of Congress totalled over 300,000 pieces, making it the largest in the world.

During fiscal 1949 the library aeronautics division acquired four distinguished collections: the papers of General Carl Spaatz, former Chief of

Staff of the United States Air Force; the papers of the late Lieutenant General Frank M. Andrews; the papers of the late General William (Billy) Mitchell; and the papers of the late Orville and Wilbur Wright.

The General Spaatz collection, comprising an estimated 150,000 pieces, forms an invaluable body of documentation, not only of the air phases of World War II but, in a more general way, of the rise of air power to its present position. Access to the General Spaatz collection is subject to the approval of the Chief of Staff, USAF, and General Spaatz.

The Wright papers form a unique documentary of the early careers of both Wilbur and Orville Wright. Historic materials hitherto not accessible include: diaries and notebooks recounting experiments from 1900 to 1910, with a detailed description by Orville Wright of the Kitty Hawk flights of 1903; correspondence on the sale of the first military airplane to the War Department; correspondence with foreign governments on the introduction of the Wright airplane abroad; financial records of Wright enterprises from 1894 to 1906; letters, documents, and reports relating to the prolonged controversy between Orville Wright and the Smithsonian Institution; and extensive correspondence files covering a period of nearly 67 years, from April, 1881, to the death of Orville in January, 1948. In making this gift to the nation, the executors of the Orville Wright estate, with the approval of the heirs of Orville Wright, have provided that free access to the papers may be granted to any trained scholar or writer doing serious research, but have stipulated that until January 1, 1960, special permission must be obtained.

The Mitchell papers, a gift of Mrs. Thomas Bolling Byrd, the widow of General William Mitchell, and her children, include letters, diaries, clippings, photographs, and numerous manuscripts (many unpublished). Of particular interest among the unpublished writings are the typescripts of books on Alaska as the key to the air defense of the United States; the Pacific as the probable scene of the second World War; and aviation in World War I (a history). These works, with illustrations, are accompanied by the war and administrative diaries, inspection reports, and voluminous notes on which they are based. Other historic documents included in the collection are: typewritten transcripts of General Mitchell's testimony at various times before numerous committees of Congress, many portions of which do not appear in the published record; materials relating to the court-martial of 1925-26 which resulted in General Mitchell's resignation from the military service; correspondence at that time and prior with members of Congress, especially the then chairman of the House Military Affairs Committee, John J. McSwain; letters (1934 and 1935) from important persons throughout the country endorsing General Mitchell for appointment as Assistant Secretary of War for Air; and an interesting series of communications in 1932 and 1933 with Franklin D. Roosevelt, whose candidacy for the Presidency General Mitchell strongly supported. In making this gift, Mrs. Byrd has left access to the papers freely open to any trained scholar who may wish to use them for purposes of serious research with the stipulation that during her lifetime her permission shall be sought for any use of the papers in the preparation of a newspaper or popular magazine article or a book intended for popular sale.

Other important aeronautical materials acquired included microfilms of 100 selected Air Force historical studies, reference histories, and unit histories prepared by the historical staff of the Army Air Forces. Complementing this collection of American air histories are the microfilm copies of the materials assembled by the official historiographers of the German Air Force of World War II, the Von Rohden Collection.

The Division continued to sponsor jointly with the National Air Council a series of lectures designed to portray the impact of aviation on present world affairs. Lectures to date include: *Air Transportation and National Defense* by C. R. Smith; *The Fundamentals of Air Power* by John C. Cooper; *Aviation History, 1903-1960* by John K. Northrop; and *The Economic Consequences of Air Power* by J. Carlton Ward, Jr.

Chief of the Aeronautics Division is Richard F. Ealls; Arthur G. Renstrom is assistant chief and Leonard Beck, research analyst.

**Other Federal Agencies**

The Federal Communications Commission worked with a number of aviation groups during the year, notably the Radio Technical Commission for Aeronautics, to set standards on VHF radio equipment, distance measuring equipment, air traffic transpondor-private line visual communication and VHF emergency and airway communications frequencies.

The Commission was also active with the International Administrative Aeronautical Committee for Aeronautics, ICAO, and the Air Coordinating Committee through their various subcommittees.

In its work with ICAO, the Commission furnished advisors to four air navigation meetings.

FCC figures revealed that ground stations and radios in private planes showed a sizeable increase in 1949, the latter reaching 23,000 (see Chapter on Lightplanes.)

During the year, the Interior Department's Fish and Wildlife Service used planes from Alaska and Canada to Mexico in a variety of ways, from hunting coyotes and wolves and spotting illegal duck blinds to conducting wildlife censuses and herding waterfowl.

More than 6,000 hours were flown by the Service's thirty-seven aircraft under Chief Pilot John N. Ball, employing eight full-time pilots in Alaska and twenty-seven men holding CAA private and commercial pilot certificates and letters of flight authority. Service policy is to use pilots who are qualified game management agents, refuge managers, biologists, or predatory and rodent control agents. Planes from the armed services, state game and fish departments and interested sportsmen supplement the work.

Other activities of the Service included flying hunters and equipment to remote spots in Utah, Idaho, Oregon, and Alaska, spraying noxious vegetation, seeding for suitable waterfowl food, aerial photography, and disease patrol (such as duck botulism). Waterfowl herding and dispersing were done to prevent crop destruction on farm lands near refuges. The war on coyotes brought a bag of 1,701 in western states while other planes attacked wolves in Alaska. The Alaska fisheries branch, operating four Grumman *Geese* amphibians, one Republic *Seabee*, one Noorduyn *Norseman,* and one twin Beechcraft, flew 928 hours on fishery patrol, observation, survey and transport.

In eastern U. S., one agent caught thirty-four violators and destroyed numerous duck traps seen from the air. In Louisiana, a Republic *Seabee* spotted seventy-six illegal traps and blinds. On the west coast and in Alaska, aerial photos were made of violators and presented as evidence in court.

Planes were also used on water-development projects and for long-distance transfers of fish.

Most important aviation mission of Agriculture's Bureau of Entomology during 1949 was its DDT-spraying battle against gypsy moths in New England. Planes and helicopters operated over a 250,000-acre area for nineteen flying days.

Another major job during the year was bait-spreading to kill grasshoppers in Wyoming and Montana, the first time a control measure had been started before an actual outbreak occurred. By catching the grasshopper in its breeding place in the range lands, a migration to more fertile areas was prevented.

In June, twelve planes sprayed 15,000 gallons of DDT over a 261,000-acre area in Oregon, destroying the spruce budworm and saving an estimated $31,000,000 in spruce. A similar campaign is planned during 1950.

The Bureau operated twenty planes, including N3N's, C-47's and World War I *Standards*. Contract planes were also used—Bell helicopters, Boeing B-18's, Twin Cessnas, Noorduyn *Norsemen,* and Stinson L-5's. Over a million acres were covered.

Entomologists estimate that it would take 400 trucks and 1,200 men to do the spraying job of one Douglas C-47 and three men. Aerial spraying is also cheaper and more lasting. Spraying solutions are effective at the rate of one pound of DDT per acre and not strong enough to do any appreciable damage to anything but the infestation. Usually one spraying from a plane is enough, while other methods must be repeated every few years.

The Agriculture Department's U. S. Forest Service employs 250 "smoke jumpers" who save about $150 thousand annually as fire-fighters. The Service operated sixteen planes in 1949, and contracted Douglas C-47's, Ford tri-motors, Travelaires, and helicopters to patrol America's 600 million acres of forest land. Approximately 4,300 flights, 7,100 hours, and nearly 700,000 pounds of freight were flown.

**Douglas C-47 combats gypsy moth**

The Forest Service also operates a plane-portable sawmill out of Missoula, Mont. Probably the only one of its kind in the world, it can be flown into the wilderness, assembled, put to work, and then flown out again.

Interior Department's National Park Service, working with the Forest Service, hauled firefighters, some coming all the way from Georgia, to the Yellowstone fires. The Park Service also used a Hiller 360 to rescue a boy who had fallen from his horse in a remote section of Yosemite National Park.

The Bureau of Reclamation of the Interior Department has six planes which it flies about 1,800 hours a year—a Lockheed *Lodestar,* two twin Beechcraft, and three Fairchild 24's. Occasionally a helicopter is contracted for powerline patrol.

Initial surveys for dam sites, transmission line locations, checking flood conditions and flow in river basin areas are done from the air, saving time and money. Initial survey work on a transmission line is done in three days by one plane and one pilot. The alternative is to send out a ground crew of five for three months.

Working through its ten regional offices, it fell to the Public Health Service during 1949 to certify water and milk supplies used by airlines, inspect commissaries where food is prepared prior to being served on planes, review plans for new planes, and okay sanitation facilities at airports and aboard planes.

If sanitation conditions do not meet with Public Health Service's approval, a statement of recommended changes is sent to the plane manufacturer or airport in question. The Service works directly under interstate quarantine regulations.

Cooperating closely with organizations representing all phases of the aviation industry, the Weather Bureau is constantly adapting its services to meet their changing needs. Numerous new and improved observing instruments and techniques for this purpose were under test and development during 1949.

Instrument landing systems, lowering ceiling and visibility operating minimums, created need for more accurate reports. Automatically recording ceilometers were therefore installed at approximately 140 stations. An improved design providing for much more rapid scanning and a more nearly continuous remote reading of ceiling heights, and a transmissometer providing for the automatic recording and remote reading of visibilities are under test. Nighttime visibility readings are being improved meanwhile by the installation at a few test stations of retro-reflectors used in conjunction with a light source to determine the farthest reflector visible. Use of direct-reading wind equipment is proceeding rapidly, and altimeter setting indicators have been installed at over 100 locations.

Radar equipment to clock severe storms is also used. The Weather Bureau has seven installations at present, two of which are cooperative, and a cooperative program with the CAA and Air Force is gradually being expanded. Weather Bureau sets cover about a 125-mile radius and respond to any storms bearing large water droplets.

Adequate facilities for the teletype transmission of all forms of increased data has become another important problem. Improved automatic transmission, and new relay and scanning equipment installed during the past few years have increased the capacity of these circuits to carry additional data and distribute it more quickly and reliably. It is anticipated that the transmission speed will be increased from 60 to 75 words per minute during 1950. For local distribution of specials and pilot reports, the teleautograph is being installed at selected locations.

A joint Air Force, Navy, and Weather Bureau Analysis Center at Washington provides completely analyzed surface and upper air charts and numerous other analyzed meteorological charts for national distribution over a growing facsimile network maintained by the Air Force. Weather Bureau uses local facsimile circuits at New York, Chicago, and San Francisco for the more rapid inter-office distribution of analyzed maps and flight forecast cross-sections from central forecasting offices to airport pilot briefing offices.

FISCAL BUDGET

(As of November 15, 1949)

| Agency | Budget Request | Congressional Appropriation | Difference |
|---|---|---|---|
| NACA | $ 96,600,000 | $ 63,000,000 | $ 33,600,000 |
| CAA | 218,183,500 | 206,548,605 | 11,634,895 |
| CAB | 3,980,000 | 3,620,500 | 359,500 |
| AIR FORCE | 5,428,887,000 | 5,276,641,000[1] | 152,246,000 |
| NAVY | 4,347,000,000 | 4,168,000,000 | 181,000,000 |
| BuAER | 1,200,667,000[2] | 1,216,686,000[3] | +16,019,000 |

[1]Public Law 434, Sect. 701, cuts back appropriation to $5,206,141,000. $615 million frozen by President.
[2]Total appropriation request less amount necessary to liquidate last year's obligations.
[3]BuAer would not give definite figure. May be $20 million less.

Major project for the National Air Museum during the year was caring for a large amount of World War II material collected from the Air Force and Navy. This included nearly a hundred and twenty aircraft of all nationalities and types. The number of acquisitions has imposed a serious space problem which has been solved temporarily by using the assembly building of the former Douglas DC-4 plant at Park Ridge, Ill., for storage. Plans for a new museum building to house only NAM material have been on the boards for some time, but the project is still in the formative stages with no hint of an early start.

During fiscal '49 the Museum received over a hundred items including the *Gulfhawk-2* from Al Williams and the Gulf Oil Corporation. Panagra's first Fairchild, Aeronca's first sport plane, a number of engines from Wright Aeronautical, and several scale models from plane manufacturers.

The National Air Museum is an outstanding example of government in aviation. While not operating in a production capacity, NAM does serve the important function of preserving some of the historic examples that have lifted the industry to its present level.

The Smithsonian Institution had been collecting aeronautical material for over seventy-five years before Congress and the President authorized a separate bureau to operate under the Smithsonian. This was on August 12, 1946, and since then the Museum has continued a policy of rounding out a representative collection of aviation history.

The first aeronautical entry the Smithsonian received was some Chinese kites back in 1877. Since then additional exhibits have included the Wright brothers' *Kitty Hawk* and eleven other pioneer aircraft of that period, eight planes of World War I, the first aircraft to cross the Atlantic, the first to fly the continent non-stop, the first to fly around the world, Lindbergh's *Spirit of St. Louis,* Wiley Post's *Winnie Mae,* Ellsworth's *Polar Star,* Loening's *San Francisco,* Doolittle's Schneider Trophy Racer, two World War II jets, and a Japanese Baka bomb. (See Chapter on Historic Planes). In addition there are a number of engine exhibits, scale models, instruments, flight clothing, and other aviation items.

# CHAPTER FOUR

## The Airlines

SCHEDULED U. S. airlines had the best year in their post-war history, if not the best ever. The year before—all the post-war years—had been notable for a balance-sheet paradox—all-time record traffic coupled with all-time record losses.

During 1949, the paradox was shattered to the delight of all concerned—including the customers.

International operations were shaken down and expanded, as were air freight and, to a lesser degree, local service operations. In the entire balance sheet of U. S. scheduled air transport, only one item showed a decline over the year before. Ton miles of express flown was off 14.3 percent, a decline more than balanced by the inauguration of air parcel post, for which there are as yet no comparable figures. Everything else, domestic and foreign, was up from 4 to nearly 50 percent.

Domestic revenue plane miles jumped from more than 316 million to 330 million, a gain of 4.4 percent, while international revenue plane miles were up from 98 million to nearly 110 million, a gain of 12 percent. Domestic freight ton miles were up from 70 to 95 million, a 34.9 percent gain. All freight service, incidentally, gained official approval in 1949 when the Civil Aeronautics Board awarded four all-cargo carriers five-year franchises. The Flying Tiger Line, Slick Airways, U. S. Airlines, and Airnews, Inc., won the awards.

A roll-call of the lines finds few without a complete turn-around in their financial situation. Capital came dramatically out of the red into the deep black, aided materially by their pioneering aircoach service program. Wisconsin Central showed a straight six months of profits, and its August figures placed it among the more financially successful feeder airlines of the country. During the first eight months of the year, Northwest Airlines showed earned profits, before taxes, of more than $2 million, compared with almost an equal amount in losses during the same 1948 period. Delta ended its fiscal year on June 30 with net profits after taxes of $639,000, following a new all-time company revenue high for the month of March of $1,501,228, with net profit after taxes of $99,560. National's revenues for the first nine months of the year were 108 percent above the same figure for 1948. Pioneer reported a six-month revenue of $700,073 as compared with 1948's $535,942, making a net profit of $56,614 as compared to only $15,808 in

1948. Other lines had comparable gains. Substantial increases in all categories of operation were noted by the three divisions of Pan American World Airways. Indications were that passengers and cargo carried in 1949 would surpass 1948 totals in PAA's Atlantic Division, serving Europe, the Middle East, India and Africa; in the Pacific Division, serving Hawaii, the Philippines, the Orient, the South Pacific and Alaska; in the Latin American Division, serving South and Central America and the Caribbean area. The half-year domestic airline profits were estimated at more than $6.3 million, with double that figure possible at the end of the year. Total operating profits were more than $10.5 million, with the net profit at more than $6.5 million. In view of the capital requirements of the airlines, these profits were none too high, but satisfactory nevertheless.

Year-end operating totals were as follows:

Domestic and International United States Airline Statistics[1]
(Estimated by Dr. Lewis Sorrell, Director of Research, Air Transport Association. For comparable ten-year figures, see back-of-the-book Statistical Summary.)

| | DOMESTIC TRUNK LINES | | | INTERNATIONAL LINES | | |
|---|---|---|---|---|---|---|
| | 1949 | 1948 | % | 1949 | 1948 | % |
| Rev. pass. mi. (000) | 6,500,000[2] | 5,822,540[2] | 11.6 | 2,155,000 | 1,888,997 | 14.1 |
| Passengers (rev.) | 14,130,500[3] | 12,324,038 | 14.7 | 1,435,000 | 1,372,749 | 4.5 |
| Rev. plane-mi. | 330,250,000 | 316,276,359 | 4.4 | 109,820,000 | 98,053,411 | 12.0 |
| Mail ton/mi. | 42,500,000 | 37,509,922 | 13.3 | 21,850,000 | 16,441,884 | 32.9 |
| Express ton/mi. | 25,500,000 | 29,768,883 | —14.3 | 55,500,000 | 41,147,863 | 34.9 |
| Freight ton/mi. | 95,000,000 | 70,437,811 | 34.9 | 6,250,000 | 4,188,467 | 49.2 |
| Operating rev. | 460,750,000[4] | 413,352,887 | 11.5 | 292,850,000 | 249,234,199 | 17.5 |

[1]Data for international lines estimated on the basis of performance for 1949—6 months' period.

[2]As of September.

[3]Computed via 460 average length of trip.

[4]Used 5.80 pass. multiplier; 1.10 for mail; .35 for express; .20 for freight. Other rev. based on % of this to total in 1st quarter of 1949 is 2%.

As conditions improved, other top post-war troubles came under control. Accidents and costly groundings were eliminated to the point that 1949 broke scores of safety records.

The two most spectacular accidents of the year were from causes beyond the control of the airlines involved.

But for a stunting Navy pilot who crashed into a transport near Fort Dix, N. J., on July 30, killing sixteen, scheduled domestic air transport would have completed 12 months without a fatality early in August. The crash broke a domestic safety record of thirty-six scheduled airlines totalling nearly 6 billion passenger miles without a fatality—the finest record ever established by any mode of travel. The only comparable record in scheduled airline history was the seventeen-month period from March, 1939, to August, 1940, also without an airline fatality, but totalling only 1.3 billion passenger miles.

The second accident was similar, although the non-transport pilot was not stunting. He crashed a P-38 into a transport at Washington National

## Uncle Sam's Income from the Airlines

**EDITOR'S NOTE: As the accompanying figures show, the Federal government—the American taxpayer—gets more net profits from the airlines than all the operators put together. During the ten year period 1939-48 inclusive, Uncle Sam's total net income from air transport operations was more than a billion and a half dollars—$1,780,720,373. This contrasts with the net airline profits of some one hundred and sixty million—$159,740,889. In other words, for every net dollar earned by the airlines, Uncle Sam earns more than ten. The figures:**

### Federal Income and Expenditures

| YEAR | FARE & FREIGHT TAXES | PERSONNEL INCOME TAX | ALL OTHER TAXES | AIRMAIL REVENUE | AIRLINE PAYMENTS |
|---|---|---|---|---|---|
| 1939 | | | 3,609,929 | 20,251,912 | 26,347,614 |
| 1940 | | 1,183,343 | 5,860,513 | 25,037,305 | 31,857,697 |
| 1941 | 87,570 | 2,453,956 | 8,870,530 | 33,230,293 | 36,315,915 |
| 1942 | 9,748,767 | 66,803,591 | 19,081,420 | 45,433,264 | 37,771,329 |
| 1943 | 11,405,331 | 98,476,297 | 20,419,426 | 94,464,782 | 28,871,760 |
| 1944 | 15,095,376 | 110,453,588 | 23,884,370 | 130,689,009 | 31,632,744 |
| 1945 | 21,256,344 | 184,468,788 | 24,622,925 | 191,912,455 | 41,557,963 |
| 1946 | 47,242,005 | 260,723,420 | 15,083,476 | 126,509,161 | 36,813,271 |
| 1947 | 58,383,702 | 345,678,996* | 21,859,839 | 76,129,360 | 48,998,346 |
| 1948 | 63,046,717 | 421,564,302* | 20,743,844 | 114,000,343 | 87,500,000 |
| TOTALS | $226,265,812 | $1,491,805,981 | $164,036,272 | $857,657,884 | $407,666,639 |

| | |
|---|---|
| TOTAL FEDERAL INCOME | $2,739,765,949 |
| TOTAL FEDERAL EXPENDITURES | $959,045,576 |
| NET FEDERAL INCOME | $1,780,720,373 |

*Estimate, based on 1946 income tax rate on average national income.

Airport on November 1 as both were coming in for a landing, despite warnings from the control tower that he change his line of flight. The resulting tragedy, worst in transport history, killed fifty-five persons.

The accidents did not prevent domestic lines from finishing the year with one of the best safety records in history.

Twenty-seven domestic and overseas carriers won awards from the National Safety Council in mid '49 which foreshadowed operations for the entire year. American Airlines set a new all-time record by ending 1948 with 2,933,272,000 passenger miles without a fatal accident. Trans World Airline had 2,144,168,000 and Braniff International Airways, Inc., 1,112,599,000. Hawaiian Airlines, Ltd., won an award for a no-accident record since it was organized 19 years and two months before. Northeast Airlines, Inc., scored for passing its fifteenth anniversary without a fatal accident, while Pan American-Grace Airways, Inc., ran up a safety score of five years and 523,422,000 passenger miles.

Lines without a fatal accident on their records also included Inland Air

Lines, Inc., Urbana, Medellin & Central, Caribbean-Atlantic Airlines, Inc., Challenger Airlines, Inc., Empire Air Lines, Inc., Florida Airways, Inc., Monarch Air Lines, Inc., Piedmont Aviation, Inc., Pioneer Air Lines, Inc., Southwest Airways Co., Trans-Texas Airways, West Coast Airlines, Inc., and Wisconsin Central Airlines, Inc.

Other award winners were American Overseas Airlines, with 389,000,-000 safe miles flown; Capital Airlines with 459,200,000; Chicago & Southern Air Lines, Inc., with 671,300,000; Colonial Airlines, Inc., with 234,-800,000—twenty years of operation without a fatality; Continental Air Lines, Inc., with 325,000,000 and fifteen years; Mid-Continent Airlines, Inc., fourteen years and 380,400,000 miles; National Airlines, Inc., with 475,200,000, and Western Air Lines, Inc., with 285,900,000.

Continental's maintenance employee safety record, unsurpassed by any domestic airline in the United States, also declared a dividend by winning the Colorado Safety Award.

Scores of new planes were added to the services to speed flights and take care of burgeoning loads.

Many of the new craft replaced the Douglas DC-3, famed as the "work horse of the air" and a leading actor in transport history for more than a decade. Lines vied with each other in retiring the plane with honors. Northwest also retired it with ceremonies. But if the DC-3 ceased service on some lines, it continued to add its score of safety and efficiency to many another and indications are that it will for years to come. For the first time, an old and honored plane will be revamped in modern lines to give continued service, Since Douglas has announced the Super DC-3 and some airlines will purchase them.

Douglas DC-6's, Consolidated-Vultee Convair Liners, Lockheed Constellations, Martin 2-0-2's, and the 1949-new Boeing Stratocruiser formed the parade of new planes added to the services.

Northwest led with Stratocruisers, putting the first model into actual passenger service August 1. It promptly responded with two flights that went down as records in the Northwest log, going from Twin-Cities to New York, 1,050 miles, piloted by Capt. Joseph Kimm, in two hours and fifty-two minutes; and from Twin-Cities to Chicago, 350 miles, pilot Capt. William Morgan, in sixty-five minutes.

Ten Stratocruisers were scheduled to fly the Northwest banner. Pan American is booked for twenty, American Overseas for eight, United for seven. All lines had models in service before the end of the year.

American featured DC-6's and Convair Liners in its domestic passenger runs, converting DC-4's to cargo service. By early spring, the line had fifty DC-6's and seventy-five Convairs in service. Douglases also featured in transport news from Delta (five DC-6's) and National (six DC-6's).

Lockheed Constellations again made national news in June when TWA ordered twenty, which will bring the line's Connie fleet to fifty-five when deliveries are completed next summer. Eastern added seven Constellations to the thirteen already flying its flag, and Chicago and Southern is down for five, deliveries to be completed by summer, 1950. An Eastern delivery, ferrying from Los Angeles to New York on February 5, set a new commercial transcontinental speed record of six hours, seventeen minutes, thirty-nine and a half seconds. It was piloted by Fred E. Davis, top speed 480 miles per hour.

Northeast took delivery on five Convairs, as did Continental.

Improved maintenance techniques and airways operations combined to make giant strides toward the airline goal of all-weather flying.

Most lines raised operation efficiency marks and the percentage of flights completed into the upper nineties.

Landing minimums allowed for scheduled air carriers were steadily reduced.

Reductions began as early as October, 1947, when Braniff International Airways, Inc., was granted permission by the Civil Aeronautics Administration to land under a minimum of 200 feet and half-mile visibility at seven southwestern cities, using CAA's instrument landing system.

In speed, in dependability, and in other ways, the air transport product has improved substantially, and so has the public acceptance of that product.

What about the price of this improved product? Today, United's passenger rate is 4 percent higher than in 1939, and the air-mail rate of pay is 56 percent lower than it was ten years ago.

On the other hand, what about the cost of the product? The materials and services which go to make up our operating expenses are 86 percent higher than in 1939.

Government investment in the air transport industry through payment of carriage of airmail began with the Post Office experiments in 1918. Over the following thirty-year period, the Government paid out $405 million for the transportation of airmail. To that figure was added $183 million for overhead and related services. The total bill for thirty years was $588 million.

During this same period receipts from the sale of postage stamps for airmail amounted to $539 million.

That means the industry development was accomplished at a net cost of $49 million.

I believe it has been a very good investment.

A few of the domestic trunk airlines are not being subsidized through mail payment at present. Instead, they are performing an improved service at what seems to be a low cost indeed.

—W. A. Patterson, President of United Air Lines

By June, 1949, 38 cities were open to landings under these minimums, while 35 were open under minimums of 300 feet and three-quarters of a mile, ten under minimums of 400 feet and a mile, and two under minimums of 500 feet and a mile and a quarter. Preview of future minimums was given in midsummer, when CAA opened Arcata, Cal., for Southwest Airways Co. to 100 feet and a quarter of a mile. Slope line approach lights as well as ILS are being used at Arcata, location of the Federal Landing Aids Experiment Station to improve transport landing operations.

Scores of lines improved operations techniques. Trans World Airline completed streamlining its operation division, combining its former domes-

**Subsidy — or Investment?**

The air transport industry has received one-fifth of the government aid granted the railroads and one-twelfth the aid granted the water carriers.

In twenty years, the airlines have accomplished in the earn-backs what it took the railroads over a century to achieve, and what the water carriers have never achieved.

Since 1941, the industry has achieved better than a 33 percent decline in dependence on government in the face of a 62 percent increase in the cost of doing business.

The American taxpayer has not only gained the greatest air transportation system on earth as a result of the air mail subsidy, plus an adjunct to the national defense which it would otherwise have cost him untold millions to provide—he is $54,000,000 ahead in cash as well.

—CARLETON PUTNAM, Chairman of the Board
Chicago & Southern Air Lines, Inc.

tic and international divisions into a system-wide unit at Kansas City, Mo., where all domestic and overseas major overhauls are now made.

TWA re-installed modified terrain warning units in its aircraft.

Two other major maintenance installations figured in the year's airline news.

United Air Lines, Inc., marked the first anniversary of its central base at South San Francisco, Cal., by reporting a series of new records. A total of 1,123 aircraft engines were overhauled during the year, as contrasted to the pre-base engine overhaul top score of some 480 annually.

Although all shops within the base showed efficiency increases, the radio, electric, and instrument repair shops made the most spectacular strides. Before coming to the base, the shops repaired 4,000 units a month, a figure that was more than doubled in the new quarters. Unit repair often hit a peak of 400 daily.

Overhaul of Mainliners at the base was almost doubled, reaching a total of 221 for the year.

Safety records among employees also improved. United lost only one hour and twelve minutes per 1,000 man-hours worked at the base, as compared with the National Safety Council record for the aircraft industry as a whole of two days per one thousand man hours.

W. P. Hoare, director of the base, recently pointed out that United's schedule completion record is proof of the job the base is doing.

At year's end, he and his staff were rounding out training for overhaul of the new Boeing Mainliner Stratocruisers which will go into general service in 1950. More than 600 specialized employees took the courses.

Eastern Air Lines, Inc., hailed as a major accomplishment the opening of its $1.5 million maintenance hangar at Miami. Built to give workers year-round fresh air, but protection from Florida sun and showers, the hangar is three stories high, almost twice as long as a football field, and has 180,600 square feet of floor space.

The building has eight docks, four on each side, into which airliners are nosed. At each dock a 30-foot recess plus a 25-foot overhanging roof provides cover for the forward 55 feet of planes. This permits new-type Constellations to be under cover from nose to trailing edge of wing. Two of the docks can change four 2500 hp Wright engines each in less than six hours. The old method of lifting engines from the ground with mobile hoists required ten hours or more for a complete change on a Constellation.

History-making and foreshadowing tomorrow's air transport trends was the progress of air coach service—low rate, low traffic hours, non-luxury flights approved by CAB for scheduled airlines. (See Government and Aviation, Civil Aeronautics Board.) Family rates for low-traffic days and excursion rates for low-traffic seasons were also featured.

Sparked by Capital's and Pan American's coach pioneering in the fall of 1948, 1949's low-rate service blossomed into one of the most sensational scheduled transportation phenomena of the year.

Records, plus surveys by the CAB, resulted in a Board decision early in September to prune some coach schedules, but to approve a net total of 6,500 additional unduplicated route miles, effective November 1, and extending to July 1, 1950. First-of-the-week family fares were also extended. The Board decision took coach and low-rate fares out of the experimental stage, virtually assuring that they would become a permanent part of U. S. air transportation. A network of inter-city schedules was set up from coast to coast, flown by Boeing Stratocoaches, Douglas DC-4 Coachmasters, and Lockheed Constellations.

Lines operating under the new schedule include Eastern, Western, National, Delta, Northwest, Capital, Pan American, TWA, and Continental.

Coach fares, averaging as low as four cents a mile, rivalled surface tariffs, and were far below standard air transport rates. Western, for example, offered a Seattle-Los Angeles rate of $40.85, $22.70 less than the standard fare. Delta reduced its Chicago-Miami coach fare to $49.85 from the regular $78.80, a saving of $28.95, and offered a coach fare of $25.50 between Atlanta and Chicago, a reduction of $14.25.

Public response was enthusiastic. The Board surveys showed Capital getting 23.4 percent of its passenger miles and 17 percent of its passenger revenues from coach service. Northwest took 20.7 percent miles and 15 percent revenue. Load factors were high. Northwest showed an 83.9 percent coach load factor, Capital, 75.2, TWA, 74.2, Mid-Continent, 53.8, and Continental, 39.8. Capital reported that its percentage of first riders was approximately double that found in regular passenger flights. A TWA survey of its two runs between Los Angeles and Kansas City and between Chicago and New York found a majority of the passengers on their first flight or flying because of the reduced rate, although the low rates were not detracting from regular TWA top-rate flights over the same routes.

TWA Boeing Stratoliners on the eastern flights were operating at a 78 percent load factor. Northwest, first with a coast-to-coast coach service (New York-Seattle), began it expecting a light load factor on westbound flights, but ended the first eight months of the year with a factor slightly under 90 percent both ways. The line used Douglas DC-4 Convertibles, capable of all-passenger or all-cargo loads, but passengers monopolized the service.

On November 4, Capital, completing a full year of coach service, was able to report a load factor on its established flights of nearly 80 percent. Capital had expanded to twelve daily coach flights, carried 135,300 passengers, flown nearly 67 million passenger miles.

Capital had already established that there was gold in coach service. J. H. Carmichael, Capital's president, in an analysis at the end of the summer, revealed that during the first nine months of 1949, his line grossed $1,752,408 in passenger fares, plus $87,277 in coach express and freight. "The net operating profit from Capital's coach operations for the nine months was $275,370," he said, "without any assistance from mail pay."

TWA reported an estimated gross coach revenue of over $2 million, and all lines indicated sizable profits. Estimated coach revenue for all scheduled lines during the year came to well over $10 million.

Family fare plans also prospered. Mid-Continent, which began family fares in November, 1948, flew a total of 11,801 passengers under the special rate during the first eight months of 1949. United had flown nearly 35,000 families by summer's end, averaging slightly more than two persons per family. Trips were above average in length—1,021 miles. A family of eight was United's biggest single order—Mr. and Mrs. Merrill K. Flood and six children, flying from Washington to Los Angeles. American reported a 36,000 family score in the same period for a total of 76,000 persons. Some 64 percent of these groups said they would not have flown without the reduced rate.

Scores of air vacations were offered to the flying public. Chicago and Southern, which pioneered an all-expense air cruise in 1947 to Cuba, ex-

> **"The past record . . . is good . . ."**
>
> Four standards by which the air transport industry and the policies of the Civil Aeronautics Board may be judged are:
>
> 1. The size and scope of the industry in terms of routes, services and equipment.
> 2. The price of service to the public.
> 3. The economic and financial strength and staying-power of the industry.
> 4. The mail pay required to support the operations.
>
> Although there are many problems which require our attention and the attention of the industry, as well as legislative action on the part of the Congress, we believe that in terms of these four standards, the past record of this industry is good and the future attractive.
>
> —JOSEPH J. O'CONNELL, JR.
> Chairman of the Civil Aeronautics Board

panded it to Jamaica, the British West Indies, and Venezuela. These cruises figured in sales contests and prizes in U. S. cities along Chicago and Southern's route. A Memphis, Tenn., firm awarded fifty C. & S Jamaica cruise prizes in a sales contest.

Colonial offered all-expense, seven-day, summer air tours from New York and Washington to Bermuda, and similar winter packages to Canadian and New England ski centers.

Northwest announced Boeing Stratocruiser flights to the Orient and Honolulu, and package tours to both destinations. Eastern spent more than $1.5 million advertising Florida as an ideal all-year resort and offered 21-day, round-trip excursion rates. A major promotion for the winter of 1949-50, modeled after one the winter before, was TWA's "quickie vacation" program for tourists to Arizona, California and other winter resort areas.

Northwest, United and a number of other lines sponsored vacation-buy-a-new-car trips to Detroit. A week-end holiday feature that made news was All American Airways' service for bicycle clubs from sweltering Washington, D. C., summer to shore resorts.

Most lines promoted special holiday extra-schedule flights. Efforts were also put forth to cut ticketing red-tape and raise commissions for travel agents. Joint reservation arrangements, linking a number of lines, were put in at widespread points across the country.

All lines were active on the sports front. TWA and Capital both reported exceptional football team traffic. TWA had the biggest in its history, with thirty teams booked for eighty special flights during the season. Capital signed four North Carolina college teams. Fans added to the travel score, as did hockey, baseball and basketball teams.

Hunters and campers were encouraged to fly by lines servicing remote areas. Northwest backed its promotion with a hunting guide for the northern 1949-1950 winter season, and Eastern continued to recruit members for its Flying Fisherman and Flying Hunter Clubs.

## AIRLINE PILOTS WHO HAVE FLOWN 20,000 HOURS OR MORE

| Name | Airline | Hours |
|---|---|---|
| Basil Rowe | Pan-American (LAD) | 30,021 |
| E. Hamilton Lee | United | 27,811 |
| Walter J, Hunter | American | 26,500 |
| Joe B. Glass | American | 26,000 |
| Ray O. Fortner | American | 24,000 |
| J. G. Walsh | Trans World Airline | 23,407 |
| H. V. Woodall | American | 23,000 |
| Harold B. Russell | American | 22,500 |
| Leland S. Andrews | American | 22,500 |
| H. T. Musick | Capital | 22,469 |
| M. D. Ator | American | 22,000 |
| A. R. Perkins | American | 22,000 |
| J. H. Mangham | American | 22,000 |
| Edward C. Bowe | American | 22,000 |
| D. S. Zimmerley | Mid-Continent | 21,904 |
| F. F. Preeg | Trans World Airline | 21,800 |
| Hiram W. Sheridan | American | 21,403 |
| H. H. Holloway | Trans World Airline | 21,385 |
| Lee R. Wallace | American | 21,350 |
| Russell J. Dick | Trans World Airline | 21,000 |
| Ralph C. Dodson | American | 21,000 |
| P. A. Vance | American | 21,000 |
| Chauncy D. Young | American | 21,000 |
| Owen J. O'Connor | American | 21,000 |
| Ivan Olson | Continental | 20,898 |
| A. W. Collins | Trans World Airline | 20,210 |
| Byron C. Moore | American | 20,200 |
| W. Lee McBride | Delta | 20,100 |
| A. J. Jaster | Mid-Continent | 20,063 |
| T. M. Moffitt | Trans World Airline | 20,049 |
| A. Klotz | Trans World Airline | 20,046 |

The following pilots have 20,000 hours or more (exact time unavailable):

| | |
|---|---|
| Fred V. Clark | Pan-American |
| Al DeWitt | American |
| S. F. Whitaker | Delta |
| R. J. Johnson | United |
| E. L. Remelin | United |
| R. L. Wagner | United |
| C. R. Bowman | United |
| H. W. Huking | United |
| H. P. Little | United |
| H. A. Gurney | United |
| W. H. Kennedy | United |
| J. O. Johnson | United |
| C. F. Sullivan | United |
| G. L. Boyd | United |
| E. J. Eshelman | United |
| R. F. Dawson | United |
| E. T. Hereford | Trans World Airline |
| John T. Rogerson | Pan-American |
| George W. Snow | Pan-American |

Passenger comforts and services were improved all along the line in regular flights. To increase summertime comfort, many companies, including Wisconsin Central, Southwest, and United, capped their planes with white paint, which kept interiors as much as fifteen degrees cooler during landings on hot days. Public address systems were installed in many of the big planes, notably by United and American, and dramamine was used on numerous flights to prevent airsickness. This last was among special services on Delta and Capital, among other flights. United also featured a contour map of its 10,700-mile system. Scores of special services were offered, from perfume for week-end lady passengers on Colonial Skycruisers to pinless diapers on Wisconsin Central.

The airline drives to serve the public resulted in scores of human-interest stories.

Monarch, one of the few airlines handling stretcher cases, served a dramatic one by flying Don Ray Dennis from the mountain area west of Denver, where the twelve-year-old fell forty-five feet from a cliff and was severely injured, to Denver, where he was admitted to a hospital only a few hours after leaving the mountain country.

All airlines in the mountain area worked overtime during the blizzard last winter. Typical were United operations. During the 40-day storm period, the line not only completed 90 percent of its coast-to-coast schedules (while all surface traffic was slowed to a snail's pace or stalled), but evacuated 500 travelers in four days with extra schedules. Some 15,500 pounds of first-class mail were flown out of Cheyenne, 5,000 pounds of meat and bread went by air to Rawlins, Wyo., and nearly 14,000 pounds of newsprint were flown into Salt Lake City in time for deadline of the *Desert News*.

An unauthorized message on National's 37-station teletype network in June started off another chain of dramatic events. National's Key West station started the story with a message to Baltimore asking cost of an ambulance to meet a flight rushing a "blue baby" to Johns Hopkins for a life-or-death operation.

In Newark, Station Agent E. T. Simeoni, reading that the ambulance would cost $25 and that the child's parents were very poor, immediately contributed a dollar. Two other station workers added two more. Ignoring the rule against personal messages, Simeoni wired the gift and ended the message with, "Anybody else interested?" His question was answered a few hours later with $600, turned over to Mr. and Mrs. Onelio Mujica, the baby's parents.

Two American Airline pilots, Archie Chamberlin and Chick Evans, amused themselves by taking snapshots from the cockpit as passengers boarded their plane with a self-developing camera that made possible delivery of pictures as soon as the ship was airborne. When Primo Carnera left his size-twenty wrestling shoes behind in a California town, a United plane flew them to the giant in time for a scheduled match. A. A. (Dolph)

Hoehling, United public relations expert, rounded up a string of other human interest oddities, as follows:

"One of the company's DC-6 captains, who also is an expert magician in his spare time, continued to delight passengers by pulling rabbits out of stewardesses' collars, pennies from youthful air travelers' ears; the lost-and-found department in Denver was nonplussed one morning to receive a box from Los Angeles containing several hundred finely picked wishbones; a G.I. cashed a check in United's Los Angeles ticket office using the serial numbers on his false teeth as identification; a seven-year-old would-be stowaway was removed gently but firmly from a Mainliner at Washington National Airport; an over-earnest passenger agent at another stop searched through her international airline files to find Shangri-La for a poker-faced joker; and a well-known New York based pilot-humorist brought whoops of incredulity from the passengers by walking through the cabin holding a string of fish while the Mainliner was flying over Lake Erie."

A Wisconsin Central pilot, Capt. Floyd Parkinson, had the unique experience of being greeted by a family of bears when he landed on a strip in the heart of Wisconsin resort country recently. "The bears just wouldn't run," drawled Parkinson. "They stood pat by the runway just as interested as the townfolks." From other points along Wisconsin Central's route, similar reports came in. At one field, a herd of deer delayed landing operations; at another, a flock of wild ducks mistook the wet, glistening runway for a lake and landed en masse.

Among the rivals for tops in the airline dramatics department for the year were stories from Eureka, Cal., and Ireland.

The Eureka story occurred one evening in June, when Mr. and Mrs. Roy Atchison and their two-month-old child got caught at 10 o'clock at night above an overcast in an Ercoupe. Running lights of the little plane were picked up by Jack Gladney, Southwest Airways DC-3 pilot. Gladney dropped flaps and wheels to slow to Ercoupe speed and lead the Atchisons in. He lost them when they went out of control into the overcast, but picked them up again a few minutes later, leading them to a hole in the clouds over Crescent City airport. The Atchisons washed out their nose wheel landing, but climbed out of their plane unscratched.

The second story broke in August, when Capt. Charles Adams, a TWA pilot, helped rescue fifty survivors of a plane which crashed into the sea off Ireland. Adams tried to guide the lost plane back to the Irish seacoast before it ditched. Failing that, he dropped flares, life-saving equipment, and supplies. He then landed his passengers at Shannon, returning to guide rescue ships to the crashed plane with flares. Another TWA plane, piloted by Capt. George Arbuthnot, also helped in the rescue work.

On the foreign front, tours, vacation rates and other attractions were offered by all operators. Pan American, inspired by the 1949 traffic into predicting a 50 percent increase in travel to Europe this winter, cut round-

**High Costs**

The following table sets forth a partial list of the increased operating costs which have confronted Continental in the past three years:

| | 1946 | 1949 | % Up |
|---|---|---|---|
| Gas (per 91 octane gallon) | $ 11.06 | $ 14.90 | 35% |
| Pilots (base pay, average per month) | 168.81 | 266.12 | 58% |
| Co-pilots (average per month) | 242.56 | 443.71 | 83% |
| Hostesses (starting salary) | 130.00 | 175.00 | 35% |
| Station personnel (starting salary) | 140.00 | 185.00 | 32% |
| Telephone and telegraph (fixed charges) | 2,247.07 | 2,914.24 | 30% |
| Meteorologists (average per month) | 253.67 | 395.47 | 56% |
| Mechanics, stock personnel (per hour) | .82 to 1.6 | 1.00 to 2.02 | 11% to 34% |

—Robert F. Six, President, Continental Air Lines, Inc.

trip fares from $630 to $466.70. Devaluation of the British pound gave added impetus to travel abroad.

Pan American also sponsored the World Town Hall Seminar, representing twenty-eight national organizations with a combined membership of some 31 million, on a world tour of twelve foreign capitals.

TWA, the only U.S. line serving Rome directly, had a good year and before January, 1950, began feeling the pressure of huge traffic to the Holy City during 1950, Catholic Holy Year. Hundreds of Americans were booked in advance for flights to Rome for the ceremony of St. Peter's Basilica that began on Christmas Eve, 1949.

So that American farmers may know how farmers in other parts of the world work and live, Travel and Transport, Inc., of Omaha, Neb., sponsored all-expense overseas tours by TWA for groups of farmers. In France, American farm groups, beginning in October, were welcomed by the Union Centrale des Cooperation Agricoles. For every hundred American farmers flying to Europe, it is expected that a group of French farmers will be granted dollar credits for visits to the U.S. (See Chapter on Lightplanes.)

Another program to build international goodwill was sponsored by American Overseas Airlines, which flew two intercontinental press flights, one from the U.S. to Europe, one from Europe to the U.S. The first flight, in June, took forty-four former American war correspondents in a Lockheed Constellation back to the Normandy beachheads for the fifth anniversary of D-Day. The men spent two weeks retracing the battle routes of Allied armies through France and Belgium into Germany. The second flight, in September, flew forty-nine editors, publishers and writers from newspapers in fourteen western European countries for a two-week visit to America. The new Boeing Stratocruiser was used in this flight, which took the writers from London to New York, San Francisco, Los Angeles, San Diego, Ft. Worth, Detroit, and Washington, D. C.

Goodwill was also built in South America by an Eastern Constellation flight in August, made up of a party led by Eastern President E. V. Rickenbacker. The Constellation, incidentally, flew the 17,000-mile trip without a single mechanical difficulty.

Back on the home front, groundlings were introduced directly or indirectly to air travel by a number of novelty promotions. A collection of Japanese dolls, flown to this country by Northwest, were shown in various cities. Displays in scores of airline ticket windows portrayed distant scenes and romantic destinations. Use of air service credit cards was expanded. Introductory round-trip fares were extended at low rates to Monarch prospects. Mid-Continent, Northeast, Capital and several other lines pushed short-hop, sightseeing, familiarization flights to prospects who had never been aloft before. Continental, finding Convair Liner excursion flights profitable, established them as a permanent featured service for special occasions and holidays. Wisconsin Central radio stations continued to build public goodwill with its weather information program, particularly in cities where no U.S. weather bureau is located. And Southwest hit on a popular promotion idea by distributing discarded inner tubes from its big airliners to swimming pools and beaches along its routes. Appropriate labels were painted on each tube.

Behind the scenes, the industry successfully, both as a group and as individual lines, put through one of the most intensive efficiency campaigns in the history of modern business.

The battle for on-time service and against red tape was fought on all fronts with outstanding success.

Typical was United's war on inefficiency which the airline chose to center at the line's operations and passenger service base at Denver. A year's planning and some $6 million turned dispatching confusion into a smooth-running machine that has cut the number of late planes in half and the number of passenger complaints to the vanishing point.

United's communications were greatly expanded and streamlined in the process, to make it one of the largest networks in the world. The line now has almost 12,000 miles of private telephone lines, plus 20,000 miles of leaded teletype wires, plus a vast array of plane-to-ground radio facilities. Over 70,000,000 words go over the teletype monthly.

TWA also emphasized on-time performance during 1949 and by August had trimmed delayed departures down to an average of 8.6 minutes. Improved landing and navigational aids reduced delays caused by weather. TWA also installed new types of loading equipment, including cargo conveyors and mechanical fork lifts, to reduce time spent on the ground. Refueling was revamped and streamlined. For international flights, check-in time for passengers at the airport was cut in half.

American Airlines revamped its phone techniques and passenger sales, as did scores of other lines. American's incoming call score for the year jumped to more than 11 million.

Across the country, feeder airlines, since the war handicapped by financial and other troubles, gained a new lease on life: some showed marked progress.

Shot-in-the-arm for the feeders came in the summer when CAB approved single-engine equipment for contact, good-terrain flights. The Iowa Airplane Company of Des Moines promptly announced that it was ordering seven Cessna 190's. Beech Bonanzas and Ryan Navions were also favorites in the feeder market.

Typical of the successful feeders was Robinson Airlines, with routes in the New York state area, which showed steady gains during the first three quarters of the year, and a good balance at year-end. In the first six months, Robinson was second only to Southwest Airways in passenger load factors among the feeders. Southwest reported 39.53, Robinson 35.38.

Some of Robinson's increased revenue was credited to commuter schedules, enabling upstate New York businessmen to leave home in the morning, work for nine or ten hours in Newark or New York City, and be home for dinner. Robinson even runs a car-washing service at its fields to win customer goodwill.

All American Airways, operating out of Washington, D. C., into seven states, also had a good year, its first in the feeder service after a decade of air pick-up flying in the same area. Not getting its first route into active operation until March, All American started from a low of 663 passengers in that month to hit a high of 12,448 in August. Only a slight fall-off in traffic was registered during the latter part of the year, which ended with a total of some 45,000 pounds of airmail and parcel post being carried each month. Air express jumped from 88,361 pounds in August to 113,617 in September. In July, the line flew more than double the average for the nation's feeders in air express.

Featured in All American service, as well as that of many other lines, were the two-minute stop, passenger step-doors, relocated cargo and mail compartments, and stop-watch schedules. All American reaped a total business volume of approximately $1,430,000 as a result of its program, and expects a far better record in 1950.

Flight completion scores showed marked improvement. Delta set a new high for the line with a flight completion factor of 97.69 percent during fiscal 1949, as compared with 94.22 percent the year before. Mid-Continent, completing 5,551,078 of its 5,697,908 scheduled miles during the first eight months of 1949, hung up an operating efficiency record of 97.42 percent. An index to operating trends was Western's July score of 99.57 percent, with one route, between Great Falls, Mont., and Lethbridge, Canada, scoring 100 percent for 10,106 miles flown.

All in all, so far as passenger services were concerned, the scheduled airlines, throwing off the difficulties and delays of the first post-war years, in 1949 made perhaps the greatest progress toward full maturity and almost faultless service in their history.

An indication of airline progress was pointed out by Alvin P. Adams & Associates, New York aviation consultants, who estimated that air travel during May exceeded first class rail travel for the first time in history—603 million revenue passenger miles on domestic airlines as contrasted with 582 million Pullman passenger miles.

Top personnel changes among scheduled airlines were not numerous. Only two—a new president and a retiring pilot—made national news.

Ralph S. Damon resigned as president of American Airlines in January—to become president of Trans World Airline. To his new post he brought thirteen years of air transport experience and more than thirty-one years of experience in the aviation industry.

E. Hamilton Lee, "the flyingest man in the world," retired as a captain of United Airlines after thirty-six years as a pilot. Beginning his career as an airmail pilot, "Ham" Lee was one of the chief actors in air transport history from its beginnings. He had flown an estimated 4.4 million miles at the time of his retirement, for a total of 27,811 hours. A farewell dinner attended by many of the greats in aviation was given in his honor at Washington, D. C., after his last flight.

Indication of the transport industry's coming-of-age was a set of anniversaries observed during the year. Colonial honored its twenty-first birthday anniversary, TWA its twentieth of scheduled transcontinental air service. This last was marked with observances along TWA routes on July 8, when the country's oldest transcontinental airline celebrated the famous flight of twenty years ago which marked the opening of coast-to-coast air-and-rail service spanning the country in the then fabulous time of forty-eight hours.

Delta also celebrated its twentieth anniversary with a meeting on June 1 in Atlanta, plus anniversary posters, buttons, and souvenir ashtrays. Passengers traveling Delta on the birthday were served cake.

National's fifteenth birthday was marked on Oct. 15, anniversary of the first flight on the line's initial Daytona Beach-St. Petersburg, Fla. route.

**All-Time Air Travel Peak is Hit in 1949**

The Government and the airlines agreed yesterday that 1949 was the biggest year yet for air travel and predicted 1950 would see even greater strides.

The Air Transport Association reported that the international, domestic trunk and feeder airlines should chalk up a net operating profit of $44,830,248 as compared with $16,321,327 in 1948 and strictly red-ink operations in the other post-war years. Civil Aeronautics Administrator, D. W. Rentzel added that these lines transported 16,500,000 passengers during the year.

Domestic trunk lines flew 6,633,319,000 revenue passenger miles, 12 percent more than in 1948. Their operating revenues were $460,527,463 and net operating income was $25,820,326, as compared with 1948's $2,075,113.

Rentzel estimated the over-all domestic airline fatality rate at 1.3 per 100 million passenger-miles, just above the all-time best of 1.2.

THE WASHINGTON POST
January 2, 1950

# CHAPTER FIVE

## Lightplanes

DESPITE low production and sales figures, lightplane activities during 1949 brought a number of interesting developments pointing toward future progress. The year was notable for safety and utility design improvements, as well as for steps toward solving some of the post-war adjustment problems, including GI training. The way was also opened for use of single-engine planes on feeder airlines and star-route mail services.

Readjustment in GI training rules by the Congress, aimed at eliminating fly-by-night training centers and play-boy students, was generally hailed by fixed-base operators as an improvement.

Out of business, at the rate of 30 to 40 a month, went many marginal operators. Those who survived, while suffering from the seasonal slump during the fall, anticipate sharing from 40,000 to 45,000 trainees during the last half of '49 and the first six months of '50.

New rules require trainees to prove that their interest in aviation is based on intent to make a career of flying or to use flying in whatever other career they choose.

"There is no doubt," according to Wayne Weishaar, secretary of the Aeronautical Training Society and a spokesman for a large group of fixed-base operators, "that Congress in the summer of 1949 placed GI flight training on a more favorable basis than it has been since the spring of 1948."

While sales of trainer planes, and especially new ones, was not expected to increase greatly as a result, at least it is felt that the GI shakedown will give lightplane manufacturers a firmer foundation upon which to build up future markets.

Consensus seemed at year-end to be that small airport operators would be helped in their battle to get personal flying on a permanently stable economic basis.

Another market for lightplanes was opened during the spring and early summer following the Civil Aeronautics Board's check-up of feeder airline

**Rent or Buy?**

If you fly more than four hours a week, don't rent a plane. It's cheaper to own a lightplane when your logbook shows over 200 hours a years. Here are the figures:

Approximate Cost Per Hour for 200 Flight Hours Per Year

| | $2,500 Two-Place Plane Cost Per Hour | $9,000 Four-Place Plane Cost Per Hour |
|---|---|---|
| Gasoline | $1.50 | $3.30 |
| Oil, including changes | .20 | .25 |
| Maintenance | 1.00 | 2.00 |
| Insurance | 1.90 | 5.00 |
| Depreciation | 1.00 | 3.60 |
| Hangar Rent | 1.25 ($20 per month) | 1.50 ($30 per month) |
| Total | $6.85 | $15.65 |

Combining all of the items in the $2,500 lightplane chart gives a total cost of $6.85 per hour or $1,370 yearly if you fly a plane 200 hours each year. Most airport operators charge about $8 an hour for solo time. Many of the smaller fields again offer the pre-war $6 an hour solo rate. Glancing back at our chart, it will be seen that $6.85 is the hourly cost to a lightplane owner who flies 200 hours per year.

Many airport operators will offer a lower rental rate if a block of time is bought in advance. When I was engaged in commercial airport operation, a $1 hourly discount was offered for 10 hours flying time paid in advance. It can be seen from these figures that unless you plan to fly more than 200 hours per year, you can rent for approximately the same $6.85 per hour that it costs the lightplane owner to fly his own plane—but you lose the convenience of ownership.

Analyzing operating costs on a four-place plane like the *Navion* or *Bonanza* in the $9,000 price class will show similar results. The figures add up to a $15.65 hourly cost to the $9,000 plane owner who flies only 200 hours per year. Most airport operators charge between $17 and $20 rental per hour for planes in this class. However, a figure close to $15.65 per hour would probably be acceptable to most commercial operators if blocks of time (10 hours or more) were bought and paid for in advance.

There are, of course, the possibilities for club or partner ownership of private planes. Naturally, any joint ownership of private planes will cut down expense to each individual partner. The purchase of a used plane instead of a new one will cut the hourly cost of depreciation and insurance considerably.

It's up to the owner whether his plane is to be just an expensive toy or a useful economical vehicle. If he uses it enough, he will find it provides the cheapest form of transportation possible.

—Ben Robin in *Flying* Magazine, October, 1949

**The late Capt. Bill Odom and "The Waikiki Beech," April, 1949**

franchises, some of which had not been taken up by operators following feeder approvals by the Board of three-year contracts in the spring of 1946.

Operators who were challenged by the Board asked permission to use single-engine planes. This the Board granted for daylight contact flights over suitable terrain.

Typical of the feeder airline reaction was Central Airlines, Inc., of Oklahoma City, now operating eight *Beech Bonanzas,* with three on order. Cessna 195's and *Ryan Navions* were also reported in demand.

The extent to which this can stimulate the lightplane market was limited by a number of factors. Authorized feeders have never numbered more than twenty, and it seemed unlikely that the Board would franchise more in the immediate future. Two star mail routes have been approved by the Post Office Department, but again a rapid expansion seems unlikely. The lightplanes will, on a number of the feeder lines, supplement multi-engine planes only; on others, the Board may bar single-engine operations because of terrain or other conditions.

Nevertheless, official approval of lightplanes for passengers on airlines was considered as a step in the right direction, and potentially a permanent and substantial source of sales.

Although new-plane sales were off, sale of four-place lightplanes showed signs of firming. Total four-place plane sales reached an estimated 2,500 by year-end—ahead of the 2,344 sold in 1946 and comparing not unfavorably with the 5,831 total in 1947 and 3,386 in 1948. Sales of two-placers hit a low of approximately 900, far under the 30,766 sold in 1946, 7,273 in '47, and 3,302 in '48.

Owing to the GI confusion and other factors, student pilot permits were also off. Total for 1946 was 173,432; 1947, 192,924; 1948, 117,725, and 1949 (estimated) 50,000.

An increase was registered in the number of private planes equipped with radio. On June 30, 1945, private planes equipped with two-way radio totalled only 2,557. By Jan. 1, 1949, this had jumped to 17,736. Total on Jan. 1, 1950, is estimated at 23,000. FCC reports also that public service radio programs broadcast by standard stations increased from 512 in 1948 to 606 in 1949.

### Industrial Flying

Most promising lightplane activity during the year was industrial flying, particularly in agriculture.

The 10-year cycle grasshopper plague occurred in 1949, and the Department of Agriculture attacked the pests with 37 airplanes, 34 of them operating on contract. Operating on schedules set by the Department's Bureau of Entomology, planes treated 2.7 million acres of range land in Wyoming and killed billions of grasshoppers with 13.5 million pounds of poison bran. Success of the program was echoed later when an Agriculture expert left for Palestine to discuss the same kind of attack on locusts, which have periodically denuded the Holy Land since pre-Biblical times.

Spraying of towns and communities to kill insect pests began in some earnest in 1948 when 119 areas contracted with operators to spread the DDT at tree-top level. During the 1949 summer, 262 communities bought this service, with fleas, mosquitoes, ticks and houseflies as the victims.

More extended use was made of aerial defoliation which kills remaining worms, weevils and insects, clears the way for the mechanical cotton picker, and preserves the quality of the cotton fiber, often ruined by the excrescences of certain worms and weevils.

A 250,000-acre attack was made on the New England gypsy moth, and 261,000 acres were sprayed to kill the spruce budworm in Oregon.

Scores of lightplanes took part in these activities, including twin-engine Cessnas, Noorduyn *Norsemen,* and Stinson L-5's.

Rice planters did everything but plough and reap with airplanes. They sowed rice by plane on their prepared fields, killed off the weeds with aerial 2,4-D spraying and estimated that 80 percent of the entire California rice crop is plane-treated.

Lightplanes also played a leading role in U. S. Department of Interior activities, notably in the Fish and Wildlife Service, where they worked full

**"The Future Is Promising"**

The Civil Aeronautics Board's approval of feeder and local air service using single-engine aircraft in scheduled operations opens an important new lightplane aviation market. Another favorable factor is Congressional approval of aerial star mail route expansion. Crystallizing the GI flight training qualifications is a third.

Considering these three new developments and the already existing and expanding firm market for personal aircraft in commerce and agriculture, the industry feels confident that the utility of today's aircraft is finally receiving its due recognition.

The future is indeed promising.

—C. J. Reese, President, Continental Motors Corporation
1949 Chairman of the Aircraft Industries Association's
Personal Aircraft Council

time on wildlife research, management and law enforcement activities. Wildlife surveys, trespass patrol, seeding for waterfowl food, herding waterfowl, predatory and rodent control, and a score of other projects were undertaken. Major air activities were in Alaska, but extended into Canada and to widespread points in the United States.

Fish and Wildlife has a fleet of 35 planes, including six Grumman *Widgeons,* five *Geese,* three Stinson L-5's, three L-1's, and one *Station Wagon;* three Piper J-5C's, two J-3C's, and one PA 11; three Republic *Seabees,* three Fairchild 24's, two Noorduyn *Norsemen,* and one Cessna 170, one 195, and one 165.

*Norsemen,* Stinson *Voyagers,* Beech *Bonanzas,* and Stinson L-5's figured throughout the year in fire-fighting activities of the U. S. Forest Service.

In an entirely new application of personal planes to ranch work, six *Navions* were used to save wheat from frost and freeze destruction in the Fairfield Valley of Idaho, fifty miles southeast of Boise.

Pilots made repeated passes over the stands of grain, keeping about thirty feet off the ground. With the planes' large flaps lowered, they so stirred up the chill early morning air that its moisture never had a chance to condense into frost on the wheat.

Lloyd Baron, a rancher who lost an $88,000 crop to the freeze in 1947, and six other ranchers made the experiment.

The experience of Harry Geisler, another Fairfield rancher, supplies this season's most striking demonstration of the effectiveness of "wheat buzzing." An eighty-acre corner of his tract was not covered by the planes. This section froze, while the larger field which the *Navions* had worked survived, even though the ground temperature went down to 22° F. during the job.

Success in the wheat rescue prompted an attack on rain spoilage of cherries. When a cherry nears maturity, rain frequently will fill the recession where the stem is attached. A raindrop will also hold to the bottom tip. The cherry absorbs the water, splits, molds and spoils.

Planes flown close to the trees immediately after a shower give the surrounding air a strong downwashed churning which knocks the raindrops off the cherries quickly and thoroughly.

The lightplane's usefulness was further demonstrated by the Beechcraft owned by the Indian Drilling Mud Company of Oklahoma. Equipped with a field laboratory to give emergency service on drilling wells, the ship serviced the wells directly—and expedited contact with the drilling superintendents and contractors.

A *Bonanza* was also added to the road equipment inventory of the New Mexico State Highway Department. Besides providing transportation for the State Highway Engineer over the state's vast network of roads, the plane was used to investigate bridge washouts, for aerial photography, and for answering the department's many rush calls.

The National Flying Farmers Association invested in the future of this type of work by establishing a research foundation for the advancement of rural aviation. First project is to develop a more practical dusting and spraying plane. Other studies directly relating to agricultural aviation include transportation of perishable products by air, developing a light air truck for small farm cargoes, and seeking broader uses of the airplane as an agricultural implement.

**Design Improvements**

Scores of safety improvements were reported during the year to Cornell University Medical College's Crash Injury Research Project. All apply to personal aircraft.

Occupants are seated farther aft than usual in six new ships, thereby getting increased protection from forward structures. Instrument panels have also been moved forward in four planes, and five panels are designed to lessen the danger of head injury. Control wheels with safety features are used in six planes.

Three planes have engine sections and supports designed to give the occupants greater protection by absorbing forces through progressive collapse. Four ships use no horizontal or vertical tubing around the pilot. Landing gears have been improved in five ships, and two planes have unusually strong overall cockpit structure.

Three planes have stronger seats and seat anchorages, and pivoted backrests on forward seats are used in six planes.

Windscreen and side windows in one plane can be knocked out of their mounting by a heavy blow without shattering, and another has forward diagonal braces specially arranged to buckle outward under heavy crash loads.

One new crop-duster has shoulder harness as standard equipment.

**Frost prevention by Ryan Navion**

More than in other years, personal aircraft made headlines during 1949.

When one of the worst winters in the history of the west and northwest paralyzed all other forms of transportation, lightplane pilots, most of them farmers or ranchers, wrote another dramatic page of aviation history. "Wherever human life was at stake," said Clyde J. Bonham of Wyoming Skyways, Inc., at Cheyenne in the heart of one stricken area, "the services of any and all lightplane owners and pilots were offered without regard for anyone's ability to pay for them." Fixed-base operations in all stricken areas became headquarters for rescue work. Pilots' lives and planes were risked hundreds of times. William Harrison, of Granby, Colo., crash landed in 40 below weather on a remote plateau. Seeking shelter in a shepherd's cabin, he was rescued six days later by other pilots. Carl Hubel of Ewing, Neb., wrecked his putt-putt while flying repair parts to a stalled bulldozer road-clearing crew. Impressed citizens bought him a new plane.

Personal planes also played a major part in last winter's huge Air Force "Operation Haylift" during the Montana-Wyoming blizzards. In a Beechcraft *Bonanza,* Teunis and Morris Clark flew all over the range to check the condition of herds, often spotting cattle that would otherwise have been lost. When a herd was located, the men dropped range cake from the plane to keep the animals from starving, or directed a Dodge Power Wagon to the spot to supply the cattle with feed.

So taxing was the emergency and so many the flights—an estimated ten thousand were made in Nebraska alone during one storm—that few records were kept. Two thumbnail reports are typical:

"Flew mother with baby to Children's hospital, Denver," reported John Fryback of Wheatland, Wyo. "Baby had peanut hull in lung and was en route to Denver by bus when bus stalled here." He adds: "On another flight, checked on odd group, man breaking trail for horse, woman holding bundle. Throttled back to see if they needed help. Did. Baby very ill. Landed on small ridge, flew mother and baby to Torrington hospital. It was miles to a road and the new cold was moving in."

Another report, from Jim Fulkerson, president of the Casper Flying Service, Gillette, Wyo., is equally typical and even more brief.

"Made emergency trip in storm to Forrest Jenkins ranch for little girl with acute appendicitis. She was operated on hour after reaching hospital. Recovering O.K."

"We made thirteen trips to Cheyenne and one to Sidney," says J. H. Lohse of Laramie. "We were hauling charcoal for the Pacific Fruit Express. Without it, thousands of dollars' worth of perishables would have frozen.

"Flew out to the Wooden Shoe ranch and picked up Phoebe McDougal. She was due at the state legislature meeting in Cheyenne and was unable to get to town any other way.

"Flew to Wheatland Reservoir and picked up Mr. Weaver; brought him to the hospital to have a cast put on his shoulder. I flew him back two days later.

"Delivered supplies to Flag ranch and picked up sheep-herder who had frozen his hands. I brought him to the doctor, then picked him up and flew him back two days later."

Another lightplane goodwill job was done during the year, when an estimated 10,000 farmers who do not fly were given rides on soil conservation days by members of the National Flying Farmers Association. Results were outstanding. Farmers, seeing their land from the air for the first time, were amazed at the erosion, and many got busy immediately to stop it.

Among the records made during the year was one that gained banner headlines. It set a new international distance record for lightplanes and was the longest non-stop solo distance flight in the history of aviation.

Made by the late William (Bill) Odom, it began at Honolulu and ended at Teterboro, N. J. Odom flew the Bonanza *Waikiki Beech*. The Federation Aeronautique Internationale approved the international distance record at 4,957.240 miles, while the National Aeronautics Association certified the solo record. The flight was actually about 5,300 miles, with takeoff from Honolulu and landing at Teterboro, N. J., on Mar. 8 after a flight of 36 hr., 2 min. It was a second try. On Jan. 14, weather ended the first at Oakland, Cal., after the jump from Honolulu.

**Increased Usefulness**

Small, personal-type aircraft in the United States number about 90,000. The basic elements of the Radio Technical Commission for Aeronautics system, such as the omni-range, precision beam radar, and very high frequency communication, are readily adaptable to personal-type aircraft at modest cost to the owners. The RTCA program offers a much simpler, more reliable, and more efficient navigation system than ever before has been available. By increasing the usefulness of present and future types of small planes, the RTCA program will stimulate the use of such planes for personal and business transportation. This, in turn, will bring economic benefit to the small-plane manufacturing industry, to the aircraft maintenance businesses, to our civil airports, and to the small-plane owners themselves.

—DELOS W. RENTZEL, Administrator of Civil Aeronautics

Two endurance flights were made during the year.

In Fullerton, Cal., on Mar. 15, Dick Reidel and Bill Harris, both with Fullerton Flying Service, took off at 11:44 a.m. in their Aeronca Sedan, *Sunkist Lady,* and landed Apr. 26 after a total flight time of 1,008 hr., 1 min. and 50 sec.

On Aug. 24, 1949, Bob Woodhouse and Woody Jongeward took off from Marsh Aviation Field, Yuma, Ariz., in an Aeronca Sedan, *City of Yuma,* and landed at 3:33 p.m., Oct. 10, having chalked up a flight time of 1,124 hr., 14 min. and 5 sec. and covering 85,000 mi.

An official NAA altitude record was set by Mrs. Mildred Zimmerman of Reading, Pa., on Sept. 26, 1949, by reaching a height of 26,130 ft. in a Piper PA 11 (Continental engine C-90-B).


**U. S. Planes Made Aviation History in 1948-9**
**(See Chapter on the Military)**

# CHAPTER SIX

## Planes in Production

### CIVIL

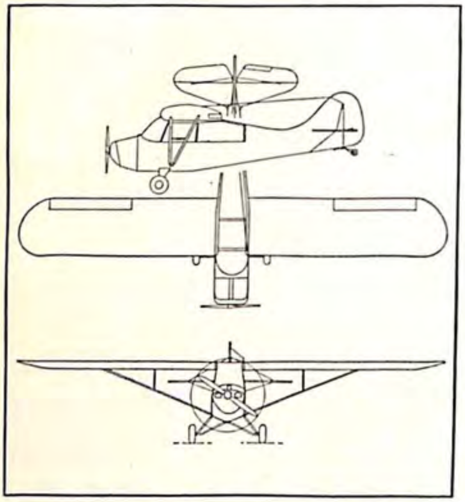
The following section on civil airplanes covers only those in production during 1949. The information on each, including pictures and 3-view drawings, was supplied by the manufacturer unless otherwise noted. In certain instances the material was limited, which meant details on some models could not be included. Quoted prices were current at our press date.

### AERONCA AIRCRAFT CORP.

Middletown, O.

**Aeronca light plane Champion**

## AERONCA CHAMPION



A 2-place, closed, land or sea, high-wing monoplane, normal category. CAA TYPE CERTIFICATE NUMBER: TC 759. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: 7 DC, July 12, 1948. ENGINEERING PERSONNEL: Leon Wolfe, ch. engr. TEST PILOT: Lou Wehring.

### DATA

POWERPLANT: Continental, C-85-8F, 85 hp. FUEL CAPACITY AND CONSUMPTION: 18.5 gal., 5.5 gal. per hr. OIL CAPACITY: 1¼ gal. APPROVED PROPELLERS: Sensenich 72GK-44, -45, -46, or McCauley 1A90. GEAR: Fixed two wheel, steerable tailwheel.

### SPECS

SPAN: 35 ft. 2 in. LENGTH: 21 ft. 6 in. HEIGHT: 7 ft. WEIGHTS: EMPTY, 809 lb.; GROSS: 1,300 lb.; USEFUL LOAD, 491 lb. WING LOADING, 7.63 lb. per sq. ft. POWER LOADING, 15.3 lb. per hp.; BAGGAGE, FULL SEATS AND TANKS, 50 lb.

### PERFORMACE

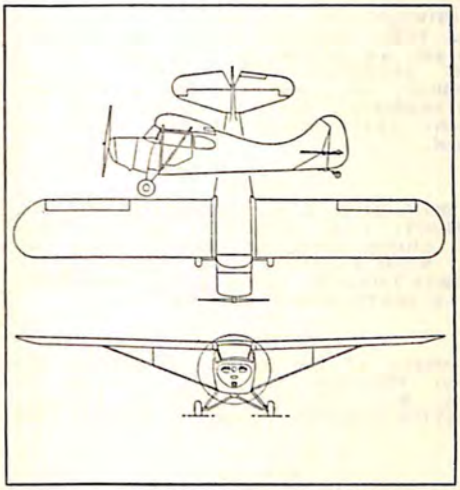
SPEEDS AT SEA LEVEL: MAXIMUM, 102 mph; CRUISING, 92 mph; STALLING, 44 mph. RATE OF CLIMB, 750 ft. 1st min. SERVICE CEILING: 14,500 ft. RANGE: Maximum with 18.5 gal. gas, 360 mi.

### REMARKS

The first of the Champion line, the 7AC, was certificated, Oct. 18, 1945. It had a 65 hp Continental, and was replaced by the 7BCM with an 85 hp Continental in Sept., 1947. This model was followed by the 7CCM, July 12, 1948 with the installation of a 90 hp Continental, increased fin area, auxiliary fuel wing tank, and fuselage member changes. (See below). The model 7CCM, first delivered in Mar., 1948, is also a 1949 production Champion model. It differs from the 7DC as follows: POWERPLANT: Continental, C-90-8FJ. FUEL CONSUMPTION: 6 gal. per hr. POWER LOADING: 13.3 lb. per hp. SPEEDS: MAXIMUM, 105 mph; CRUISING, 95 mph. RATE OF CLIMB, 900 ft. 1st min. RANGE: Maximum with 18.5 gal. gas, 351 mi. PRICE (f.a.f.): 7DC, $2,495; 7CCM, $2,545. PRODUCTION: As of Nov. 1, 1949, 16.


**Aeronca's '49 Super Chief**

## SUPER CHIEF



A 2-place, closed, land or sea, high-wing monoplane, normal and utility category. CAA TYPE CERTIFICATE: TC 796. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: 11CC, May 10, 1948. ENGINEERING PERSONNEL: Leon Wolfe, ch. engr. TEST PILOT: Lou Wehring.

### DATA

POWERPLANT: Continental, C-85-8F, 85 hp. FUEL CAPACITY AND CONSUMPTION: 23 gal., 5.5 gal. per hr. OIL CAPACITY: 1¼ gal. APPROVED PROPELLERS: Sensenich 72GK44, -45, -46 or McCauley 1A90. GEAR: Fixed two wheel, steerable tailwheel.

### SPECS

SPAN: 36 ft. 1 in. LENGTH: 20 ft. 5 in. HEIGHT: 6 ft. 7 in. WEIGHTS: EMPTY, 820 lb.; GROSS, 1,350 lb.; USEFUL LOAD, 530 lb. WING LOADING, 7.5 lb. per sq. ft. POWER LOADING, 15.5 lb. per hp; BAGGAGE, FULL SEATS AND TANKS, 70 lb.

### PERFORMANCE

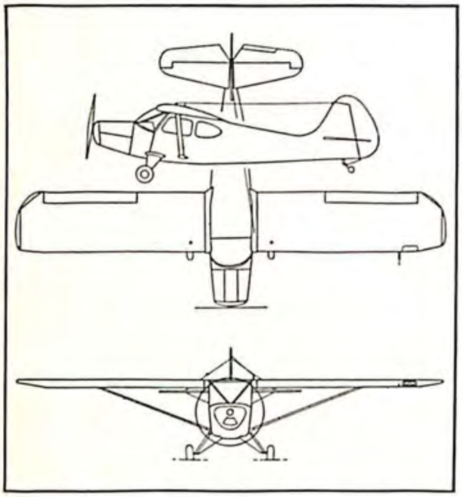
SPEEDS AT SEA LEVEL: MAXIMUM, 100 mph; CRUISING, 95 mph; STALLING, 38 mph. RATE OF CLIMB, 600 ft. 1st min. SERVICE CEILING: 14,500 ft. RANGE: Maximum with 23 gal. gas, 420 mi.

### REMARKS

The Super Chief is the latest model of the post-war, 65 hp Chief (11AC). PRICE (f.a.f.): $2,585. PRODUCTION: As of Nov. 1, 1949, 22.

**Multi-purpose Aeronca Sedan**

## SEDAN



A 4-place, closed, land or sea, high-wing monoplane, normal category. CAA TYPE CERTIFICATE NUMBER: TC 802. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: 15AC, Sept. 23, 1948. ENGINEERING PERSONNEL: Leon Wolfe, ch. engr. TEST PILOT: Lou Wehring.

### DATA

POWERPLANT: Continental, C-145-2, 145 hp. FUEL CAPACITY AND CONSUMPTION: 36 gal., 8.8 gal. per hr. OIL CAPACITY: 2 gal. APPROVED PROPELLERS: Sensenich 73BR-45, -44, Lewis L6FK39, or McCauley 1A170-DM7647. For the seaplane model, McCauley 1A170-DM7645. GEAR: Fixed two wheel.

### SPECS

SPAN: 37 ft. 6 in. LENGTH: 25 ft. 3 in. HEIGHT: 7 ft. WEIGHTS: EMPTY, 1,150 lb.; GROSS, 2,050 lb.; USEFUL LOAD, 900 lb. WING LOADING, 10.2 lb. per sq. ft. POWER LOADING, 14.1 lb. per hp; BAGGAGE, FULL SEATS AND TANKS, 120 lb.

### PERFORMANCE

SPEEDS AT SEA LEVEL: MAXIMUM, 129 mph; CRUISING, 112 mph; STALLING, 53 mph. RATE OF CLIMB, 800 ft. 1st min. SERVICE CEILING: 13,000 ft. RANGE: 456 mi.

### REMARKS

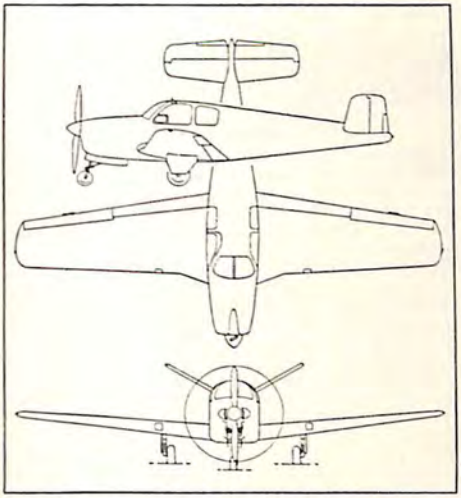
Visibility in this model is claimed to exceed that of a current automobile sedan. It is equipped with a 12 volt system and includes a landing and taxi light rated at 400,000 candlepower located outboard on the leading edge of the left wing. The Sedan is well adapted to floats. PRICE: $4,695. PRODUCTION: As of Nov. 1, 1949, 173.

## BEECH AIRCRAFT CORP.

Wichita, Kans.

**"Business" Beechcraft Bonanza**

# BONANZA



A 4-place, closed, land, all metal, low-wing monoplane; normal and utility category. CAA TYPE CERTIFICATE NUMBER: TC 777. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: A 35 (utility category), July 15, 1948; 35 (normal category), Mar. 25, 1947.

DATA

POWERPLANT: Continental E-185-1 or E-185-8, 185 hp at 2,300 rpm. FUEL CAPACITY AND CONSUMPTION: 39 gal.; 9.8 gal. per hr. at 170 mph. OIL CAPACITY: 2½ gal. PROPELLERS: Beech Controllable, R203-120 Hub, R203-218-88 Blade, or B200-100 Hub, B200-220-88 Blade. FLAPS: NACA slotted. GEAR: Retractable tricycle.

SPECS

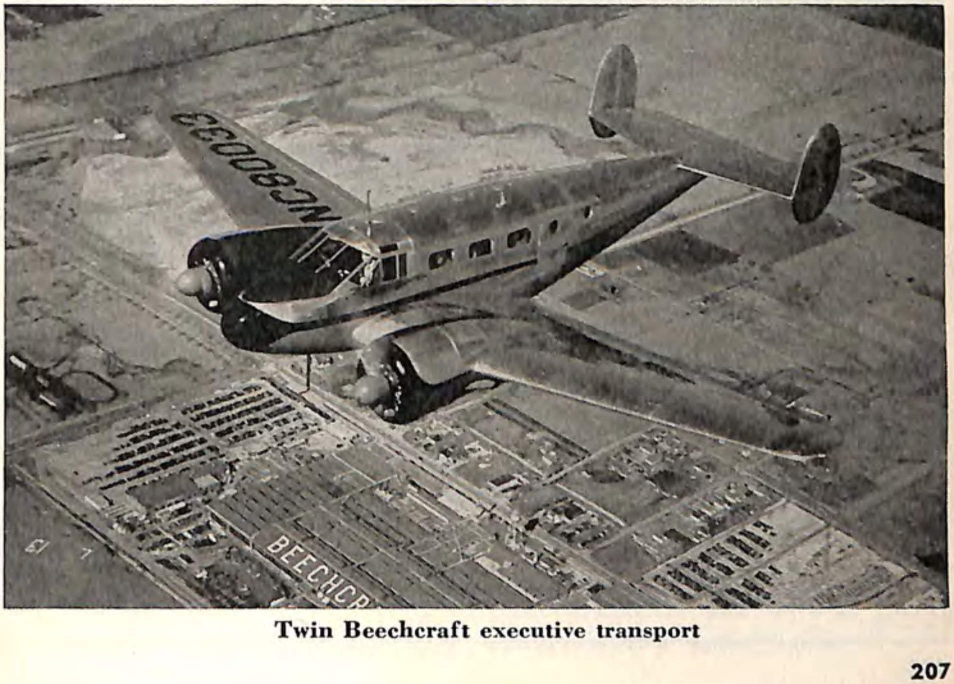
SPAN: 32 ft. 10 in. LENGTH: 25 ft. 2 in. HEIGHT: 6 ft. 6½ in. WEIGHTS: EMPTY, 1,580 lb.; GROSS, 2,650 lb.; USEFUL LOAD, 1,070 lb. WING LOADING, 14.92 lb. per sq. ft. POWER LOADING: 16.06 lb. per hp. BAGGAGE, FULL SEATS AND TANKS: 110 lb.

PERFORMANCE

SPEEDS AT SEA LEVEL: MAXIMUM, 184 mph; CRUISING, 170 mph at 8,000 ft.; STALLING, 56 mph (with flaps), 66 mph (without flaps). RATE OF CLIMB: 890 ft. 1st min. SERVICE CEILING: 17,100 ft. RANGE: 750 mi. at 10,000 ft. at 160 mph.

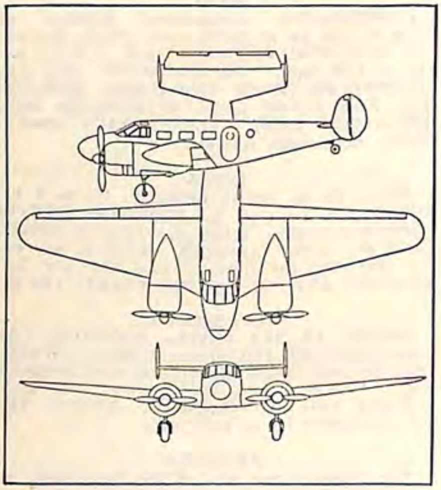
REMARKS

The Bonanza was one of the first planes to use a "Vee" tail. Its popularity has shown a steady increase with the business executive since it first appeared and over 2,000 have been manufactured. This model holds the lightplane nonstop world's endurance record of 4,957.240 miles (see RECORDS). PRICE: $10,975. PRODUCTION: As of Nov. 1, 1949, 262.




**Twin Beechcraft executive transport**

## D18S



A twin-engine 10-place, executive type, all metal, low-wing, land monoplane; normal category. CAA TYPE CERTIFICATE NUMBER: TC 765. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: D18S, April 26, 1946. FIRST DELIVERY: Model 18, December 1945.

### DATA

POWERPLANT: Two Pratt and Whitney Wasp Jr. SB-3 or B-5, 450 hp at 2,300 rpm. FUEL CAPACITY AND CONSUMPTION: 206 gal.; 33 gal. per hr. (286 gal. with auxiliary tanks.) OIL CAPACITY: 17 gal. APPROVED PROPELLERS: Hamilton Standard Hydromatic 22D30, or constant speed, 2D30. FLAPS: Plain 45 degrees. GEAR: Two wheel retractable.

### SPECS

SPAN: 47 ft. 7 in. LENGTH: 33 ft. 11½ in. HEIGHT: 9 ft. 2½ in. WEIGHTS: EMPTY, 5,680 lb., constant speed; 5,770 lb., hydromatic; GROSS, 8,500 lb., constant speed; 8,750 lb., hydromatic; USEFUL LOAD: 3,135 lb. WING LOADING: 24.35 lb. per sq. ft. POWER LOADING: 10.62 lb. per hp.

### PERFORMANCE

SPEEDS: MAXIMUM, 230 mph at 400 hp.; CRUISING, 211 mph at 10,000 ft. at 300 hp. RATE OF CLIMB, 1,250 ft. 1st min. (8,500 lb). SERVICE CEILING: 21,200 ft. (8,500 lb.). RANGE: 750 to 1,500 mi. depending on fuel arrangement.

### REMARKS

More than 90 percent of the U. S. bombardiers and navigators, and about 50 percent of the multi-engine pilots were trained in the approximately 5,000 military versions of this model manufactured during World War II. The post-war models have a number of seating arrangements, and a wide selection of interior styling. Many owners have equipped their planes with the latest in electronic aids, and special features for passenger comfort. Included are such items as a roll-out combination bed and couch, desks, bars, instruments and radio in the passenger compartment, and individual tables. The outward appearance of the D18S is about the same as the war model except for the extension of the wing leading edge between the fuselage and nacelles for better handling at low speeds.

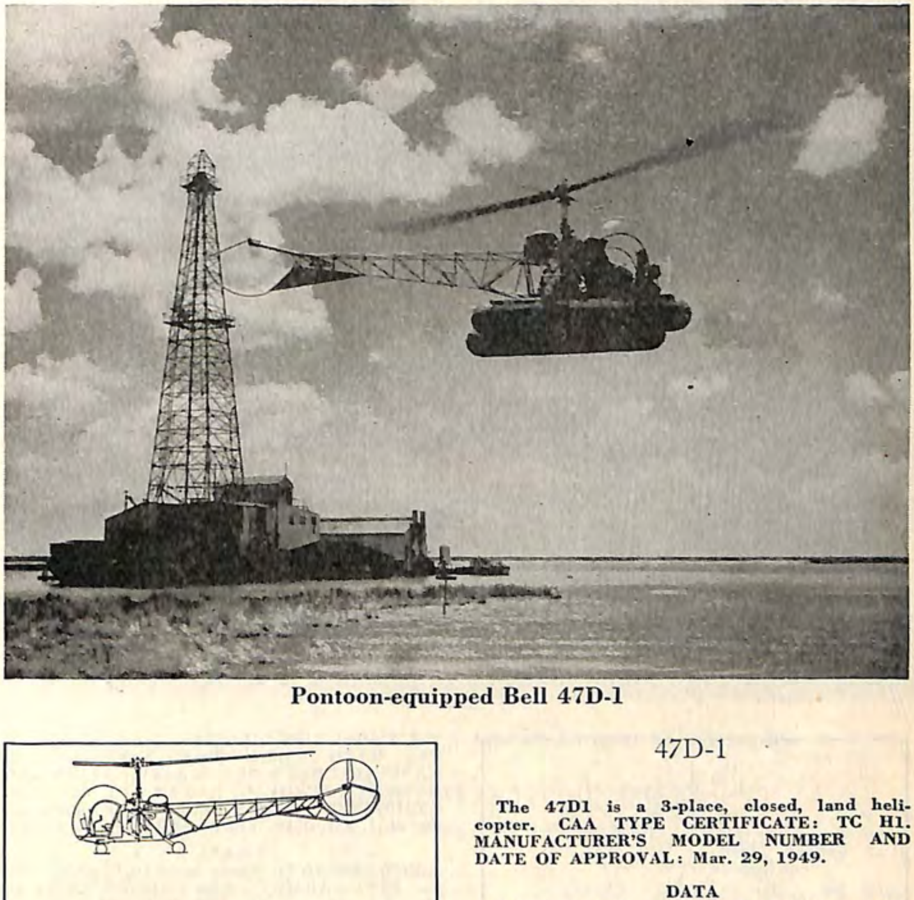
Another production model is the D18C, approved July 16, 1947. It is similar to the D18S except for the following: POWERPLANT: Two Continental, R9-A, 525 hp each at takeoff. SPEEDS: MAXIMUM, 240 mph at 4,000 ft.; CRUISING, 224 mph at 350 hp at 8,500 ft. RATE OF CLIMB, 1,450 ft. 1st min. SERVICE CEILING: 23,800 ft. RANGE: 1,370 mi. with nose tank.

This model was approved as a transport June 3, 1947 and has been used extensively by feeder lines in this country, and to some extent abroad. PRICE (f.a.f.): $66,500 up, depending on model. PRODUCTION: As of Nov. 1, 1949, 38.

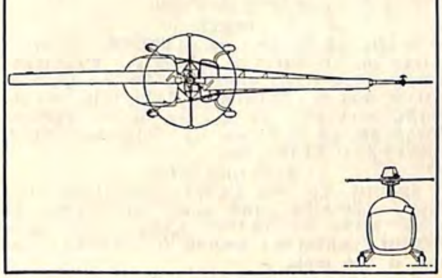
"You observe, Madame, the balloon engages all mankind, and it is indeed a wonderful and unexpected addition to human knowledge; but we have a daring projector, who, disdaining the help of fumes and vapours, is making better than Daedalean wings, with which he will master the balloon and its companions as an eagle masters a goose. It is very seriously true that a subscription of eight hundred pounds has been raised for the wire and workmanship of iron wings, one pair of which, and I think a tail, are now shown in the Haymarket, and they are making another pair at Birmingham. The whole is said to weight two hundred pounds—no specious preparation for flying, but there are those who expect to see him in the sky."

Letter from Dr. Samuel Johnson to Mrs. Hester Thrale
January 12, 1784

# BELL AIRCRAFT CORP.
Buffalo, N. Y.



**Pontoon-equipped Bell 47D-1**



## 47D-1

**The 47D1 is a 3-place, closed, land helicopter. CAA TYPE CERTIFICATE: TC H1. MANUFACTURER'S MODEL NUMBER AND DATE OF APPROVAL: Mar. 29, 1949.**

### DATA

**POWERPLANT: Franklin 6V4-178-B32, 178 hp. FUEL CAPACITY: 29 gal. OIL CAPACITY: 2 gal. GEAR: Four-wheel type or twin floats.**

### SPECS

**MAIN ROTOR DIAMETER: 35 ft. 1½ in. ANTI-TORQUE ROTOR DIAMETER: 5 ft. 9 in. LENGTH: 41 ft. 2-9/16 in. WEIGHTS: EMPTY, 1,380 lb.; GROSS, 2,200 lb.; USEFUL LOAD, 820 lb.; MAXIMUM PAYLOAD, 450 lb. ROTOR DISC LOADING: 2.28 lb. per sq. ft. POWER LOADING: 11¼ lb. per bhp.**

### PERFORMANCE

**SPEEDS AT SEA LEVEL: MAXIMUM, 92 mph; CRUISING, 80 mph. RATE OF CLIMB FULLY LOADED: 800 ft. per min. SERVICE CEILING: 9,600 ft. RANGE: 194 mi.**

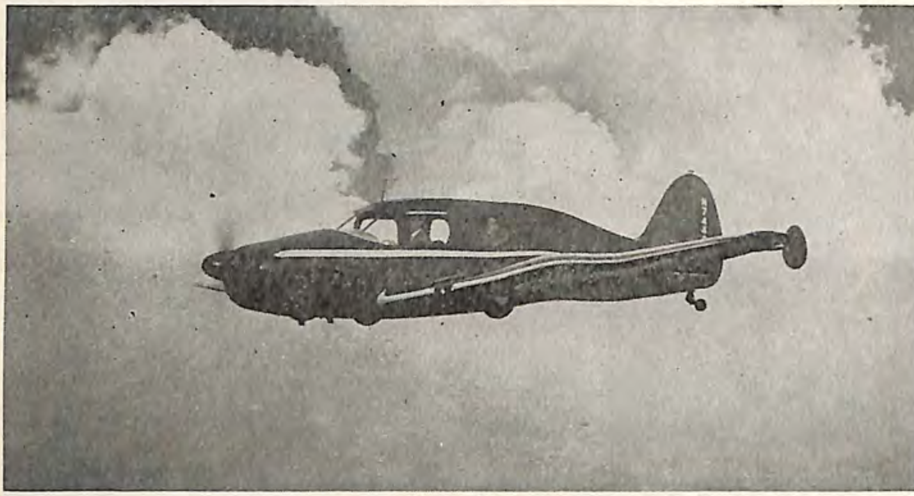
**REMARKS**

**The 47D-1 is an improved version of the 47-D. The main changes include an increase from a 2-place to 3-place, a one-piece bubble canopy instead of the split type, dual location for the battery for partial C. G. control, a tail rotor guard, roller bearing transmission, and minor modifications. The model can be equipped as a sprayer, duster, or fogger for agriculture uses.**

**There is no more civil production on the 47-D, although the Army Field Forces had a contract for sixty-five that was completed early in the year. (See Military Section.)**

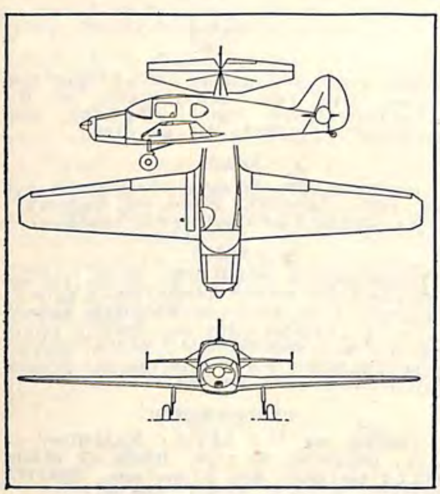
# BELLANCA AIRCRAFT CORP.

Newcastle, Del.



**4-place Bellanca Cruisair**

## CRUISAIR



**A 4-place, closed, low-wing, land, monoplane. CAA TYPE CERTIFICATE NUMBER: 773. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: 14-13-3, Oct. 25, 1948. ENGINEERING PERSONNEL: G. M. Bellanca and B. J. Salvadori. TEST PILOT: J. J. Kaveney.**

**DATA**

**POWERPLANT: Franklin 6A4-150-B3, 150 hp. FUEL CAPACITY AND CONSUMPTION: 40 gal., 9.5 gal. per hr. OIL CAPACITY: 2 gal. APPROVED PROPELLERS: Sensenich 74RA or Koppers Aeromatic. FLAPS: Slotted, 45 degrees. GEAR: Retractable-conventional.**

**SPECS**

**SPAN: 34 ft. 10.4 in. LENGTH: 21 ft. 3 11/16 in. HEIGHT: 6 ft. 2½ in. WEIGHTS: EMPTY, 1,250 lb.; GROSS, 2,150 lb.; USEFUL LOAD, 900 lb.; MAXIMUM PAYLOAD, 790 lb. WING LOADING, 13 lb. per sq. ft. POWER LOADING, 14.35 lb. per hp.; BAGGAGE, FULL SEATS AND TANKS, 85 lb.**

**PERFORMANCE**

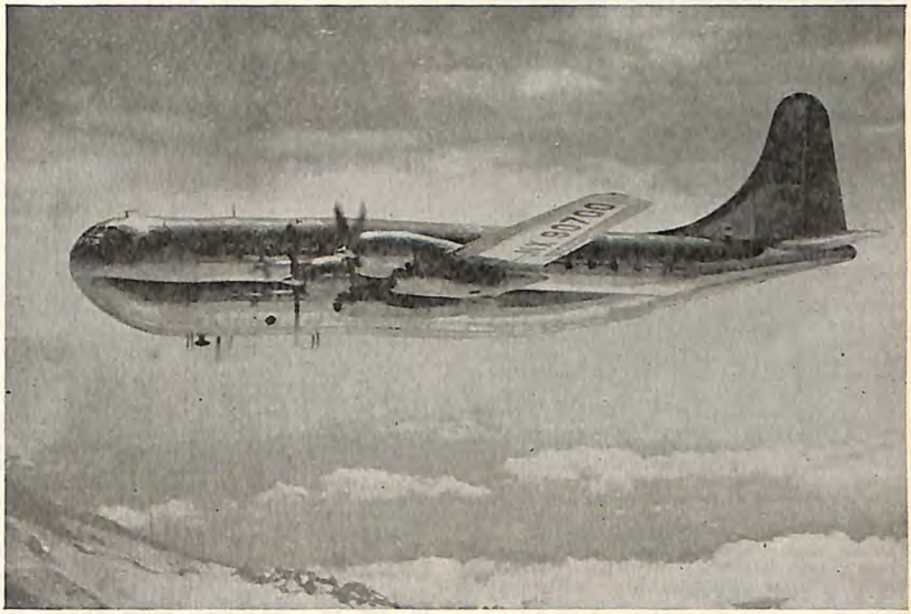
**SPEEDS AT SEA LEVEL: MAXIMUM, 160 mph; CRUISING, 150 mph; STALLING, 48 mph. RATE OF CLIMB, 1,100 ft. 1st min. SERVICE CEILING: 22,000 ft. RANGE: 725 mi. at 146 mph.**

REMARKS

The Cruisair has bonded plywood wings, giving it a placard diving speed of 216 mph. It can reach 15,000 ft. in 21 minutes, and its ceiling in 50 minutes, both at cruising power. A station-wagon model is available. **PRICE** (f.a.f.): $6,950. **PRODUCTION**: As of Nov. 1, 1949, 27.

# BOEING AIRPLANE COMPANY

Seattle, Washington



**Boeing Stratocruiser on test flight over the Cascades**

## BOEING STRATOCRUISER

**CAA TYPE CERTIFICATE AND DATE**: TC-812 (Stratocruiser), Sept. 3, 1948.

**OUTSTANDING FEATURES**: Largest commercial transport now in production. Outstanding feature is double-deck "Inverted Eight" body design. Stratocruisers are also notable for high speeds and for freight and passenger capacities. The plane's vertical stabilizer is so high (38 ft.) that it has been hinged to allow it into normal-sized hangars.

**FAMILY**: The first Boeing 4-engine (299) (1935); the XB-15, only one manufactured (1935); the Stratoliner (1938), first pressurized transport; the Flying Boat Model 314 (1939); the B-29 Superfortress (1942) (See PLANES IN USE); and B-50 Superfortress described elsewhere in this section.

**OVERALL TIME FROM CONTRACT TO DELIVERY OF FIRST APPROVED COMMERCIAL STRATOCRUISER**: 2 yr., 2 mo., 3 days.

**ENGINEERING PERSONNEL**: Richard L. Rouzie, Wellwood E. Beall, Edward C. Wells, Lysle A. Wood, Alan F. Kelsey.

**ENGINEERING BEGUN**: June 20, 1940.

**TEST PILOTS**: John B. Fornasero, James A. Fraser, Robert T. Lamson, Elliott Merrill. (Lamson and Merrill won the Octave Chanute Award in 1945 for their high altitude work.)

**FIRST PRODUCTION CONTRACT**: Jan., 1943, 3 XC-97's to the Air Force. First commercial production contract for Stratocruisers to Pan American Airways, Nov. 28, 1945.

**FIRST COMMERCIAL STRATOCRUISER DELIVERY**: Jan. 31, 1949, to PAA.

**NOTES**: Six million square feet of blue prints were used in designing the Stratocruiser, plus more than 2,300 man-years of work. More words were used to report data than are in the Encyclopedia Brittanica. Pre-flight tests included a 40,000-mile run for the power plant, 11,800 simulated landings with the tricycle gear, five years of wind-tunnel tests, 1,900 test-hours for the generating system. Flooring was tested in Boeing plant aisles by the tramping of more than a million feet. Flight tests, totalling more than 250,000 miles, included a true airspeed dive of 498 mph and 54 flights between Seattle and Tampa, Los Angeles and New York. CAA tests began on Feb. 9, 1948. Says a Boeing test expert; "We have flown our test ships some 900 hours, and flight time roughly costs us $3,000 per hour. This figure is based on actual airplane expense, plus crew pay, plus ground costs of the flight test division thought to apply, plus an item for engineering overhead. The $3,000 figure is total Boeing expense, and should *not* be compared in any way to the expenses of airline operations with this type of airplane."

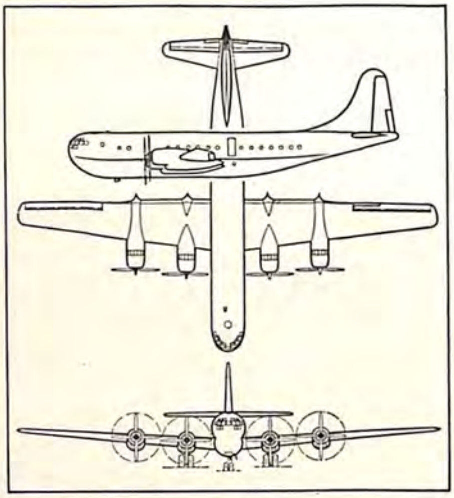
PASSENGER ACCOMMODATIONS: Commuter arrangement has capacity of 122 passengers; standard seating (type being delivered), 55 to 75; sleepers, 45. Typical passenger accommodations include main compartment (4,041 cu. ft.), dressing rooms (466 cu. ft.), lounge (550 cu. ft.). Decks are connected by circular staircase. Air in cabin changes every one and one-third minutes, and can be maintained at 70° F. in weather as low as -60° F. Cabin pressure does not change up to 15,000 ft. At 20,000 ft., cabin conditions are those at 3,000; at 25,000, 5,500. Upper sleeping berths are retractable into cabin wall. Stratocruisers claim largest galleys aloft (350 cu. ft.) including two electric ovens, five-gallon coffee urn, wet-ice refrigeration. Commercial interiors vary: PAA, NWA, and AOA have galleys at the rear. BOAC and UAL galleys are amidships. UAL features a honeymoon stateroom far aft. Windows also vary: circular windows are favored by PAA, and BOAC, NWA's are rectangular, AOA and UAL use a combination of both. Interior color schemes are beige-blue-green (PAA), browns (NWA), Hawaiian (UAL), oak (BOAC), white gold (AOA).

### SPECS

FLIGHT CREW: Normally five: pilot, co-pilot, flight engineer, radio operator, navigator.

MAINTENANCE: Provisions for fast maintenance are built into design so that an entire power package can be changed by four men in 30 minutes, a starter by one man in 30 minutes, a prop by two men in 2 hours, 45 minutes. Three-piece cowls attached by hook-type hinges and trunk-like latches speed engine work. Power packages are interchangeable. Wing leading edge sections are hinged. Full-extended flaps give access to fuel lines, wiring, flap and aileron controls. Instrument panels are hinged for easy access to rear.

POWERPLANT: 4 Pratt and Whitney, TSB3-G 3,500 hp each with water soluble alcohol injection (39 parts water, one part oil, 60 parts commercial methyl alcohol). NORMAL FUEL CAPACITY: 7,790 gal. (Fuel stored in 35 nylon cells weighing nearly a ton less than conventional containers.) FUEL CONSUMPTION: 467 gal. per hr. OIL CAPACITY: 190-196 gal. OIL CONSUMPTION: .015 lb. per bhp hr. at 2,270 rpm. APPROVED PROPELLERS: Four-bladed Curtiss Electric or Hamilton Standard, full feathering, reverse thrust. WING SPAN: 141



ft. 3 in. (the wings are 16% stronger, 650 lb. lighter, 26% more efficient than B-29's.) LENGTH: 110 ft. 4 in. HEIGHT: 38 ft. 3 in. (taxi condition), 26 ft. 7 in. (vertical tail hinged down). GEAR: Tricycle, electrically retractable, dual-wheel. (Retracts 9 sec.; lowers, 3 sec. Nose wheel hydraulically steerable to 60° each side.) Gear weight 7,022 lb., a main tire, 263 lb.

WEIGHTS: EMPTY, 83,500 lb. GROSS, 142,500 (take-off); 121,700 lb. (landing). MAXIMUM PAYLOAD, 30,000 lb. WING LOADING, 81.4 lb. per sq. ft. POWER LOADING, 10.2 lb. per hp. BAGGAGE, FULL SEATS AND TANKS, 17,100 lb.

### PERFORMANCE

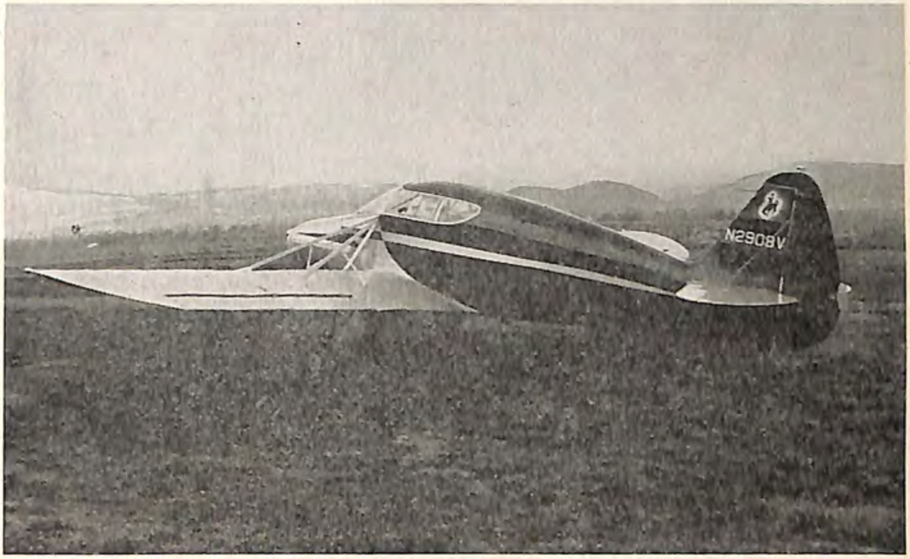
SPEEDS: MAXIMUM, at 30,000 ft., 375 mph. CRUISING at 25,000 ft., 300-340 mph. STALLING, 93 mph. TAKE OFF: C.A.R. field length, sea level, 142,500 lb., 6,250 ft.; 130,000 lb., 4,900 ft. RATE OF CLIMB: 1,100 ft. per min. The plane can climb to 15,000 ft. on two engines. LANDING: C.A.R. field length, sea level, 110,000 lb. gross, 5,860 ft.; same weight with reversible propellers, 3,480 ft. SERVICE CEILING: 33,000 ft. RANGE: Zero wind, no fuel reserve, 10,500 lb., payload, 4,600 mi.; 20,000 lb., 3,550 mi.; 25,000 lb., 3,000 mi.

PRICE: $1,500,000 (approx.) for the Stratocruiser.

PRODUCTION: 55 Stratocruisers are in the process of delivery to 5 major airlines: Pan American World Airways, 20; Northwest Airlines, 10; American Overseas Airlines, 8; United Airlines, 7; British Overseas Airways Corporation, 10. On the basis of these orders and others being negotiated as this goes to press, Boeing estimates that production on these models will continue until at least 1951.

# CALL AIRCRAFT CO.

Afton, Wyo.




**Call-Air**

**A 2-place, closed, low-wing, land monoplane. CAA TYPE CERTIFICATE NUMBER: TC 758. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: A-2, July 31, 1946; and A-3, June 11, 1947. Only major difference in the two models is the powerplant installation. ENGINEERING PERSONNEL: Ivan L. Call. TEST PILOT: Barlow H. Call.**

DATA

**POWERPLANT: A-2, Lycoming O-290-A, -B, or -C, 125 hp. A-3, Continental C125-2, 125 hp. FUEL CAPACITY AND CONSUMPTION: 27 gal., 5 gal. per hr. APPROVED PROPELLERS: Sensenich 76 JB and 75 JR. GEAR: Fixed conventional.**

SPECS

**SPAN: 35 ft. 9⅜ in. LENGTH: 23 ft. 5⅜ in. HEIGHT: 7 ft. WEIGHTS: EMPTY, 975 lb.: GROSS, 1,550 lb.; USEFUL LOAD, 575 lb. WING LOADING, 8.53 lb. per sq. ft. MAXIMUM BAGGAGE: 50 lb.**

PERFORMANCE

**SPEEDS AT SEA LEVEL: MAXIMUM, 120 mph; CRUISING, 109 mph; STALLING, 45 mph. RATE OF CLIMB: 1,000 ft. per min. SERVICE CEILING: 17,500 ft. RANGE: 456 mi.**

REMARKS

**PRICE: $4,525. PRODUCTION: As of Nov. 1, 1949, 6.**

" 'The Mail must fly' has been the order; and the Mail has flown. The operation of the service every day in the year except Sunday, between Washington and New York and daily between Cleveland and Chicago, encountering all sorts of weather conditions and meeting them successfully, has further demonstrated the practibility of employing the airplane for commercial uses.

The Aerial Mail has been maintained, throughout the year ending May 14th, 1919, with a record of 92 percent—gales of exceptional violence and heavy snow storms being encountered and overcome."

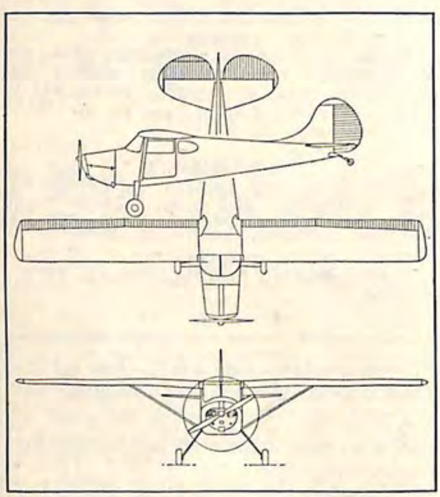
*Aircraft Year Book,* 1920

# CESSNA AIRCRAFT CO.

Wichita, Kans.

**Cessna's 4-place family and business Model 170**

## 170



A 4-place, closed, all-metal, land, high-wing monoplane, normal and utility category. CAA TYPE CERTIFICATE NUMBER: TC 799. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL; 170A, Dec. 15, '48.

### DATA

POWERPLANT: Continental, C-145-2, 145 hp. FUEL CAPACITY AND CONSUMPTION: 42 gal., 7.5 gal per hr. OIL CAPACITY: 2 gal. APPROVED PROPELLERS: McCauley 1A170, Sensenich 73BR-50. FLAPS: Trailing edge, 50 degrees. GEAR: Fixed two-wheel, steerable tailwheel.

### SPECS

SPAN: 36 ft. LENGTH: 25 ft. HEIGHT: 6 ft. 7 in. WEIGHTS: EMPTY, 1,185 lb.; GROSS, 2,200 lb.; USEFUL LOAD, 985 lb.; MAXIMUM PAYLOAD, 743 lb. WING LOADING, 12.8 lb. per sq. ft. POWER LOADING, 15.5 lb. per hp. BAGGAGE, FULL SEATS AND TANKS: 68 lb.

### PERFORMANCE

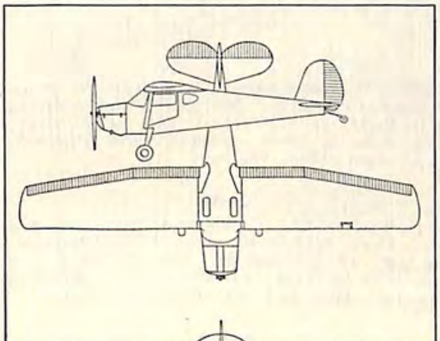
SPEEDS AT SEA LEVEL: MAXIMUM, 140 mph; CRUISING, 120 mph; STALLING, 53 mph (with flaps), 58 mph (without flaps). RATE OF CLIMB: 690 ft. 1st min. SERVICE CEILING: 15,500 ft. RANGE: 640 mi.

### REMARKS

The 1949 "170" has a single metal strut instead of the conventional two-strut arrangement used on the 1948 model. The wing is all-metal with square tips and a taper. Other changes include an improved flap, an increase in fuel capacity, and a new gravity feed fuel system instead of a fuel pump. PRICE (f.a.f.): $5,995. PRODUCTION: As of Nov. 1, 1949, (170) 292, (170A) 147.

**The new all-metal Cessna 140**

## 140



**A 2-place closed, land or sea, monoplane, normal and utility category. CAA TYPE CERTIFICATE NUMBER: TC 768. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: 140, Mar. 21, 1946. ENGINEERING PERSONNEL: Tom Salter, ch. engr.**

DATA

**POWERPLANT: Continental C-85-12 or -12F (85 hp); Continental C-90-12F (90 hp). FUEL CAPACITY AND CONSUMPTION: 25 gal., 4.5 gal. per hr. for 85 hp; 5 gal. per hr. for 90 hp. APPROVED PROPELLERS: Sensenich 72RK-56 or 74FK-51, McCauley 1A90-CF, 1A90-CH or 1B90-CM for C-90 engine; Sensenich 74-FC-47-49 or -51, McCauley 1A90-CF or 1A90CH for C-85 engine. FLAPS: Trailing edge, 45 degree travel. GEAR: Conventional, steerable tailwheel.**

SPECS

**SPAN: 33 ft. 4 in. LENGTH: 21 ft. 6 in. HEIGHT: 6 ft. 3¾ in. WEIGHTS: EMPTY, 907 lb.; GROSS, 1,500 lb.; USEFUL LOAD, 569 lb.; MAXIMUM PAYLOAD: 354 lb. WING LOADING, 9.75 lb. per sq. ft. POWER LOADING: 17.6 lb. per hp for 85 hp; 16.7 lb. per hp for 90 hp. BAGGAGE, FULL SEATS AND TANKS: 54 lb.**

PERFORMANCE

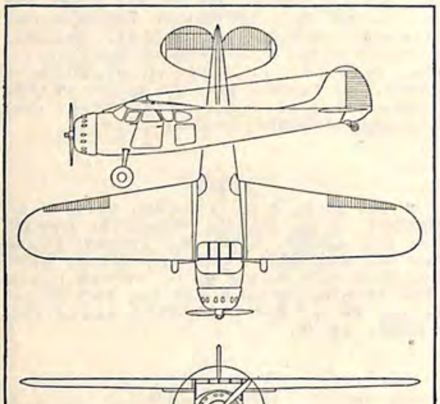
**SPEEDS AT SEA LEVEL: MAXIMUM, 125 mph (C-85); 127 mph (C-90); CRUISING, 110 mph (C-85); 115 mph (C-90); STALLING: 52 mph. RATE OF CLIMB: 560 ft. 1st min. (C-85); 640 ft. 1st min. (C-90). SERVICE CEILING: 12,200 ft. (C-85); 12,600 ft. (C-90). RANGE: 450 mi.**

REMARKS

The new all-metal 140 appeared early in the year. It has the same wing design as the 170, although not as much span. Its general appearance throughout is similar to the 170 on a smaller scale. Among the "family appeal" features is an arrangement for fitting a "tot seat" holding two children in the baggage compartment. The Model 120 appeared on the same type certificate as the 140, but is no longer in production. Cessna production models are now all-metal. PRICE: (C-90), $3,695; (C-85), $3,495. PRODUCTION: As of Nov. 1, 1949; (140) 38, (140A) 146.

**Cessna 190-195 "executive type" plane**

## 190



A 5-place, closed, land, all-metal, monoplane, normal and utility category. CAA TYPE CERTIFICATE NUMBER: TC 790. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: 190, Jul. 1, 1947; 195, June 2, 1947. ENGINEERING PERSONNEL: Tom Salter, ch. engr.

DATA

POWERPLANT: Continental W760-23, 240 hp. FUEL CAPACITY AND CONSUMPTION: 80 gal., 13 gal. per hr. OIL CAPACITY: 5 gal. APPROVED PROPELLERS: Hamilton Standard 2B20 hub with 6135A-15 blades.

SPECS

SPAN: 36 ft. 2 in. LENGTH: 27 ft. 1 in. HEIGHT: 8 ft. WEIGHTS: EMPTY, 2,015 lb.; GROSS, 3,350 lb.; USEFUL LOAD, 1,130 lb.; MAXIMUM PAYLOAD, 810 lb. WING LOADING, 15.35 lb. per sq. ft. POWER LOADING, 13.95 lb. per hp. BAGGAGE, FULL SEATS AND TANKS: 131.5 lb.

PERFORMANCE

SPEEDS AT SEA LEVEL: MAXIMUM, 178 mph; CRUISING, 160 mph; STALLING, 62.5 mph. RATE OF CLIMB: 1,090 ft. 1st min. SERVICE CEILING: 16,100 ft. RANGE: 700 mi.

REMARKS

The 190 and 195 are Cessna's bids for the executive type personal airplane market. Good range, roomy interior, and easy conversion to a utility model are among its qualifying features. Maintenance is claimed to be simplified by the use of a hinged mount that can be swung by removing two bolts. PRICE: $13,-250. PRODUCTION: As of Nov. 1, 1949, 24.

## 195

This model is similar to the 190 with the following exceptions: LENGTH, 27 ft. 4 in.; POWERPLANT, Jacobs R755A2, 300 hp; FUEL CONSUMPTION, 15 gal. per hr.; EMPTY WEIGHT, 2,030 lb.; USEFUL LOAD, 1,115 lb.; MAXIMUM PAYLOAD, 795 lb.; POWER LOADING, 11.16 lb. per hp; BAGGAGE, FULL SEATS AND TANKS, 116.5 lb.; MAXIMUM SPEED, 181 mph; CRUISING SPEED, 165 mph. RATE OF CLIMB, 1,200 ft. 1st min.; SERVICE CEILING, 18,300 ft.

REMARKS

The armed services are using a number of these for air-sea rescue and bush work in Alaska, and also as a liaison plane. PRICE: $14,950. PRODUCTION: As of Nov. 1, 1949, 130.

# CONSOLIDATED VULTEE AIRCRAFT CORP.

San Diego, Cal.

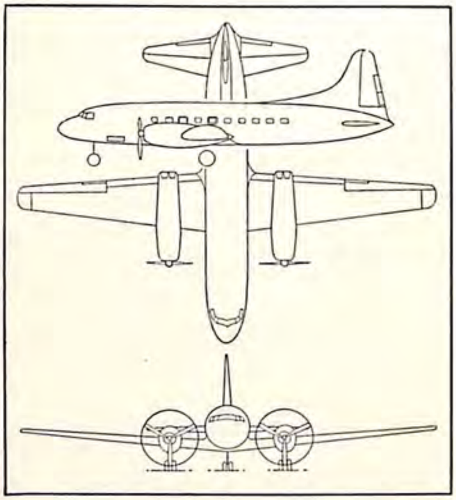
**Post-war transport, Convair 240**

## CONVAIR-LINER 240

CAA TYPE CERTIFICATE AND DATE: TC 793, Sept. 14, 1948.

OUTSTANDING FEATURES: The Convair-Liner 240 was designed as a short and medium haul, fast-flying, pressurized post-war transport to meet the varying needs of a number of airlines. One of the most-sought features was the elimination of ground delays wherever possible. Self-contained steps in the door and a space for passengers to pick up their own baggage are built in. The pressurization allows rapid ascents and descents without passenger discomfort. The prototype of the 240 (Model 110) was built as a result of the specification requirements of airline engineers. The 240 differs from the 110 as follows: 30 mph faster, pressurized, square windows, straight wing instead of a gull, and heavier nacelles. A thermal anti-icing system is used on the wings and tail surfaces.

NOTES: 75,000 man hours' fabrication time is spent on each plane. Extensive testing included a 100,000 cycle strength test by a mechanical "sitter" on the passenger seats. FIRST



PRODUCTION CONTRACT: American Airlines for 100 in late 1945 (later renegotiated for 75). PASSENGER ACCOMMODATIONS: Standard arrangement includes seats for forty passengers grouped in two's on either side of center aisle. Fragmentor tubes, used as heat exchangers, heat fresh air delivered to the cabin. Cabin pressure remains at 9,700 ft. at a plane altitude of 20,000 ft.

FLIGHT CREW: Pilot and co-pilot, with seats well forward in the nose allowing them to see the gear when extended. Engine and radio controls, automatic pilot, and trim controls are on a pedestal between the pilots.

MAINTENANCE: Short cuts are featured wherever possible to keep the ground time to a minimum. Three hundred inspection doors and panels allow easy access to most sections. "Orange peel cowls" (four hinged sections) facilitate work on engines and accessories. The wing leading edge from fuselage to nacelles is hinged at the top for quick inspection to engine cables, hydraulic lines, and outer wing wiring. Refueling takes five minutes.

POWERPLANT: Two Pratt and Whitney R-2800 CA-18. Take-off power (wet), 2,400 bhp at sea level and 2,800 rpm. Cruise power (high blower), 1,200 bhp at 16,000 ft. and 2,300 rpm. FUEL CAPACITY: 1,000 gal. (one 500 gal. tank in each wing). OIL CAPACITY: 41 gal. APPROVED PROPELLERS: Hamilton Standard; diameter, 13 ft. 1 in.; 3 blades, automatic full feathering and reversible or Curtiss Electric; diameter 13 ft. 1 in.; 3 blades, automatic full feathering and reversible with auto-synchronization. WING SPAN: 91 ft. 9 in. LENGTH: 74 ft. 8 in. HEIGHT: 26 ft. 11 in. GEAR: Tricycle retractable. All wheels are dual. WEIGHTS: EMPTY, 26,400 lb.; GROSS, 40,500 lb.; MAXIMUM LANDING GROSS: 38,600 lb.; PAYLOAD, 9,300 lb. (40 passengers and baggage at 195 lb. each, 7,800 lb. and 1,500 lb. cargo). WING LOADING: 49.5 lb. per sq. ft. (maximum takeoff). POWER LOADING: 8.4 lb. per bhp (maximum takeoff). PERFORMANCE: MAXIMUM SPEED (placard), 336 mph; CRUISING SPEED: 291 mph at 16,000 ft., 1,100 bhp per engine, and 39,000 lb. gross; STALLING SPEED, SEA LEVEL: 89 mph with full flaps, power off, and 38,600 lb. gross. SERVICE CEILING: 30,000 ft. MAXIMUM RANGE: 920 mi. (1,100 bhp, 200 mi. or 1,600 lb. fuel reserve, and a 10 mph headwind). PRICE: $495,000 (approx.).

PRODUCTION started on the first Convair-Liner early in 1946. On Mar. 16, 1947, with pilots R. R. Rogers and E. D. Shannon at the controls, the plane made its first flight. Other members of the crew who also had a hand in the production were: L. J. Bordelon, chief flight engineer; J. T. Ready, Jr., chief flight test engineer; and William K. Ehmcke, flight test engineer.

American Airlines took delivery of an X model Jan. 25, 1948, which they used for training purposes. The first fully licensed plane was delivered to American Airlines on Feb. 23, 1948. Trans-Australia Airline was the first foreign purchaser. They took delivery at San Diego, Cal., Aug. 25, 1948.

On June 1, 1949, Convair-Liners completed their first year of scheduled airline service, American Airlines having started June 1, 1948. Airlines established the best safety record ever set by flying a new type transport in its first year of operation. Domestic and foreign-owned airlines, flying more than 150 of the planes, logged 500,000,000 passenger miles, flew 25,000,000 airplane miles, safely carried 2,250,000 passengers.

Latest 1949 (Sept. 16) information available shows the following companies operating Convair-Liners with the number ordered: American Airlines, 75; Western Airlines, 10; Pan American World Airways, 20; Continental Airlines, 5; KLM Royal Dutch Airlines, 12; Trans-Australia Airlines, 5; FAMA Airlines, 5; Orient Airways, Ltd., 3; Swissair, 4; Sabena, 6; Central Air Transport Corp., 6; Northeast Airlines, 5; and individuals, 2. Total 158.

See Military Section for Air Force version.

**News Item**

"In the Evening Post, a London newspaper published in the reign of Queen Anne, bearing a date December 20-22, 1700, there is a curious description of a flying ship, stated to have been invented by Bartolomeo Lorenzo, a Brazilian priest. The paper has an engraving of the air ship and a long description. The inventor claimed that he could travel 200 miles in twenty-four hours.

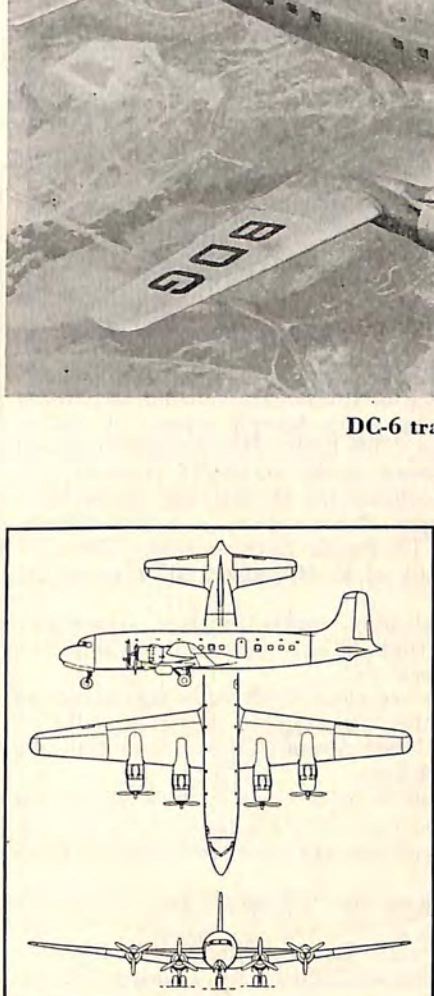
—*Ledger,* Birmingham, Ala., Dec. 7, 1907

# DOUGLAS AIRCRAFT CO., INC.

Santa Monica, Cal.


**DC-6 transport liner**

## DC-6



**CAA TYPE CERTIFICATE AND DATE:** TC 781, June 23, 1947.

**OUTSTANDING FEATURES:** Among the post-war transport innovations and improvements found on the DC-6 are a radiant heating system through cabin walls and floors, automatic pressurization giving the cabin an 8,000 ft. altitude pressure at 20,000 ft., electric anti-icing of propellers, thermal anti-icing of wings and tail surfaces, and reversible propellers. The plane carries 52 to 58 passengers as a day plane, but can be made up en route to accommodate 26 as a sleeper.

**ENGINEERING PERSONNEL:** Edward F. Burton, chief engineer; J. B. Edwards, project engineer.

**FIRST DELIVERY:** Mar. 28, 1947, to American Airlines and United Airlines.

**NOTES:** Preceded by the DC-4, which has flown billions of miles in global operations during and after the war, the DC-6 appeared after nearly two million hours of engineering research, 302,000 man-hours of laboratory study, and 145,733 hours in structural and component strength tests. Before the first delivery the plane had a total of 2,000 hours flight and certification testing. Probably the best known of the 6's is the Presidential *Independence*. Do-

**mestic lines now using DC-6's include United Airlines, American Airlines, Braniff Airlines, National Airlines, and Delta Airlines. Foreign users include KLM Royal Dutch Airlines, SAS, Philippine Airlines, BCPA, FAMA, Sabena, and PANAGRA.**

**FLIGHT CREW: Domestic runs: pilot, co-pilot, and flight engineer. Radio operator and navigator are added for overseas runs.**

**POWERPLANT: Four Pratt and Whitney R-2800CA-15, hp at take-off, 2,100 bhp each (2,400 bhp with water). Normal rated power, 1,800 bhp each. NORMAL FUEL CAPACITY: 4,700 gal. FUEL CONSUMPTION: 380 gal. per hr. at 315 mph at 84,000 lb. OIL CAPACITY: 150 gal. APPROVED PROPELLERS: Curtiss Electric (STD.) or Hamilton Standard reversible. WING SPAN: 117 ft. 6 in. LENGTH: 100 ft. 7 in. HEIGHT: 28 ft. 5 in. GEAR: Fully retractable tricycle using two sets of dual-type main wheels mounted aft of the center of gravity, and a steerable nosewheel. WEIGHTS: Standard takeoff gross weight, 72,000 lb. plus fuel; maximum takeoff gross weight, 95,200 lb., structural design landing gross weight, 78,000 lb. WING LOADING (gross weight, 84,000 lb.): 57.5 lb. per sq. ft. POWER LOADING (take-off power at 84,000 lb.): 10 lb. per bhp.**

**PERFORMANCE: Maximum cruise power, high blower, 1,175 bhp, 322 mph with a gross of 78,000 lb. at 20,600 ft.; 315 mph with a gross of 84,000 lb. at 20,400 ft.; and 295 mph with a gross of 95,2000 lb. at 20,200 ft. Sixty percent sea level maximum continuous power at 10,000 ft.; 284 mph with 78,000 lb., 279 mph with 84,000 lb. and 266 mph with 95,200 lb. TAKE-OFF, C.A.R. FIELD LENGTH: Sea level without water injection, 78,000 lb., 3,790 ft.; 84,000 lb., 4,640 ft. Sea level with water injection and 78,000 lb., 3,490 ft.; 84,000 lb., 4,200 ft.; 95,200 lb., 5,730 ft. At 5,000 ft. without water injection and 78,000 lb., 5,210 ft.; 84,000 lb., 6,320 ft. At 5,000 ft. with water injection and 78,000 lb., 4,990 ft.; 84,000 lb., 6,320 ft. LANDING, C.A.R. FIELD LENGTH at 78,000 lb.: Sea level, 5,060 ft.; at 5,000 ft., 5,785 ft. SERVICE CEILING: 28,400 ft. with 78,000 lb. RANGE: 3,370 mi. with 3,322 gal. fuel; 4,260 mi. with 4,248 gal. fuel. PRODUCTION: 163 DC-6's have been delivered or are on order.**

**Biggest Airline**

Today, the Military Air Transport Service is the greatest potential user of transport aircraft in the world.

Its post-war fleet, representing some twenty models, totals more than 900 aircraft, headed by the Douglas C-54 (Navy R5D), veteran workhorse of the Hump, Operation Vittles, and MATS trunk lines; and the old reliable Douglas C-47, which MATS employs chiefly in domestic feeder operations.

Newer types appear in far smaller numbers. The C-47 Douglas *Globemaster,* a powerful, great capacity transport, capable of carrying more than 20 tons of cargo, has been used extensively in long-range trans-Atlantic support of Vittles, especially to carry engine replacements. The C-121 Lockheed *Constellation* is used at present as a long-range, high-speed personnel carrier on MATS trans-Atlantic runs. It is immediately convertible to air evacuation use for carrying patients from overseas evacuation points. The C-97 Boeing *Stratofreighter* is a high-altitude, high-speed aircraft used at present on MATS Pacific Division runs. The C-97 has unusually long range with a load capacity of 43,000 pounds, 137 troops or 83 litter cases.

The C-82 Fairchild *Box-Car* is a high-wing, squared-fuselage, twin-engine aircraft which has been used in air rescue work. The C-82 can airlift large and bulky cargo, troops, and miscellaneous cargoes.

The remainder of MATS various types are those employed in the specialized missions of the several services. Air Weather, for example, uses Boeing B-29's, while Air Rescue uses Boeing B-17's and United Aircraft Corporation's Sikorsky H-5 helicopters. Other aircraft complete the total.

MATS C-121 operations are tied to our Atlantic Division at Westover Air Force Base, Mass. Our C-97's operate entirely in the Pacific Division and our C-74's have been exclusively test-developed and operated out of Brockley Air Force Base, Mobile, Ala.

The reasons for this inflexible arrangement are rigid special requirements for maintenance, spare parts, and crew training.

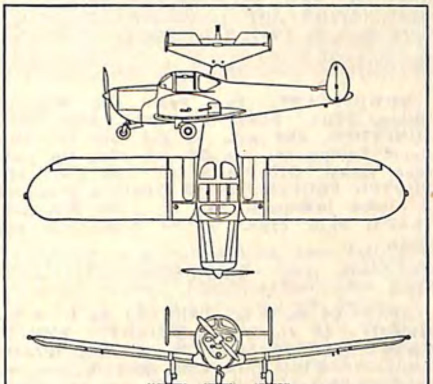
—Maj. Gen. Laurence S. Kuter, USAF,
Commander, Military Air Transport Service

# ENGINEERING AND RESEARCH CORP.

Riverdale, Md.


**Ercoupe Club-Air, "Spin-proof, simplified controls, easy-to-fly plane"**

## ERCOUPE



A 2-place convertible, land, low-wing, monoplane, normal category. CAA TYPE CERTIFICATE NUMBER: TC-787. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: G, Jan. 28, 1949. ENGINEERING PERSONNEL: Fred Weick and Robert Sanders. TEST PILOT: "Tommy" Thompson.

### DATA

POWERPLANT: 85 hp Continental, C-85-12 or C-85-12F. FUEL CAPACITY AND CONSUMPTION: 24 gal., 4.7 gal. per hr. at 2,000 ft., 2,400 rpm. APPROVED PROPELLERS: Sensenich, Hartzell Ground Adjustable, McCauley, or Koppers Aeromatic.

### SPECS

SPAN: 30 ft. LENGTH: 20 ft. 9 in. HEIGHT: 5 ft. 11 in. GEAR: Fixed tricycle, steerable nosewheel. WEIGHTS: EMPTY, 838 lb.; GROSS, 1,400 lb.; USEFUL LOAD, 562 lb. WING LOADING, 9.8 lb. per sq. ft. POWER LOADING, 16.47 lb. per hp; BAGGAGE, FULL SEATS AND TANKS: 75 lb., including "Kiddy Seat" occupant.

**PERFORMANCE**

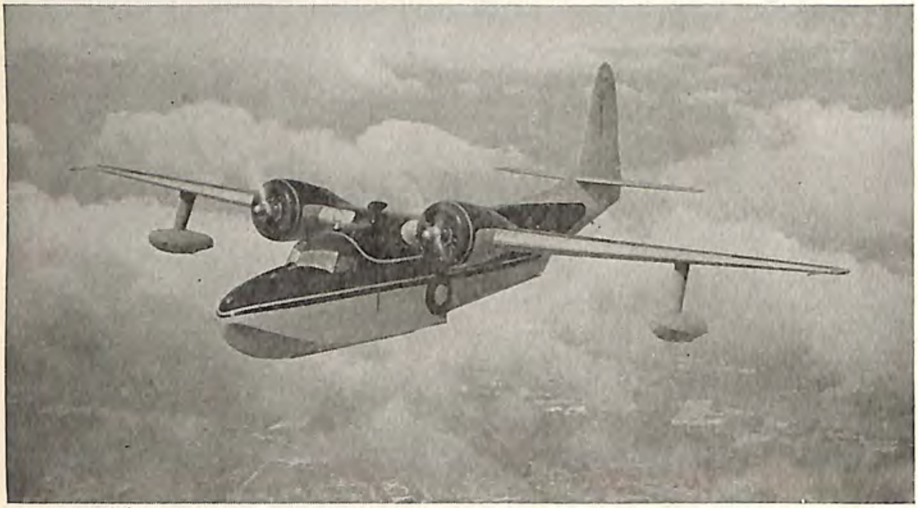
**SPEEDS AT SEA LEVEL: MAXIMUM, 125 mph; CRUISING, 110 mph; STALLING, 48 mph; RATE OF CLIMB, 560 ft. 1st min. SERVICE CEILING: 11,000 ft. RANGE: 430 mi. at 110 mph (no wind); max. possible, 530 mi. at 80 mph.**

**REMARKS**

**Spin-proof, simplified controls, easy-to-fly plane. Rudder pedals have been eliminated by linkage so that both rudders and ailerons are operated from the wheel. Solo time is claimed to be 33-1/3 percent less than on conventional craft. PRICE (f.a.f.): $3,995. PRODUCTION: As of Nov. 1, 1949; (E) 7, (G) 42.**

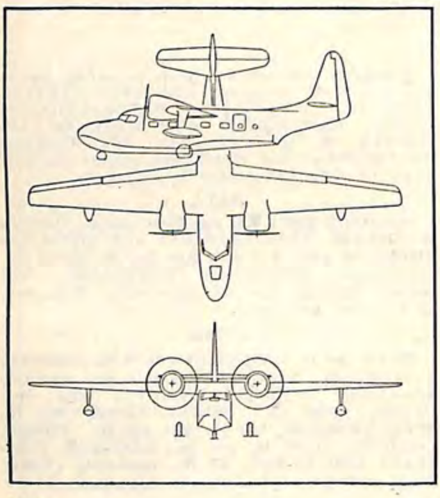
# GRUMMAN AIRCRAFT ENGINEERING CORP.

Bethpage, L. I., N. Y.



**Grumman Mallard, amphibian executive transport**

## MALLARD



**An 8-10 passenger amphibian, executive transport. CAA TYPE CERTIFICATE NUMBER: TC 783. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: G-73, Sept. 8, 1947. TEST PILOT: F. Rowley.**

**DATA**

**POWERPLANT: Two Pratt and Whitney Wasps, S3H1. FUEL CAPACITY AND CONSUMPTION: 380 gal., 52 gal. per hr. Optional Equipment: two 50 gal. wing tip pontoon tanks. OIL CAPACITY: 20 gal. APPROVED PROPELLERS: 2 Hamilton Standard 3 bladed hydromatic,—8 ft. 3 in. diameter. FLAPS: Split Type. GEAR: Retractable tricycle.**

**SPECS**

**SPAN: 66 ft. 8 in. LENGTH: 48 ft. 4 in. HEIGHT: 18 ft. 9 in. WEIGHTS: EMPTY, 9,350 lb.; GROSS, 12,750 lb.; USEFUL LOAD: 3,400 lb. WING LOADING, 28.2 lb. per sq. ft. POWER LOADING, 10.4 lb. per hp. BAGGAGE, FULL SEATS AND TANKS: up to 440 lb.**

PERFORMANCE

SPEEDS AT SEA LEVEL: MAXIMUM, 215 mph: CRUISING, 180 mph; STALLING, 71 mph. RATE OF CLIMB: 1,290 ft. 1st min. SERVICE CEILING: 23,000 ft. RANGE: with 10 passengers, 2 crew members, and 100 lb. baggage, 735 mi. With fewer passengers the range can be increased to 1,330 mi, and with auxiliary tanks can be rated to over 1,500 mi.

REMARKS

100,000 engineering man-hours went into the development of the Mallard before test flights started, Apr. 20, 1946. The design resulted from studies made by Grumman with the help of the Navy Bureau of Aeronautics, NACA Laboratories, and several technical schools. The Mallard is certificated as a scheduled air carrier transport, but is used chiefly as an executive plane. PRICE (f.a.f.): $150,-000.

# KAMAN AIRCRAFT CORP.

Windsor Locks, Conn.


**Kaman 190 Duster**

## K-190L

The 190 is a 2-place, land, open helicopter. CAA TYPE CERTIFICATE: 1H1. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: K-190A, Apr. 15, 1949.

DATA

POWERPLANT: Lycoming 0-435-X, 190 hp. FUEL CAPACITY AND CONSUMPTION: 40 gal., 12 gal. per hr. OIL CAPACITY: 3 gal. GEAR: Tricycle.

SPECS

MAIN ROTOR DIAMETER: 38 ft. LENGTH: 23 ft. HEIGHT: 11 ft. WEIGHTS: EMPTY, 1,750 lb.; GROSS, 2,500 lb.; USEFUL LOAD, 800 lb. ROTOR DISC LOADING: 1.9 lb. per sq. ft. POWER LOADING: 13.3 lb. per bhp.

PERFORMANCE

SPEEDS AT SEA LEVEL: MAXIMUM, 75 mph; CRUISING, 70 mph. RATE OF CLIMB FULLY LOADED: 700 ft. per min. SERVICE CEILING FULLY LOADED: 10,000 ft. RANGE: 194 mi.

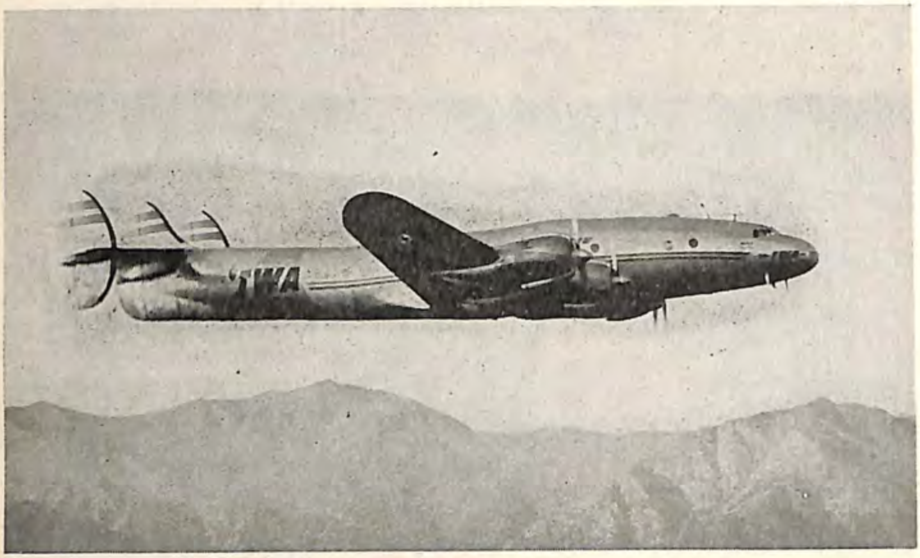
REMARKS

The Kaman twin-rotor helicopter was first offered the public June 15, 1949, on a leasing arrangement. The company furnished the machine, pilot, mechanic, complete insurance coverage, and guaranteed performance.

During the year Kaman expanded its production and leasing program. J. O. Emmerson is chief engineer and W. R. Murray, chief test pilot. PRODUCTION: As of Nov. 1, 1949, 7.

# LOCKHEED AIRCRAFT CORP.

Burbank, Cal.




**Global transport, Lockheed Constellation**

## CONSTELLATION

CAA TYPE CERTIFICATE AND DATE: TC 763, Mar. 14, 1947.

OUTSTANDING FEATURES: The "Connie" was designed as a long-range, high altitude transport. The fuselage conforms in general to the air flow line over the wings at cruising. The camber of the fuselage reduces lift-drag ratio and allows for optimum floor arrangement. The multiple tail adds stability and also reduces the overall height.

Fourteen of the world's transport systems are, or soon will be, equipped with Constellations, which gives the plane the distinction of carrying two of every three trans-Atlantic passengers. It now holds claim to more speed records than any other aircraft.

FAMILY: Other Lockheed transports before the Constellation include the Lodestar and Electra designed in 1939. The Super-Electra became the British Hudson bomber in 1938, and in the same year Lockheed began building the P-38, Lightning, for the Army Air Corps. Lockheed aircraft go back to 1912 and include the Vega, the XC-35, the first pressurized plane. The XC-35 flew successfully in the sub-stratosphere in 1936.

DEVELOPMENT: Research, design, and preflight testing took three and a half years. The design was started in 1939, and before the first flight on Jan. 9, 1943, ten million engineering man-hours and close to $59 million had been spent on the project. The first flight was made at Lockheed Air Terminal, Burbank, Cal., with Eddie Allen at the controls. This plane and subsequent war-time Constellations went into Air Force service as C-69 transports.

**Trans World Airline inaugurated the first commercial Constellation flight in Feb., 1946. Commercial airline records with the Connie include a Burbank, Cal., to New York run of 6 hr. 17 min. and 39 sec., and a flight from Gander, Newfoundland to Shannon, Ireland in 5 hr. and 3 min.**

**Since TWA took the first delivery, the Constellation line has expanded to include the following transport systems: American Overseas Airlines, British Overseas Airways Corp., Air France, Air India, KLM Royal Dutch Airlines, Linea Aeropostal Venezolana, Pan American, Eastern Air Lines, Inc., Qantas Empire Airways, Ltd., South African Airways, and Panair do Brasil, F. A., Chicago and Southern Air Lines, Inc. Capital Airlines, Inc. is also scheduled for Constellations. On Sept. 1, 1949 this transport became the first to be certificated under International Aviation Organization standards.**

**The Air Force has a fleet of Constellations and the Navy has two PO-1W's which is a special electronic version of the plane.**

**ENGINEERING PERSONNEL: Hall Ibbard, chief engineer; C. L. Johnson, chief research engineer.**

**PASSENGER ACCOMMODATIONS: Various seating arrangements are used by the different airlines flying Constellations. TWA's arrangement provides for fifty-one passengers on its domestic runs. Overseas flights accommodate either forty "sit-up" fares or eighteen berths (these can be used as doubles) with four "sit-ups."**

**TWA is standardizing its present fleet of thirty-five Connies to hold more passengers. Space for these additional seats will come from relocating coat racks and installing more compact washrooms. Three windows will be added. The twenty-three-model 049's will show a seat increase from fifty-one to fifty-seven (these are on domestic runs); the twelve-model 749's in international service will be redesigned to carry forty-nine instead of the present forty. The twenty new 749-A's to be delivered in the spring of 1950 are already designed to carry forty-nine passengers.**

**Cabins on Lockheed Constellations are pressurized to maintain 10,000 ft. pressure at 22,800 ft. altitude. Both heat and refrigeration are also provided for passenger comfort.**

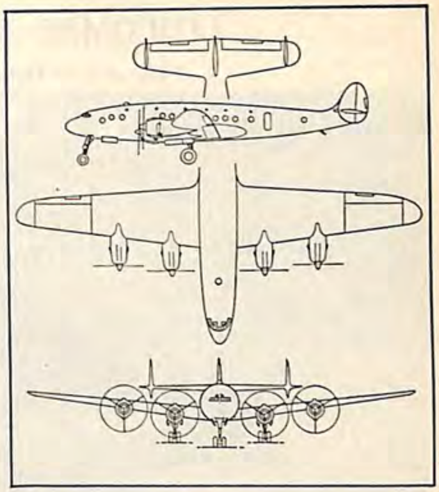
**FREIGHT FEATURES: The cargo area consists of two freight compartments below the floor and aft of the flight deck. The front compartment measures 154 cu. ft., the rear, 280 cu. ft. These are loaded from the bottom. Additional cargo area (approx. 400 cu. ft.—8,000 lb.) is available by using an external cargo carrier called the *Speedpak*. This is quickly attached or removed and can be used most advantageously for short and medium ranges.**

## SPECS

**FLIGHT CREW: In domestic operations, pilot, co-pilot, and flight engineer; in overseas operations, a navigator-radio operator is added; in certain long-range flights, additional relief crew members are carried.**

**MAINTENANCE: Included in the list of easy maintenance attactions are: 30-min. engine replacement, all four engines interchangeable, hinged cowls, and a minimum of right and left hand components.**

**POWERPLANT: Four Wright Cyclones 749C-18BD1, 2,500 hp each at takeoff. FUEL CAPACITY: 5,820 gal. OIL CAPACITY: 216 gal. APPROVED PROPELLERS: Curtiss Electric reversible C634S—C306 hub with three 830-2064-0 blades, WING SPAN: 123 ft. LENGTH: 95 ft. 2 in. HEIGHT: 22 ft. 5 in. GEAR: Tricycle, fully retractable, steerable nosewheel.**



**WEIGHTS: EMPTY, standard interior, 59,109 lb.; GROSS, 107,000 lb.; USEFUL LOAD. 47,891 lb.; MAXIMUM PAYLOAD, 22,000 lb. WING LOADING: 64.9 lb. per sq. ft. POWER LOADING: 10.7 lb. per hp.**

## PERFORMANCE

**SPEEDS: MAXIMUM, 343 mph at 19,200 ft. CRUISING, 300 mph at 23,000 ft.; STALLING, 91 mph at sea level. RATE OF CLIMB: 1,234 ft. per min. at sea level and maximum gross. TAKEOFF: 2,160 ft. LANDING: Over a 50 ft. obstacle and to a full stop, 2,880 ft. without using reversible propellers. SERVICE CEILING: 27,800 ft. fully loaded. RANGE: 5,100 mi.**

**PRICE: Approximately $1 million.**

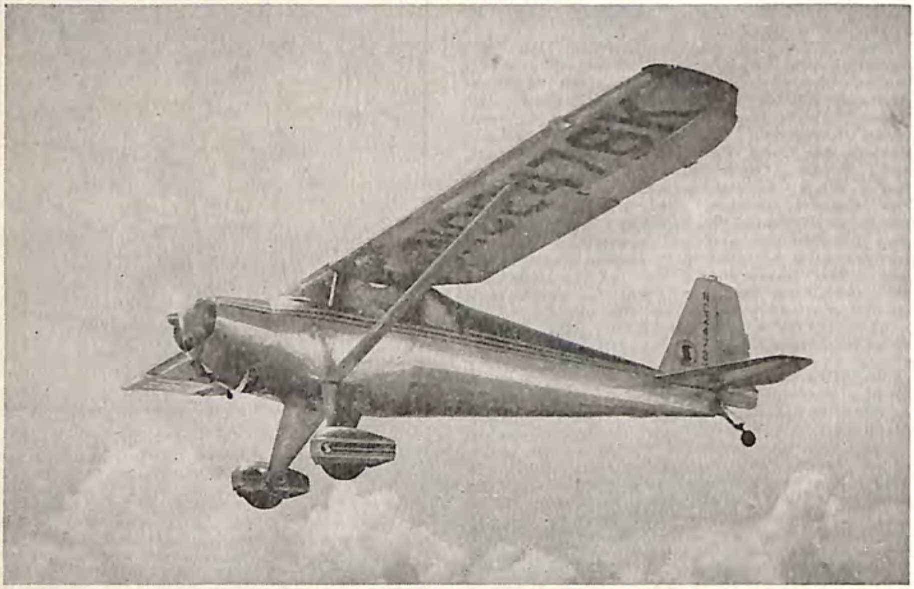
**PRODUCTION: There have been completed or are on order 213 Constellations. The production line at Lockheed's Burbank factories has not stopped since the first production models were put in service in 1945. Present orders assure continued manufacture well into 1951.**

"A Texan inventor comes to the front with a flying machine that will fly. He should be ruled out of the Amalgamated Association of Flying Machine Inventors for violating one of the rules of the game."

*N. Y. Commercial*
Feb. 13, 1903

# LUSCOMBE AIRPLANE CORP.

Dallas, Tex.



**All-metal Luscombe Deluxe**

## SILVAIRE SKY PAL

**A 2-place, closed, land and sea, high-wing monoplane. CAA TYPE CERTIFICATE NUMBER: TC 694. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: 8-A, Sept. 9, 1949 (the original approval date on this model was Mar. 27, 1939 although revisions have continued until Sept. 9, 1949 with no production under the latest revision date). ENGINEERING PERSONNEL: Eugene Norris.**

### DATA

**POWERPLANT: Continental C-65, 65 hp. FUEL CAPACITY AND CONSUMPTION: 12½ gal., 4 gal. per hr. OIL CAPACITY: 1 gal. APPROVED PROPELLERS: Lewis or Sensenich. GEAR: Fixed two wheel, steerable tailwheel.**

### SPECS

**SPAN: 35 ft. LENGTH: 29 ft. HEIGHT: 6 ft. 3 in. WEIGHTS: EMPTY, 750 lb.; GROSS, 1,260 lb.; USEFUL LOAD, 510 lb. WING LOADING, 9 lb. per sq. ft. POWER LOADING, 19.4 lb. per hp.**

### PERFORMANCE

**SPEEDS: MAXIMUM, 115 mph; CRUISING, 105 mph; STALLING, 48 mph. RATE OF CLIMB, 800 ft. 1st min. SERVICE CEILING: 15,000 ft. RANGE: 315 mi.**

### REMARKS

**Luscombe production stopped early in the year when the company went into receivership. Material for Luscombe models not supplied by manufacturer. PRICE: $2,095. PRODUCTION: As of Nov. 1, 1949, 39.**

"It is all settled. Wright brothers have perfected the flying bird airship, and it makes successful flights. Play the 'Star Spangled Banner' and let the eagle scream. America once more heads the procession. But the last pathless wilderness is gone, the wilderness of the air. It will soon be specked with aeroplanes and smell to the heaven, indeed, with gasoline. . . ."

*Globe Democrat,* St. Louis, Mo.
May 14, 1908

## SILVAIRE SPECIAL

A 2-place, closed, land, high-wing monoplane. CAA TYPE CERTIFICATE NUMBER: TC 694. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: 8-F, May 25, 1948. ENGINEERING PERSONNEL: Eugene Norris.

DATA

POWERPLANT: Continental C-90, 90 hp. FUEL CAPACITY AND CONSUMPTION: 25 gal., 5 gal. per hr. OIL CAPACITY: 1¼ gal. APPROVED PROPELLERS: Lewis. GEAR: Fixed two wheel, steerable tailwheel.

SPECS

SPAN: 35 ft. LENGTH: 20 ft. HEIGHT: 6 ft. 3 in. WEIGHTS: EMPTY, 810 lb.; GROSS, 1,400 lb.; USEFUL LOAD, 590 lb. WING LOADING: 10 lb. per sq. ft. POWER LOADING: 15.6 lb. per hp.

PERFORMANCE

SPEEDS: MAXIMUM, 115 mph; CRUISING, 105 mph; STALLING, 39 mph. RATE OF CLIMB, 900 ft. 1st min. RANGE: "Over 300 mi."

REMARKS

Two other versions of the 8-F model are the T8-F, Observer Special and T8-F Observer Deluxe. Both these models are the same as the 8-F except they have tandem seating, landing gear axles are 2 in. farther forward, minor changes in the fuel system, battery relocated, hydraulic brakes added, and modified dorsal fin. The useful load of Observer Special is 580 lb. and 540 lb. for the Observer Deluxe. PRODUCTION: As of Nov. 1, 1949, 102.

## SILVAIRE SEDAN

A 4-place, closed, land, high-wing monoplane. CAA TYPE CERTIFICATE NUMBER: TC 804. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: 11-A, July 2, 1948. ENGINEERING PERSONNEL: Eugene Norris.

DATA

POWERPLANT: Continental E-165, 165 hp. FUEL CAPACITY AND CONSUMPTION: 42 gal., 9 gal. per hr. OIL CAPACITY: 2½ gal. APPROVED PROPELLERS: Sensenich or Hartzell. GEAR: Fixed two wheel, steerable tailwheel.

SPECS

SPAN: 38 ft. LENGTH: 23 ft. 6 in. HEIGHT: 6 ft. 10 in. WEIGHTS: EMPTY, 1,260 lb.; GROSS, 2,280 lb.; USEFUL LOAD, 940 lb. WING LOADING, 13.8 lb. per sq. ft. POWER LOADING: 13.8 lb. per hp.

PERFORMANCE

SPEEDS: MAXIMUM, 140 mph; CRUISING, 130 mph; STALLING, 55 mph (with flaps), 58 mph (without flaps). RATE OF CLIMB: 900 ft. 1st min. SERVICE CEILING: 17,000 ft. RANGE: 500 mi. PRODUCTION: As of Nov. 1, 1949, 15.

"The year 1920 will stand unique in the history of aeronautics, particularly in the United States. In 1919 there was the acute stimulus of popular curiosity in one of the mysterious elements which won the war. But in 1920 came the readjustment and consequently the necessity for flying to demonstrate its usefulness in peace.

"If established business experienced difficulty in shifting from extraordinary activity to normal levels, what a task, then, for aeronautics, peculiarly developed as a military adjunct, to challenge the age-long beliefs of time and space, and to share with the older forms of transportation the honor of greatly reducing the one and minimizing the other!

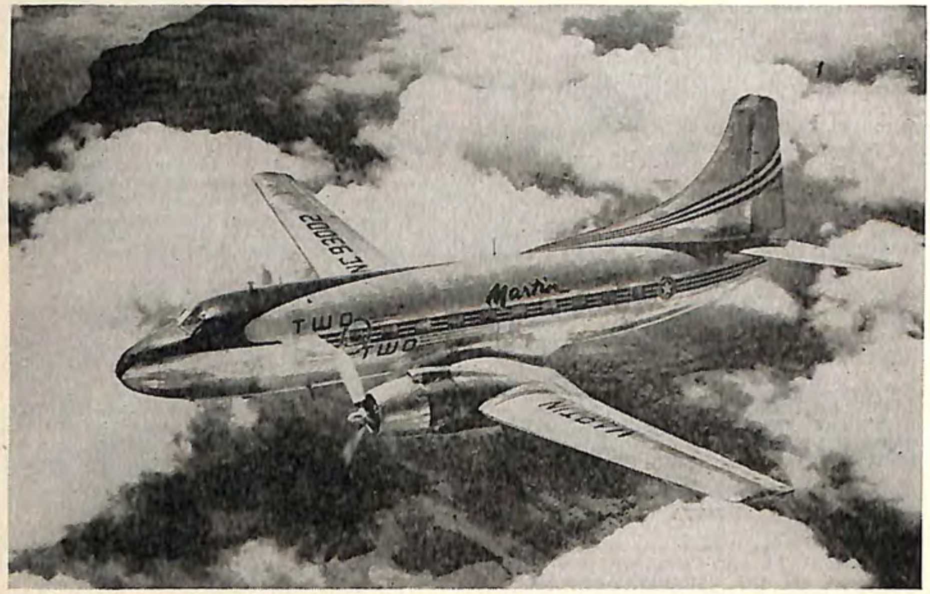
"In examining the record of the last twelve months, one is impressed with the brilliant promise and the sober want. Great things have been accomplished—great first flights by the Wright Brothers were made only seventeen years ago. But whatever has been achieved has been due rather more to individual vision and courage than to general support.

If spectacular flights, such as the crossing of the Atlantic by airplane and airship, were recorded in 1919, to 1920 were reserved certain achievements which, if not so likely to astonish, were more certain to advance the art."

*Aircraft Year Book*, 1921

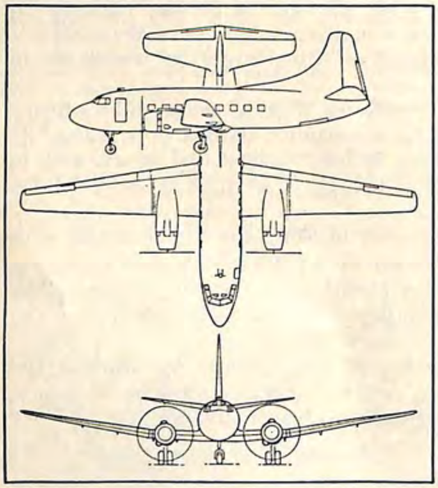
# THE GLENN L. MARTIN AIRCRAFT CO.

Baltimore, Md.



**Martin post-war designed 2-0-2 transport**

## 2-0-2



**CAA TYPE CERTIFICATE AND DATE:** TC 795, Sept. 3, 1947.

**OUTSTANDING FEATURES:** Over twenty-five designs were studied before it was decided that the 2-0-2 plan offered the most for the type service it was anticipated it would enter. A survey had shown that 69 percent of air travel was under 500 miles. The 2-0-2 with its tricycle gear and reversible propellers was well-adapted to short field use, and also shortened ground operations. Other time-savers are the method of servicing the 2-0-2 (practically all of which can be done from the underside of the wings) and the built-in ramp. Hydraulic, electrical, and heater lines can be reached through hatches under the cabin floor, and a good part of the engine servicing can be done from the ground. Thermal-heating keeps wing and tail surfaces free of ice, while propeller blades are heated electrically. Some of the fire preventives built into the plane include: fuel cells outboard of engine nacelles, zoned engine fire extinguisher systems, and automatic fire extinguishers in inaccessible sections of the plane.

**ENGINEERING PERSONNEL:** Paul Piper, project engineer.

FIRST DELIVERY: Northwest Airlines, Inc., Aug. 4, 1947. First scheduled flight, Nov. 15, 1947.

NOTES: Flooring, bulkheads and doors in the 2-0-2 are made of "Honeycomb," a lightweight Martin-developed product. The core is made of linen or kraft paper formed into honeycombed shape, impregnated with a vinyl plastic and bonded to the faces of metal, plastic, wood, glass, or other flat material.

In testing operations Martin used three planes, two for flight and one for the static tests. The two completed models had over 500 hours flight time before CAA started their tests. The CAA testing included a 17,000-mi. service test, the first ever given under a CAA regulation. These flights were conducted under regular service conditions at full gross weight.

PASSENGER ACCOMMODATIONS: The standard seating capacity is thiry-six for the 2-0-2. Windows in the transport measure 16½ x 19½ inches, and the artificial light is from flush overhead fluorescent lights that run the length of the cabin. A continuous stream of fresh air is supplied on the ground or in flight. This air can be heated and circulated through the walls and between the panes of the double windows, keeping them fog-free. The hydraulically operated passenger ramp in the rear is controlled by the stewardess, and lowers in a few seconds, speeding deplaning.

FREIGHT FEATURES: The cargo and baggage capacity of the standard 2-0-2, measuring 281 cu. ft. is made up of one compartment forward and one under the floor. A side door opens to the forward cargo, mail compartments and cockpit. Cargo is loaded from beneath for the other compartment.

SPECS

FLIGHT CREW: Pilot and co-pilot.

MAINTENANCE: The 2-0-2 was designed with an eye to fast maintenance. A good part of the work can be done by the mechanic while standing on the ground. All hydraulic, electrical and heater lines can be reached through individual hatches underneath the fuselage. Cockpit instruments are serviced through the nosewheel well, and any standard instrument can be replaced in five minutes. The entire trailing edge of the wing can be inspected by opening the flap shutter.

POWERPLANT: Two Pratt and Whitney R-2800 CA18, 2,400 hp at takeoff. NORMAL FUEL CAPACITY: 1,010 gal. OIL CAPACITY: 46 gal. PROPELLERS: Three-bladed Hamilton Standard, reverse thrust, diameter, 13 ft. 1 in. WING SPAN: 93 ft. 3 in. LENGTH: 71 ft. 4 in. HEIGHT: 28 ft. 5 in. GEAR: Tricycle retractable.

WEIGHTS: EMPTY OPERATING, 26,930 lb.; GROSS, 39,900 lb. (takeoff); 38,000 lb. (landing); USEFUL LOAD, 14,814 lb.; MAXIMUM PAYLOAD, 9,270 lb. WING LOADING: 46 lb. per sq. ft. POWER LOADING: 8 lb. per bhp.

PERFORMANCE

SPEEDS: MAXIMUM, 311 mph at 14,000 ft., 1,690 bhp per engine and 35,000 lb. gross; CRUISING, 286 mph at 12,000 ft., 1,400 bhp per engine and 35,000 lb. gross; STALLING, 76 mph at sea level and 38,000 lb. gross. TAKE-OFF: C.A.R. field length to clear 50 ft. obstacle, with 39,900 lb. gross, 1,565 ft. LANDING: C.A.R. field length to clear 50 ft. obstacle with 38,000 lb. gross, 1,720 ft. SERVICE CEILING: 33,000 ft. with 35,000 lb. gross. RANGE: With 36 passengers and baggage, 1,000 lb. cargo, 1,200 bhp per engine, and fuel reserve for 200 mi. plus 45 min., 635 mi. MAXIMUM RANGE: With no reserve and no headwind at 10,000 ft, 2,020 mi.

PRODUCTION: Northwest Airlines now has twenty-five 2-0-2's in operation. From Sept., 1947, to Nov., 1949, the company flew 2-0-2's 223,255,000 revenue passenger miles. Other lines using the 2-0-2 include: Linea Aerea Nacional and Linea Aeropostal Venezolana.

### Aviation Forecasts

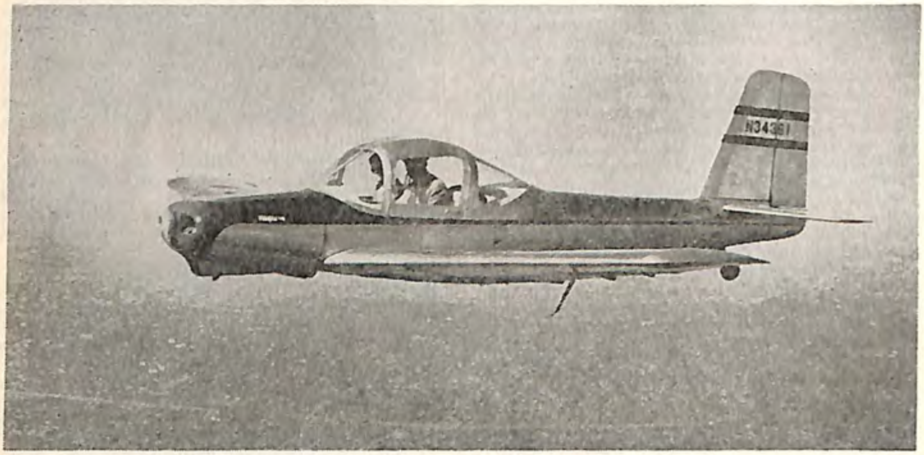
"My own opinion is that if, within the next eighteen months or two years, an aeroplane is discovered which will travel for, say, thirty or forty miles, excellent progress will have been made.

"There are, of course, a number of technical difficulties which cause the building of a flying machine to be a matter of considerable uncertainty. The chief problem, perhaps, to be overcome is to make the lifting effect of the aeroplane greater than the weight of the machine; but, after conducting many experiments, I sometime ago proved that this drawback is by no means an insurmountable one. I am of opinion that the most perfect flying machine yet constructed has been made by the Wright brothers in America. In its initial trial trip this machine remained in the air for fully thirty minutes, without the aid even of a gas bag, while it also attained a velocity of forty miles an hour, and better still its steering apparatus proved almost perfect."

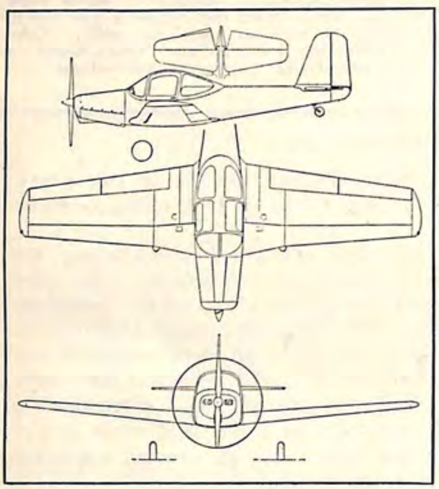
Sir Hiram Maxim
*New York Daily Tribune*
December 23, 1906

# MEYERS AIRCRAFT CO.

Tecumseh, Mich.




**Meyers 145**



A 2-place, closed, land, low-wing monoplane. CAA TYPE CERTIFICATE NUMBER: TC 3A1. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: 145, Nov. 2, 1948.

### DATA

POWERPLANT: Continental C-145, 145 hp. FUEL CAPACITY AND CONSUMPTION: 30 gal. 7½ gal. per hr. OIL CAPACITY: 2 gal. APPROVED PROPELLERS: McCauley 73-61 and Hartzell ground adjustable. FLAPS: Slotted, 45 degrees. GEAR: Conventional retractable with full-swivelling tailwheel.

### SPECS

SPAN: 30 ft. LENGTH: 21 ft. 4 in. HEIGHT: 6 ft. WEIGHTS: GROSS, 1,735 lb.; USEFUL LOAD, 600 lb. BAGGAGE, FULL SEATS AND TANKS: 50 lb.

### PERFORMANCE

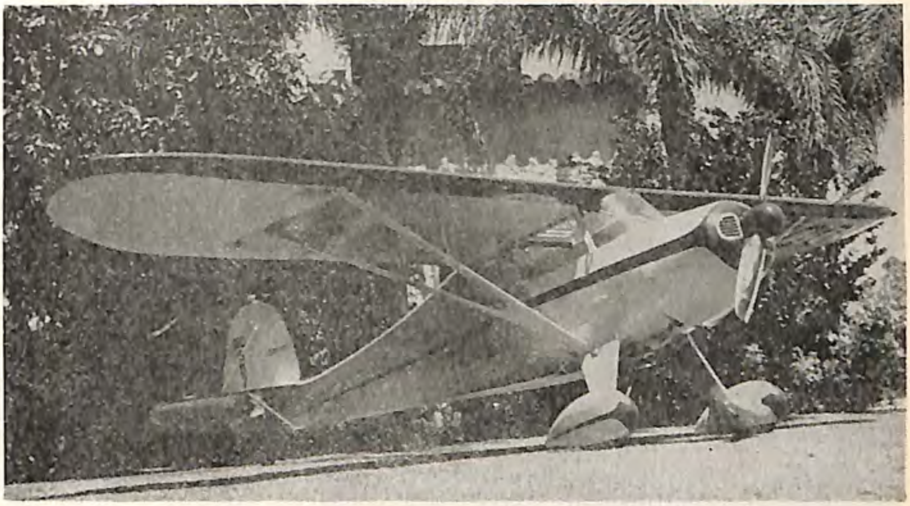
SPEEDS AT SEA LEVEL: MAXIMUM, 166 mph; CRUISING, 145-155 mph. LANDING SPEED (sea level and 45 degrees flaps): 42 mph. RATE OF CLIMB: 960 ft. 1st min. SERVICE CEILING: 18,000 ft. RANGE: 600 mi. (4 hr. with 30 min. reserve).

### REMARKS

A high cruising speed and long range in a personal plane were the two main objectives in designing the 145. The range can be increased to 1,000 mi. with a fuel capacity of 50 gal. The gross weight is upped to 1,860 with these long-range tanks. Some interesting features of the 145 include: plastic windows in the wing to give pilot a view of his gear at all times, cabin entrance on both sides, and flush door handles. PRICE (f.a.f.): $5,250.

# MONOCOUPE AIRCRAFT AND ENGINE CORP.

Melbourne, Fla.



**Monocoupe 90AL-115**

A 2-place, closed, land, high-wing monoplane. CAA TYPE CERTIFICATE NUMBER: TC 306. MODEL DESIGNATION AND DATE OF APPROVAL: 90AL-115, Sept. 17, 1948. ENGINEERING PERSONNEL: Orrin Ross. TEST PILOTS: "Woody" Edmondson and Kenneth Brugh.

DATA

POWERPLANT: Lycoming 0-235-C1, 115 hp. FUEL CAPACITY AND CONSUMPTION: 28 gal., 6½ gal. per hr. OIL CAPACITY: 1½ gal. APPROVED PROPELLER: McCauley 1A110-GF-7650. GEAR: Fixed two wheel, steerable tail-wheel.

SPECS

SPAN: 32 ft. LENGTH: 20 ft. 5 in. HEIGHT: 6 ft. 6 in. WEIGHTS: EMPTY, 1,000 lb.; GROSS, 1,610 lb.; USEFUL LOAD, 610 lb. WING LOADING: 10 lb. per sq. ft. POWER LOADING: 14 lb. per hp. BAGGAGE, FULL SEATS AND TANKS: 608 lb.

PERFORMANCE

SPEEDS AT SEA LEVEL: MAXIMUM, 160 mph; CRUISING, 140 mph; STALLING, 45 mph. RATE OF CLIMB, 1,000 ft. per min. SERVICE CEILING; 18,000 ft. RANGE: 480 mi.

REMARKS

PRICE (f.a.f.): $3,890. PRODUCTION: As of Nov. 1, 1949, 47.

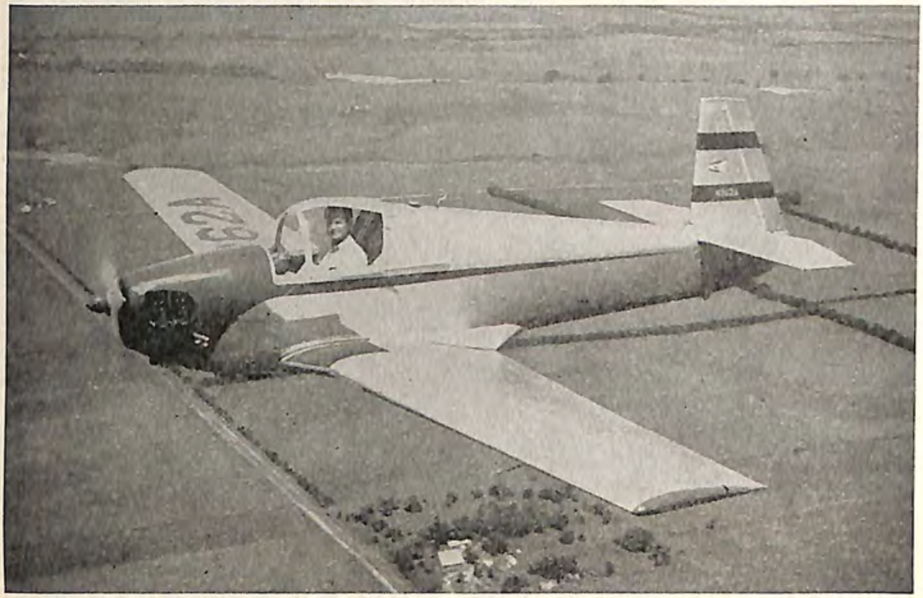
**Aviation Forecasts**

"Any forecast of the developments likely to take place in the aeronautical industry this year is extremely dangerous because the possibilities of the industry are unlimited. Primarily, however, the development for 1917 is likely to be of a military character. The United States Army, at the present time, has under order 302 planes from twelve different companies and the purchase of 59 more machines has been authorized, but as yet orders have not been placed. Only 73 machines are now in service with the Army, and the resources of the constructors will be strained to make prompt deliveries of the machines that have been ordered."

*Aviation and Aeronautical Engineering*
February 1, 1917

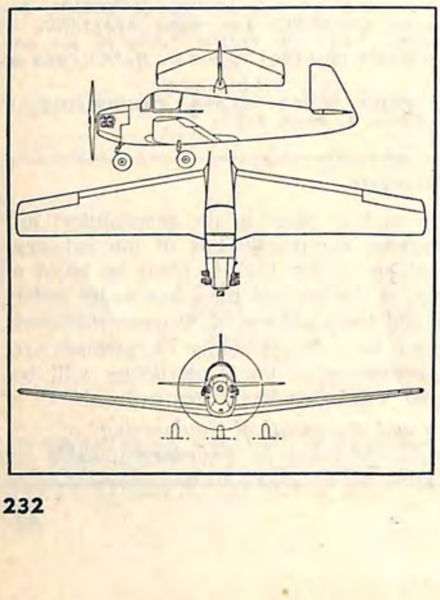
# MOONEY AIRCRAFT, INC.

Wichita, Kans.



**Mooney M-18, "one-man business" plane**

## M-18L



A 1-place, closed, land monoplane, normal and utility category. CAA TYPE CERTIFICATE NUMBER: TC 803. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: M-18L, Mar. 15, 1949: FIRST DELIVERY: March, 1949. ENGINEERING PERSONNEL: N. E. Miller, ch. engr. TEST PILOT: W. W. Taylor.

DATA

POWERPLANT: Lycoming O-145-B2, 65 hp. FUEL CAPACITY AND CONSUMPTION: 11 gal., 3 to 4 gal. per hr. OIL CAPACITY: 1 gal. APPROVED PROPELLERS: Sensenich Models 66CB-54 and 66CB-52. FLAPS: Slotted, 16½ degrees. GEAR: Tricycle retractable.

SPECS

SPAN: 26 ft. 10½ in. LENGTH: 17 ft. 7¼ in. HEIGHT: 6 ft. 2½ in. WEIGHTS: EMPTY, 500 lb.; GROSS, 780 lb.; USEFUL LOAD, 280 lb. WING LOADING, 8.2 lb. per sq. ft. POWER LOADING, 12 lb. per hp. BAGGAGE, FULL SEATS AND TANKS: 40 lb.

PERFORMANCE

SPEEDS AT SEA LEVEL: MAXIMUM, 138 mph; CRUISING, 125 mph; STALLING, 40 mph. RATE OF CLIMB: 1,090 ft. 1st min. SERVICE CEILING: 19,400 ft. RANGE: 390 mi.

REMARKS

73 to 84 cents for gas and oil per 100 miles is claimed by the manufacturer for the M-18L. The new model has a Lycoming engine instead of a converted Crosley automobile engine used in the previous model, M-18. It has retained the spin resistant characteristics of the former model, and features the "Safe Trim" device, which eliminates trimming due to power changes. PRICE (f.a.f.): $1,995. PRODUCTION: As of Nov. 1, 1949, 71.

# PIPER AIRCRAFT CORP.

Lock Haven, Pa.

**Piper's 90-hp "Cub"**

## CUB SPECIAL

A 2-place, closed, land or sea, highwing monoplane, normal and utility category. CAA TYPE CERTIFICATE NUMBER: TC 691. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: PA-11, Apr. 30, 1947. ENGINEERING PERSONNEL: Walter Jamouneau, ch. engr. TEST PILOT: Jay Myers, ch. test pilot.

DATA

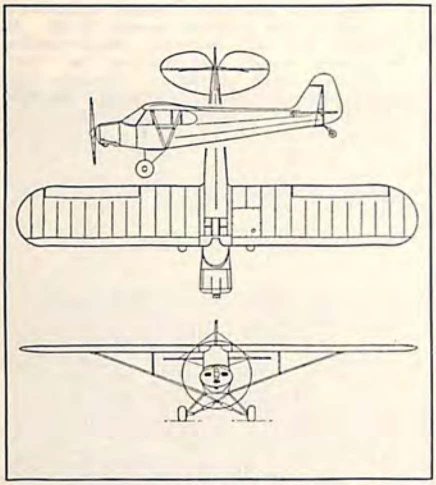
POWERPLANT: Continental, 90 hp. FUEL CAPACITY AND CONSUMPTION: 18 gal., 4.7 gal. per hr. OIL CAPACITY: 2 gal. APPROVED PROPELLERS: Sensenich 72 CK 50. GEAR: Fixed two-wheel, steerable tailwheel.

SPECS

SPAN: 35.3 ft. LENGTH: 22.4 ft. HEIGHT: 6.7 ft. WEIGHTS: EMPTY, 750 lb.; GROSS, 1,220 lb.; USEFUL LOAD, 490 lb. WING LOADING, 6.9 lb. per sq. ft. POWER LOADING, 13.5 lb. per hp.; BAGGAGE, FULL SEATS, AND TANKS, 32 lb.

PERFORMANCE

SPEEDS AT SEA LEVEL: MAXIMUM 112 mph; CRUISING, 100 mph; STALLING, 40 mph. RATE OF CLIMB, 900 ft. 1st min. SERVICE CEILING: 16,000 ft. RANGE: 350 mi.



REMARKS

The Cub Special is a direct descendant of the original Cub which first flew in 1931. It is the most recent of a line of tandem-seated models, whose total production is over 20,000. The basic models in this series have been:

E-2 (1931-36) 37 hp. square wing tips, open cockpit, 9 gal. fuel capacity, and a cruising speed of 60 mph.

J-2 (1936-37) 37 and 40 hp, rounded wing tips, cabin enclosure, wider gear, improved flight performance.

J-3 (1937-46) 40, 50, 60, and 65 hp. Servicing and stamina features were improved in the J-3 models. This is the series that popularized the name Cub, and has been used extensively as a trainer.

L-4 (1941-45), the military version of the J-3. About 6,000 were used by the armed services during the war for artillery spotting, liaison work and personnel transport. The major differences in this model were a rear observation window and reversible rear seat. It had a 65 hp Continental. PRICE (f.a.f.): $2,595. PRODUCTION: As of Nov. 1, 1949, 398.

**Piper Family Cruiser**

## FAMILY CRUISER

**A 4-place, closed, land, high-wing monoplane, normal and utility category. CAA TYPE CERTIFICATE NUMBER TC 797. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: PA-14, Aug. 26, 1948. ENGINEERING PERSONNEL: Same as Cub Special. TEST PILOT: Same as Cub Special.**

DATA

**POWERPLANT: Lycoming, 0-235-C1, 115 hp. FUEL CAPACITY AND CONSUMPTION: 35 gal., 7 gal. per hr. OIL CAPACITY: 1½ gal. APPROVED PROPELLERS: Sensenich 74 EM 52. FLAPS: Trailing edge. GEAR: Fixed two-wheel, steerable tailwheel.**

**SPECS**

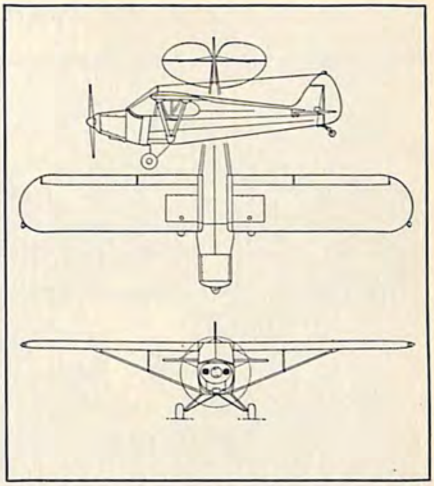
**SPAN: 35.5 ft. LENGTH: 23.3 ft. HEIGHT: 6.4 ft. WEIGHTS: EMPTY, 1,020 lb.; GROSS, 1,850 lb.; USEFUL LOAD, 830 lb. WING LOADING. 10.3 lb. per sq. ft. POWER LOADING, 17.1 lb. per hp; BAGGAGE, FULL SEATS AND TANKS, 80 lb.**

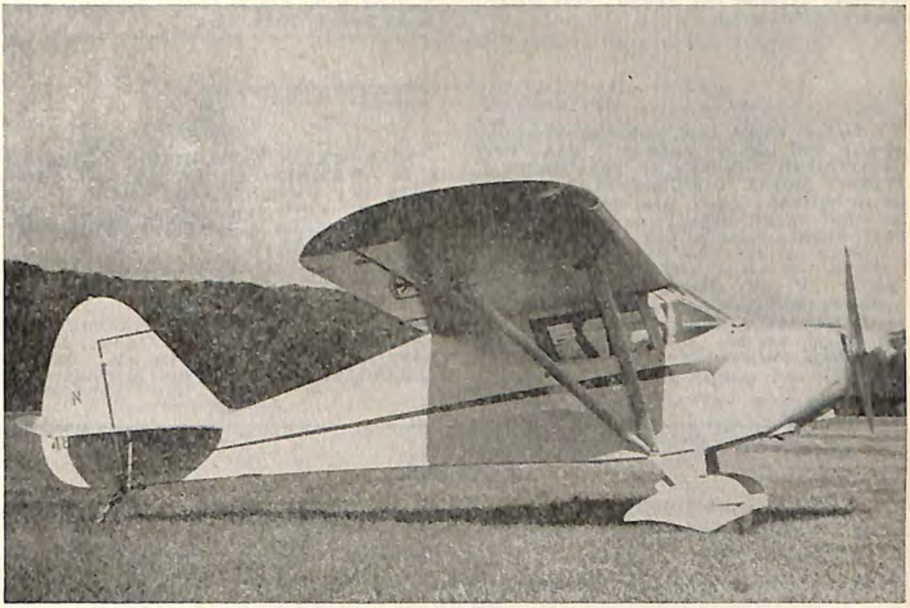
**PERFORMANCE**

**SPEEDS AT SEA LEVEL: MAXIMUM, 123 mph; CRUISING, 110 mph; STALLING, 46 mph (with flaps). RATE OF CLIMB, 600 ft. 1st min. SERVICE CEILING: 12,500 ft. RANGE: 500 mi.**

**REMARKS**

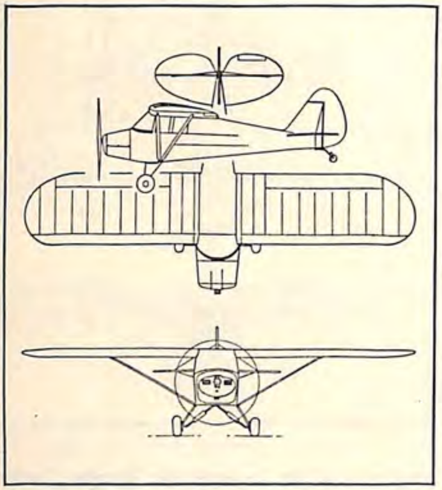
**The first Cruiser model (J-5) was a 75 hp plane that went into production late in 1939. This model was designed primarily for passenger-carrying and airport operation. The pilot sits in the front, with room for two passengers in the rear. Normal cruise, about 75 mph. The war-time version of this model was used by the Navy and Marines as an ambulance plane. The turtle deck folded up to make space for a litter. The civilian version of the military model is designated, J-5-C. The postwar model, Super Cruiser (PA-12), had a 100 or 108 hp Lycoming engine with the same seating arrangement as the J-5, and cruised at about 100 mph. Two of these planes were flown around the world in 1947 by Clifford Evans and George Truman. One of the planes has been purchased by Piper Aircraft and presented to the National Air Museum, Smithsonian Institution, Washington, D. C. The new Family Cruiser, first announced in 1947, has had the fuselage widened to take two people in front. PRICE: $3,995. PRODUCTION: As of Nov. 1, 1949, 40.**





**Piper Vagabond**

## VAGABOND



A 2-place, closed, land, high-wing monoplane, normal category. CAA TYPE CERTIFICATE NUMBER: TC 800, MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: PA-15, July 1, 1948. ENGINEERING PERSONNEL: Same as Cub Special. TEST PILOT: Same as Cub Special.

### DATA

POWERPLANT: Lycoming, O-145, 65 hp. FUEL CAPACITY AND CONSUMPTION: 12 gal., 4 gal. per hr. OIL CAPACITY: 1¼ gal. APPROVED PROPELLERS: Sensenich 70LY34 or 70LY38. GEAR: Fixed two-wheel, steerable tailwheel.

### SPECS

SPAN: 29.3 ft. LENGTH: 18.7 ft. HEIGHT: 6 ft. WEIGHTS: EMPTY, 620 lb.; GROSS, 1,100 lb.; USEFUL LOAD, 480 lb. WING LOADING, 7.5 lb. per hp. POWER LOADING, 16.8 lb. per hp; BAGGAGE, FULL SEATS AND TANKS, 40 lb.

### PERFORMANCE

SPEEDS AT SEA LEVEL: MAXIMUM, 100 mph; CRUISING, 90 mph; STALLING, 45 mph. RATE OF CLIMB, 510 ft. 1st min. SERVICE CEILING: 10,000 ft. RANGE: 250 mi.

### REMARKS

The Vagabond was designed to provide an economical plane for the student and private flyer. The original model had a 65 hp Lycoming engine, and did not have duals or shock struts. The PA-17, introduced a little later, included both duals and shock struts, and a change to a 65 hp Continental. This was the first production model in the Piper series to use the shortened wing, 6 ft. shorter than the standard Cub. PRICE $1,995. PRODUCTION: As of Nov. 1, 1949, 82.

## VAGABOND TRAINER

A 2-place, closed, land, high-wing monoplane, normal and utility category. CAA TYPE CERTIFICATE NUMBER: TC 805. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: PA-17, Aug. 26, 1948. ENGINEERING PERSONNEL: Same as Cub Special. TEST PILOT: Same as Cub Special.

### DATA

POWERPLANT: Continental, A-65, 65 hp. FUEL CAPACITY AND CONSUMPTION: 12 gal., 4 gal. per hr. OIL CAPACITY: 2 gal. APPROVED PROPELLERS: Sensenich 72CK42. GEAR: Fixed two-wheel, steerable tailwheel.

### SPECS

SPAN: 29.3 ft. LENGTH: 18.7 ft. HEIGHT: 6 ft. WEIGHTS: EMPTY, 650 lb.; GROSS, 1,150 lb.; USEFUL LOAD, 650 lb. WING LOADING, 7.8 lb. per sq. ft. POWER LOADING, 17.7 lb. per hp; BAGGAGE, FULL SEATS AND TANKS, 40 lb.

### PERFORMANCE

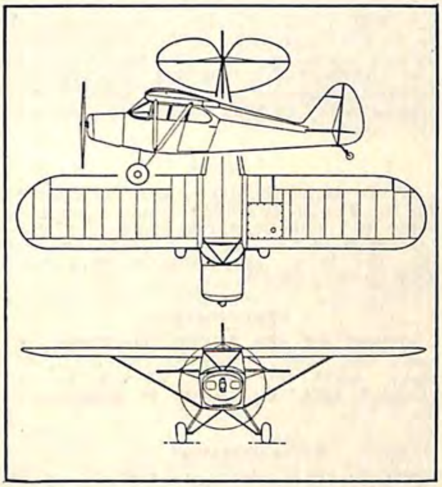
SPEEDS AT SEA LEVEL: MAXIMUM, 100 mph; CRUISING, 90 mph; STALLING, 45 mph. RATE OF CLIMB, 530 ft. 1st min. SERVICE CEILING, 10,500 ft. RANGE: 250 mi.

**Prediction**

"The wars of the future will be fought in the air. The chief weapon used will undoubtedly be something in the nature of an aerial torpedo. This is inevitable, and it will come soon. And the first man to discover and to perfect a navigable aerial torpedo will change the coloring of the map of the whole world."
—Excerpts from a statement by Sir Hiram Maxim, Oct. 23, 1906

**4-place Piper Clipper**

## CLIPPER



**A 4-place, closed, land, high-wing monoplane, normal and utility category. CAA TYPE CERTIFICATE NUMBER: TC 1A1. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: PA-16, Oct. 18, 1948. ENGINEERING PERSONNEL: Same as Cub Special.**

**TEST PILOT: Same as Cub Special.**

### DATA

**POWERPLANT: Lycoming, 0-235-C1, 115 hp. FUEL CAPACITY AND CONSUMPTION: 30 gal., 6.2 gal. per hr. OIL CAPACITY: 1½ gal. APPROVED PROPELLERS: Sensenich, 73FM-52. GEAR: Fixed two-wheel, steerable tailwheel.**

### SPECS

**SPAN: 29.3 ft. LENGTH: 20 ft. HEIGHT: 6.2 ft. WEIGHTS: EMPTY, 850 lb.; GROSS, 1,650 lb.; USEFUL LOAD, 800 lb. WING LOADING, 11.2 lb. per sq. ft. POWER LOADING, 16.2 lb. per hp; BAGGAGE, FULL SEATS AND TANKS, 50 lb.**

### PERFORMANCE

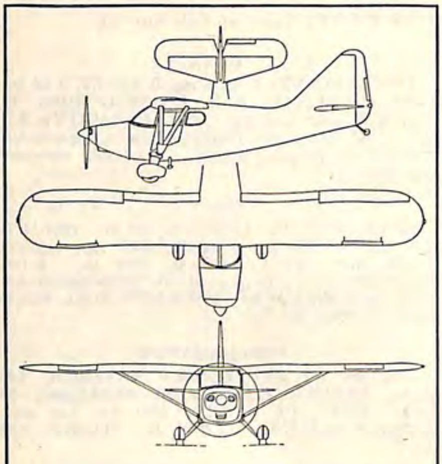
**SPEEDS AT SEA LEVEL: MAXIMUM, 125 mph; CRUISING, 112 mph; STALLING, 50 mph. RATE OF CLIMB, 600 ft. 1st min. SERVICE CEILING: 11,000 ft. RANGE: 480 mi.**

### REMARKS

**The Clipper is an outgrowth of the Vagabond. The fuselage is a little longer making room for four people or a two place with 36 cu. ft. of cargo space. To date it is Piper's best seller on the current production list. PRICE: $2,995. PRODUCTION: As of Nov. 1, 1949, 703.**

**The '49 Piper-Stinson**

## PIPER-STINSON



**A 4-place, closed, land or sea, high-wing monoplane, normal and utility category. CAA TYPE CERTIFICATE NUMBER TC 767. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: 108-3, May 18, 1948.**

### DATA

**POWERPLANT: Franklin, 6A4-165-B3, 165 hp. FUEL CAPACITY AND CONSUMPTION: 50 gal., 9.6 gal. per hr. OIL CAPACITY: 2¼ gal. APPROVED PROPELLERS: McCauley 1-A170-DM-7651 and Sensenich wood. FLAPS: Trailing edge. GEAR: Fixed two-wheel, steerable tailwheel.**

### SPECS

**SPAN: 34 ft. LENGTH: 25.2 ft. HEIGHT: 7.5 ft. WEIGHTS: EMPTY, 1,320 lb.; GROSS: 2,400 lb.; USEFUL LOAD, 1,080 lb. WING LOADING, 15.5 lb. per sq. ft. POWER LOADING, 14.5 lb. per hp; BAGGAGE, FULL SEATS AND TANKS, 100 lb.**

### PERFORMANCE

**SPEEDS AT SEA LEVEL: MAXIMUM, 133 mph; CRUISING, 130 mph; STALLING, 61.5 mph; RATE OF CLIMB, 580 ft. 1st min. SERVICE CEILING: 15,500 ft. RANGE: 554 mi.**

### REMARKS

**This model is the latest of a long line of Voyagers developed by Stinson before Piper took over in 1948. The first Stinson was a biplane built in Detroit by Eddie Stinson in 1925. This began a line of personal and transport planes which included the Detroiter series, the Model R, SM-8-A, and the Reliant series—all four and five-place aircraft of 225**

to 450 hp. Stinson also built a line of tri-motors which were used by many major airlines before Douglas and Lockheed transports entered the picture.

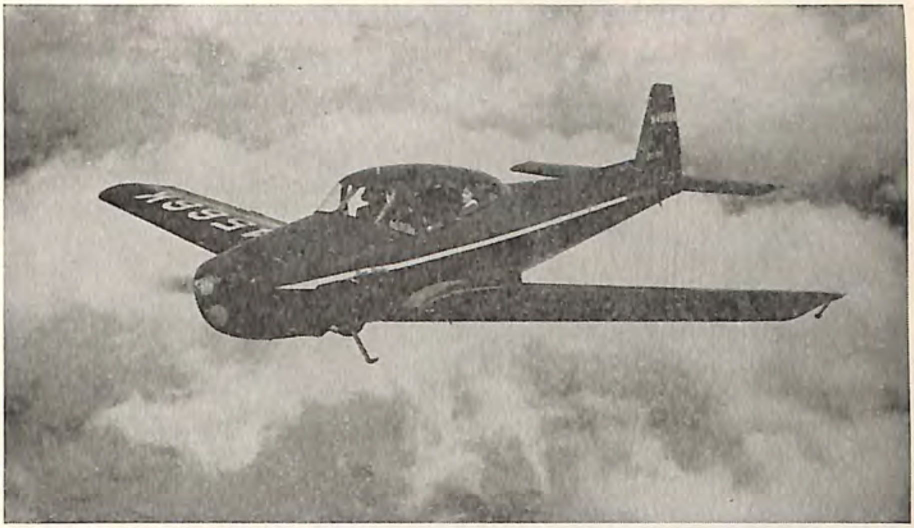
The Stinson 105 with a 75 hp engine was the first lightplane built by that company. It was followed by the Stinson 90-A Voyager with a 90 hp engine in 1940.

During the war, Stinson manufactured the 190 hp L-5 which was used for liaison work. They also built the AT-19, which was the military version of the gull-wing Reliant.

The first post-war Voyager was a 150 hp model which has been equipped with a 165 hp engine, a larger fin and rudder, and other refinements to become the present production model in this series. PRICE: $6,484. PRODUCTION: As of Nov. 1, 1949, 157.

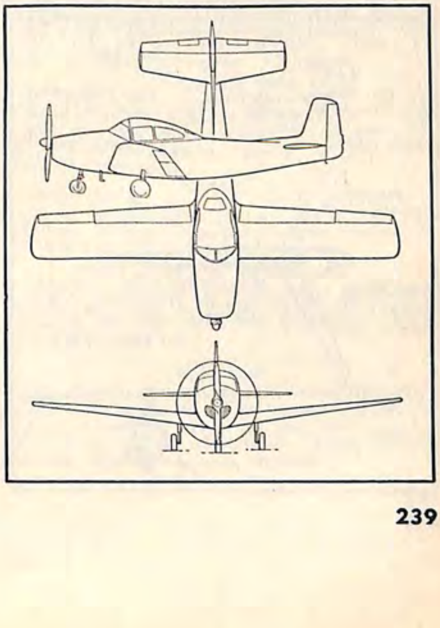
# RYAN AERONAUTICAL CO.

San Diego, Cal.



## NAVION

A 4-place, closed, all-metal, land, low-wing, monoplane, normal and utility category. CAA TYPE CERTIFICATE NUMBER: TC 782. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: NAvion, Jan. 28, 1947. FIRST DELIVERY PRESENT MODEL: March 1, 1949. ENGINEERING PERSONNEL: Harry Sutton, dir. engineering; D. H. Williams, project engr. TEST PILOT: P. J. Girard.



### DATA

POWERPLANT: Continental E-185-3, 205 hp at 2,600 rpm. FUEL CAPACITY AND CONSUMPTION: 40 gal., 10½ gal. per hr. OIL CAPACITY: 2½ gal. APPROVED PROPELLERS: Hartzell HC 12x20-7 or Aeromatic. FLAPS: Split-type, 45 degrees travel. GEAR: Retractable tricycle.

### SPECS

SPAN: 33 ft. 4½ in. LENGTH: 27 ft. 3 in. HEIGHT: 8 ft. 7⅝ in. WEIGHTS: EMPTY, 1,730 lb.; GROSS, 2,750 lb.; USEFUL LOAD, 1,020 lb. WING LOADING, 14.6 lb.

per sq. ft. POWER LOADING, 14.6 lb. per hp. BAGGAGE, FULL SEATS AND TANKS: 80 lb. MAXIMUM PAYLOAD: 760 lb.

PERFORMANCE

SPEEDS AT SEA LEVEL: MAXIMUM, 163 mph; CRUISING, 155 mph; STALLING, 54 mph. RATE OF CLIMB: 900 ft. per min. (with metal prop, 1,000 ft. per min.). SERVICE CEILING: 15,600 ft. RANGE: 500 mi. (with auxiliary tank, 800 mi.)

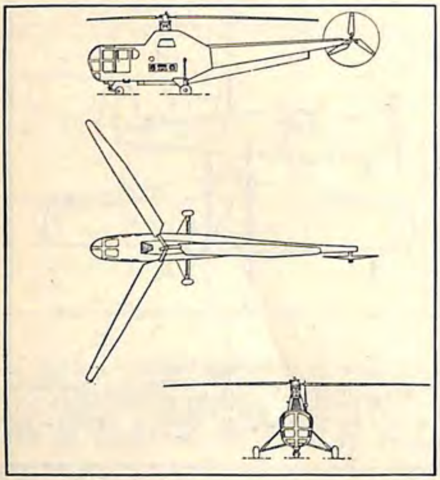
REMARKS

North American started to manufacture the Navion in April 1946, building over 1,000 before transferring design and manufacturing rights to Ryan. The basic design was retained and new features added. Navions have been manufactured for Army Ground Forces and Air National Guard (L-17B, Ryan Model; L-17A, North American Model) for liaison and observation. PRICE (f.a.f.): $10,985. PRODUCTION: As of Nov. 1, 1949, 298.

# SIKORSKY AIRCRAFT

## DIVISION OF UNITED AIRCRAFT CORP.

Bridgeport, Conn.

## S-51

The S-51 is a 4-place, closed, land helicopter, normal and utility category. CAA TYPE CERTIFICATE: H-2. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: S-51, Apr. 17, 1947.

DATA

POWERPLANT: Pratt and Whitney Wasp, Jr. R-985-B4, 450 hp. FUEL CAPACITY AND CONSUMPTION: 100 gal., 28 gal. per hr. OIL CAPACITY: 8 gal. GEAR: Tricycle.

SPECS

MAIN ROTOR DIAMETER: 48 ft. LENGTH: 57 ft. ½ in. HEIGHT: 12 ft. 11 in. WEIGHTS: EMPTY, 3,795 lb.; GROSS, 5,300 lb.; USEFUL LOAD, 1,505 lb.; MAXIMUM PAYLOAD, 1,081 lb. BLADE LOADING: 46.1 lb. per sq. ft. POWER LOADING: 11.78 lb. per bhp.

PERFORMANCE

SPEEDS AT SEA LEVEL: MAXIMUM, 103 mph; CRUISING, 85 mph. RATE OF CLIMB FULLY LOADED: 1,000 ft. per min. SERVICE CEILING: 13,000 ft. RANGE: 225 mi.

REMARKS

Included in the helicopter firsts to the credit of the S-51 are: first multi-passenger to be TC'd, the first to be used on scheduled air mail service, and the first to be based on Naval vessels. The single main rotor has three freely flapping (individually hinged) full-feathering blades with fore-and-aft blade movement damped hydraulically. Pitch change of the blades is by conventional type pilot's stick. The collective pitch lever changes the pitch of all blades at once and is synchronized with the engine throttle. The tail rotor has three blades whose pitch is changed by the rudder pedals. The pilot sits forward with space for three passengers directly behind.

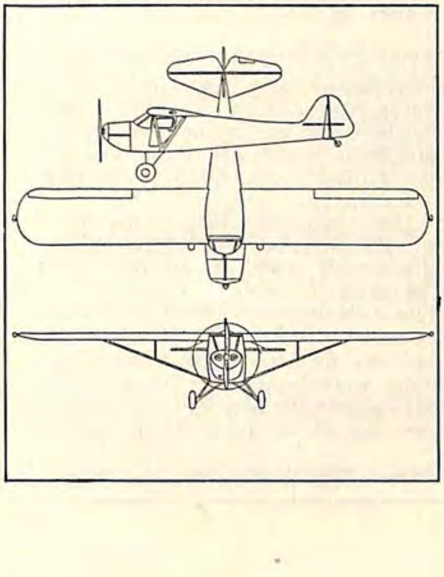
Another Sikorsky model, the S-52, approved Feb. 25, 1948, is being replaced by the S-52-1, which will probably become a production model when TC'd.

Engineering personnel include: Igor Sikorsky, engineering manager; S. E. Gluhareff, assistant engineering manager, and M. E. Gluhareff, chief engineer. Test pilots were: D. D. Viner, chief test pilot; R. S. Decker, H. E. Thompson, and J. E. Chudars. PRICE: $80,000 (approx.).

# TAYLORCRAFT, INC.

Conway, Pa.

## TRAVELER



A 2-place, closed, land and sea, high-wing monoplane. CAA TYPE CERTIFICATE: TC 696. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: BC12-D1, Sept. 10, 1946.

DATA

POWERPLANT: Continental A-65-8, 65 hp. FUEL CAPACITY AND CONSUMPTION: 12 gal., 4 gal. per hr. OIL CAPACITY: 1 gal. APPROVED PROPELLERS: Lewis. GEAR: Fixed steerable, tailwheel.

SPECS

SPAN: 36 ft. LENGTH: 22 ft. HEIGHT: 6 ft. 6 in. WEIGHTS: EMPTY, 750 lb.; GROSS, 1,200 lb. WING LOADING: 6.5 lb. per sq. ft. POWER LOADING: 18.5 lb. per hp.

PERFORMANCE

SPEEDS: MAXIMUM, 100 mph; CRUISING, 95 mph; STALLING, 38 mph. RATE OF CLIMB: 1,000 ft. 1st min. SERVICE CEILING: 15,000 ft. RANGE: 300 mi.

REMARKS

The Deluxe version of this model, BC-12-D, is the same as the BC-12-D1 except for the addition of position lights, 18 gal. fuel capacity, oil pressure and oil temperature gauges. PRICE: Traveler, $1,995; Deluxe, $2,365.

**Taylorcraft Deluxe Model**

**DELUXE MODEL 85**

**A 2-place, closed land and sea, high-wing monoplane. CAA TYPE CERTIFICATE: TC 696. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: BC12D-85 Deluxe, Sept. 30, 1948.**

**DATA**

**POWERPLANT: Continental C-85-8, 85 hp. FUEL CAPACITY AND CONSUMPTION: 18 gal., 4½ gal. per hr. OIL CAPACITY: 1 gal. APPROVED PROPELLER: Lewis. GEAR: Fixed, steerable tailwheel.**

**SPECS**

**SPAN: 36 ft. LENGTH: 22 ft. HEIGHT: 6 ft. 6 in. WEIGHTS: EMPTY, 800 lb.; GROSS, 1,280 lb. WING LOADING: 7 lb. per sq. ft. POWER LOADING: 15 lb. per bhp.**

**PERFORMANCE**

**SPEEDS: MAXIMUM, 107 mph; CRUISING, 100 mph; STALLING, 38 mph. RATE OF CLIMB: 575 ft. 1st min. RANGE: 400 mi.**

**REMARKS**

**PRICE: $2,585. PRODUCTION: As of Nov. 1, 1949, 28.**

"Bulletins of the experiments in aerial navigation come in almost daily and they are as various in their tone as they are numerous. In a single day of the present week it was reported, from San Francisco, that one daring aeronaut and his machine had come to grief in the bay, and from London and Paris, that two French voyagers had successfully and even brilliantly compassed the journey from the English to the French capital in a few hours.

"The failure at San Francisco is more than counterbalanced by the recent brilliant performance of Professor Baldwin in the same field. Baldwin's unlucky successor was Heaton of San Jose. He had a narrow squeak for his life, but he emerged from the bay undaunted and will be heard of again.

"More power to him and to all the other experimenters, whether they fail or succeed. In either case they equally deserve the world's respectful consideration. The time has gone by when air sailors are the butt of popular ridicule. They have made their place among the serious workers and benefactors of the world. Every success and every failure brings nearer the day when the navigation of the air will be as much a part of our daily life as automobiling and not a whit more perilous."

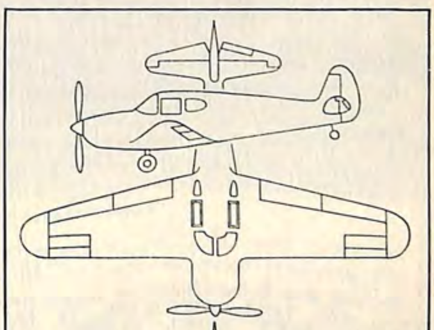
—*Morning Telegraph,* New York, Feb. 15, 1905

# TEXAS ENGINEERING AND MANUFACTURING CO., INC.

Dallas, Texas

**Latest Swift 125**

## TEMCO SWIFT



**A 2-place, closed, land, all-metal, low-wing monoplane; CAA TYPE CERTIFICATE NUMBER: TC 766. MANUFACTURER'S MODEL DESIGNATION AND DATE OF APPROVAL: GC-1B, Sept. 20, 1946. ENGINEERING PERSONNEL: L. A. Childs, Jr. TEST PILOT: L. P. Meyers.**

### DATA

**POWERPLANT: C-125-2 Continental, 125 hp. FUEL CAPACITY AND CONSUMPTION: 27.5 gal., 7.9 gal. per hr. OIL CAPACITY: 2 gal. APPROVED PROPELLERS: Aeromatic F-200/00-73 or Sensenich 73KR59 or 73BR54. FLAPS: Slotted, 30 degrees. GEAR: Retractable-conventional.**

### SPECS

**SPAN: 29 ft. 4 in. LENGTH: 20 ft. 10¾ in. HEIGHT: 6 ft. 1 in. WEIGHTS: EMPTY, 1,185 lb.; GROSS, 1,710 lb.; USEFUL LOAD, 525 lb. WING LOADING, 13 lb. per sq. ft. POWER LOADING, 13.7 lb. per hp. There is no baggage allowance with full seats and tanks.**

PERFORMANCE

SPEEDS: MAXIMUM, 150 mph; CRUISING, 140 mph; STALLING, 48 mph. RATE OF CLIMB: 1,000 ft. 1st min. SERVICE CEILING: 16,000 ft. RANGE: 425 mi.; 575 mi. with 9 gal. auxiliary tank.

REMARKS

The Swift prototype, powered by an 85 hp Continental, was developed just before the war. Wings were plywood and the fuselage and control surfaces fabric covered. Operations on this model were suspended during the war, and before it had received its final CAA certification. After the war Globe Aircraft re-engineered and certificated the Swift as an all-metal plane with fabric-covered controls. This model used the 85 hp Continental.

Soon after Globe developed a 125 hp model and contracted with Texas Engineering and Manufacturing Co. to produce it. In Dec., 1946 Globe Aircraft failed and TEMCO purchased all rights and inventories. Several changes were made including a redesigned fuel vent system, a metal hatch, and tear-drop windows replacing the all-plastic canopy of former models. A muffler and soundproofing kit is now available as optional equipment.

There is a Deluxe model which has the same equipment as the Standard except for an Aeromatic propeller, oil cooler, and General Electric two-way radio. PRICE (f.a.f.): Standard, $3,995; Deluxe, $4,495. PRODUCTION: As of Nov. 1, 1949, TEMCO had shipped 46.

# UNITED HELICOPTERS, INC.

Palo Alto, Cal.

**"Rotor-matic control" Hiller 360**

## HILLER 360

The 360 is a 3-place, open or closed, helicopter. CAA TYPE CERTIFICATE: TC 6H1. MANUFACTURER'S MODEL NUMBER AND DATE OF APPROVAL: 360, July 5, 1949.

DATA

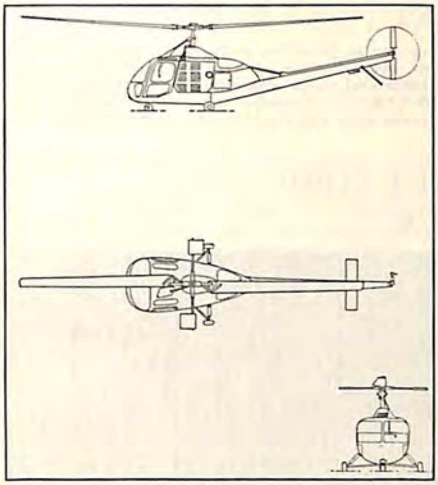
POWERPLANT: Franklin 6V4-178-B33, 178 hp. FUEL CAPACITY AND CONSUMPTION: 27 gal., 11 gal. per hr. OIL CAPACITY: 2½ gal. GEAR: Three-wheel type.

SPECS

MAIN ROTOR DIAMETER: 35 ft. LENGTH: 38 ft. HEIGHT: 5.7 ft. WEIGHTS: EMPTY, 1,432 lb.; GROSS, 2,247 lb.; USEFUL LOAD, 815 lb. ROTOR DISC LOADING: 2.34 lb. per sq. ft. POWER LOADING: 12.6 lb. per bhp.

PERFORMANCE

SPEEDS: MAXIMUM CRUISING, 84 mph; NORMAL CRUISING, 76 mph. RATE OF CLIMB: 800 ft. per min. SERVICE CEILING: "Over 10,000 ft." RANGE: 200 mi.



REMARKS

**United Helicopters was founded in 1945 by Stanley Hiller, Jr. He had built and flown the first successful co-axial helicopter in 1944, and developed the two-place Commuter in 1946. Later in the year United built this country's first jet torque-compensating helicopter. The control system of the 360 is relatively simple. It consists of an overhead control stick, connected through linkage to the control rotors. The control rotors in turn control the main rotors. PRICE (f.a.f.): $19,995.**

**News Item**

"Some time ago the French journal *Auto* raised the question whether it was possible by means of a bicycle to obtain the initial impluse for achieving an extended gliding flight. This article elicited numerous letters whose writers stated they had already made such experiments with a degree of success. The method followed is to have a bicycle fitted with a propeller which is operated by the pedals and provided with wings which are usually fastened to the shoulders of the rider. One writer stated that he had flown as much as 330 feet by this means.

The idea has naturally roused much interest among bicycle manufacturers."

*Scientific American*, June 1, 1912

"Ballonist say that birds flight is limited to 1,315 feet above the surface of the earth. How beautifully exact."

*Globe*, Boston
15 Sept. 1900

**Jet Futures**

"The turbo-prop, which has been given a great developmental impetus in the last two years by the military services in the United States and abroad, has the principal advantage of including a greater amount of power in a single unit and is generally a more compact and simpler engine than the reciprocating engines now in use on commercial aircraft. Considerable work still remains to be done on the problems of vibration and speed control. It yields maximum miles per pound of fuel when operating at close to 100 percent output and its range increases materially with altitude.

The turbo-jet, because of its simplicity of principle, small size and extremely light weight in regard to per pound of thrust, is quite naturally receiving the greatest amount of research and development. Since the thrust does not vary greatly with speed in the sub-sonic range, the greatest propulsive efficiency in miles per pound of fuel is obtained at high speed. The turbo-jet powered aircraft can, therefore, travel high and fast.

The unvarnished fact is that the reciprocal engine powered aircraft will be superseded in the very near future by the turbo-propeller and the turbo-jet."

—DELOS W. RENTZEL, Administrator of Civil Aeronautics

# MILITARY

**The following list of military aircraft includes, so far as possible, only those planes in production during 1949. Numerous contract cancellations, contracts announced but not signed, and other variables dictate this limitation. Security limits information on some models. Recent military planes not in this section can be found in PLANES IN USE. All material for this section, including pictures and 3-view drawings, has been compiled from data supplied by the manufacturer and the military.**

## BELL AIRCRAFT CORP.

Buffalo, N. Y.

**Navy's HTL-2 (AF version, H-13B)**

**TYPE: Helicopter. DESIGNATION: (AF) H-13B; (N) HTL-2. This is the military model of the 47D.**

### DATA

**POWERPLANT: Franklin 6V4-178-B32 (AF); Franklin O-335-3 (N), each 178 hp. FUEL CAPACITY: 33 gal. OIL CAPACITY: 2 gal. GEAR: Four-wheel type or twin floats.**

### SPECS

**MAIN ROTOR DIAMETER: 35 ft. 1½ in. ANTI-TORQUE ROTOR DIAMETER: 5 ft. 8⅛ in. LENGTH: 41 ft. 2-9/16 in. HEIGHT: 9 ft. 1¼ in. WEIGHTS: EMPTY, 1,533 lb. (AF); 1.581.6 lb. (N); GROSS, 2,200 lb. (AF); 2.201 (N); USEFUL LOAD, 667 lb. (AF); 619.4 lb. (N). DISC LOADING: 2.28 lb. per sq. ft. POWER LOADING, 11¼ lb. per bhp.**

### PERFORMANCE

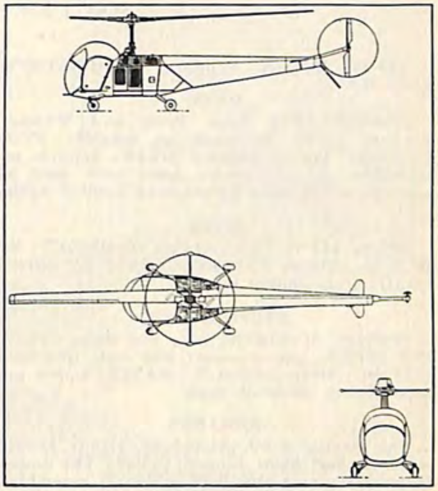
**SPEEDS AT SEA LEVEL: MAXIMUM, 92 mph. CRUISING, 80 mph. RATE OF CLIMB FULLY LOADED: 800 ft. per min. SERVICE CEILING: 9,800 lb. RANGE: 200 mi.**

### REMARKS

**The last of this type was delivered early in the year, and production has been discontinued. The model has a full-blown plastic canopy and doors which can be removed for open cockpit work. The rotor system is two bladed with a stabilizer bar which rotates with the mast at right-angles to the rotor blades. The bar prevents sudden tilting of the rotor disc as well as aiding general stability. The last order to be**

**filled was one for the Army Field Forces for sixty-five.**

**The HTL-3 (N) is similar to the HTL-2 except for engine horsepower which has been increased from 178 to 200. The Navy ordered nine.**



" 'Ballooning lacks one thrilling phase. There are no speed ordinances to be violated.'—*Chicago News.* All in good time, neighbor. We shall doubtless one of these days have aerial boulevards staked out and illuminated at night with stationary balloons bearing electric lights. Then the speed ordinances will be formulated."

*Herald,* New York
25 Oct. 1907

# BOEING AIRPLANE CO.

Seattle, Wash.


**Long range medium bomber, Boeing Superfortress**

## SUPERFORTRESS

**TYPE:** Medium Bomber. **DESIGNATION:** (AF) B-50.

**DATA**

**POWERPLANT:** Four Pratt and Whitney R-4360, 3,500 hp each at takeoff. **PROPELLERS:** Curtiss Electric. **GEAR:** Tricycle retractable. Tractor treads have been used to test operations from unimproved landing fields.

**SPECS**

**SPAN:** 141 ft. **LENGTH:** 99 ft. **HEIGHT:** 32 ft. 9 in. **GROSS WEIGHT:** 164,000 lb. **BOMB LOAD:** Over 28,000 lb.

**PERFORMANCE**

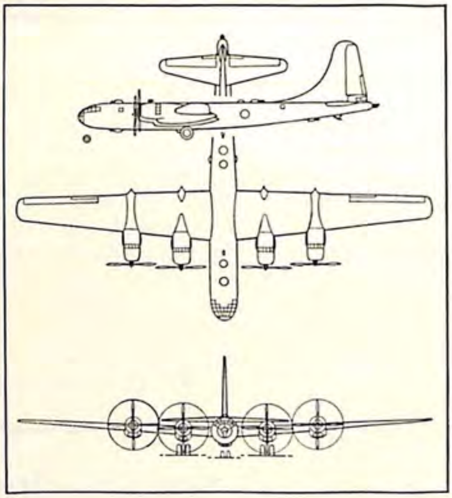
**SPEEDS: MAXIMUM,** over 400 mph; **CRUISING SPEED,** approximately 300 mph. **SERVICE CEILING:** Over 30,000 ft. **RANGE:** 6,000 mi. with 10,000 lb. bomb load.

**REMARKS**

The Boeing B-50 piloted by Elliott Merrill made its first flight June 25, 1947. The Superfortress replaces the B-29 which it resembles, although it is basically a 75 percent new plane.

Since the first one, models have included the B-50B which is the same as the A except for a stronger wing; the B-50C, redesignated B-54, and given an improved powerplant. The B-54 order was cancelled April 5, 1949. The funds from the cancellation were used to purchase 36 additional B-36's and 5 more B-47's. The D model contract, ordered from prior procurement funds, remained in effect.

During 1949, a Superfortress successfully completed a three and one-half month series of cold weather tests in the Arctic. During the tests temperatures ranged upwards from 83 degrees below zero. The principal modification was the use of the plane's standard combustion-heater wing anti-icing system to pre-heat all four engines before flight.



The best known of all B-50's is the *Lucky Lady II* which landed at Carswell Air Force Base, Fort Worth, Tex., on Mar. 2, 1949, after completing the first non-stop around-the-world flight.

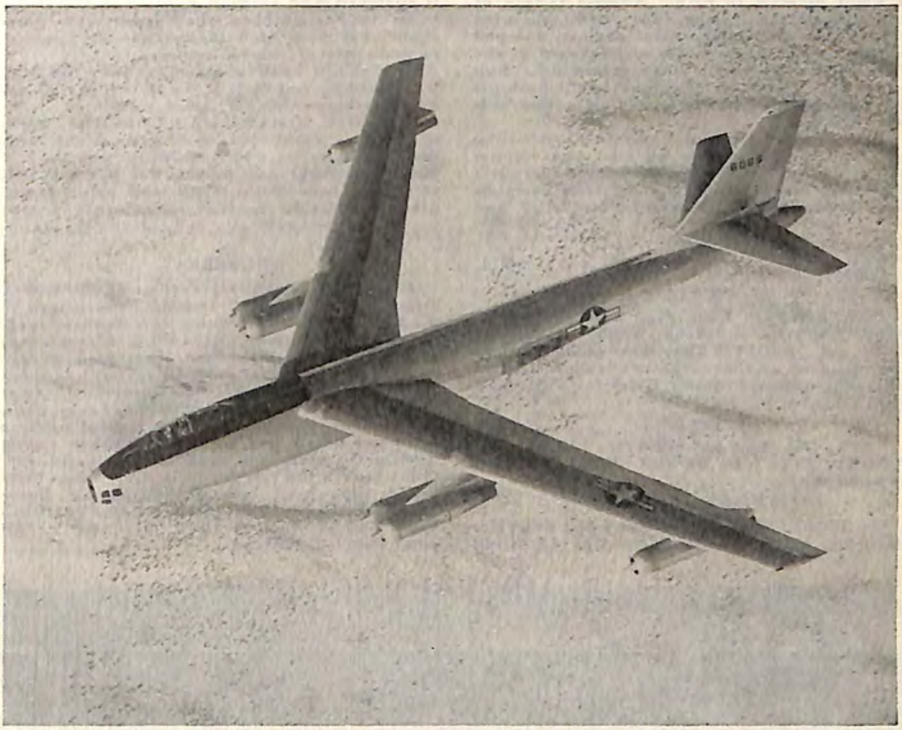
The 23,452 mile circuit took 94 hours and 1 minute, and was commanded by Capt. James Gallagher. Four in-flight refueling operations were required. **PRODUCTION:** As of Nov. 1, 1949, 100.

All other data is classified.

**News Item**

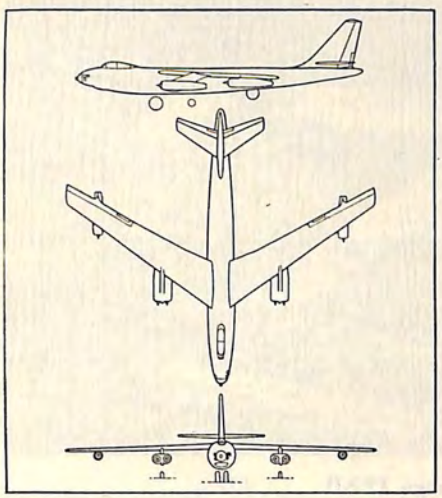
"Much has been said and written lately about the use of the flying machine as a destructive weapon. 'Bomb' dropping has been a popular feature of recent aviation meets and enthusiastic reporters have given their imaginations full rein, with the result that cities have been destroyed, forts demolished and battleships sunk. It must be observed, however, that all such tests have been made from heights of three hundred feet or less, at which range an aeroplane would not have a ghost of a show against machine guns, shrapnel, rapid-fire guns or even rifle fire. When we consider aeroplanes flying at reasonably safe heights, say between one and two miles, the problem of accurately dropping projectiles becomes a difficult one and scientific calculation must take the place of guess-work."

*Scientific American,* Oct. 28, 1911



**World's fastest bomber, Boeing's B-47 Stratojet**

## STRATOJET



**TYPE: Light Bomber. DESIGNATION: (AF) B-47.**

**DATA**

**POWERPLANT: Six General Electric J-47's turbo-jets, each rated at 5,200 lb. thrust. GEAR: Dual main wheels in tandem with a single outrigger near each wing tip. All are retractable.**

**SPECS**

**SPAN: 116 ft. LENGTH: 108 ft. HEIGHT: 28 ft. GROSS WEIGHT: Over 125,000 lb. NORMAL BOMB LOAD: Over 20,000 lb.**

**PERFORMANCE**

**MAXIMUM SPEED: "600 mph class." SERVICE CEILING: Over 35,000 ft. RANGE: Over 2,000 mi.**

**REMARKS**

**Robert M. Robbins, Boeing project pilot, and Scott Osler, another Boeing test pilot, made the first flight in the Stratojet in late 1947, two years after design work had started on the project.**

**The 35 degree swept-back wing and tail is the first to be used on a bomber. The thin wing is flexible for its size, and on the ground has a drooped appearance which changes to**

a slight dihedral in flight. Another feature of the wing is the leading edge retractable wing slots. Each wing carries three engines, one pod of two on outriggers under and forward of the inboard section, and a single mount near each wing tip. There are eighteen 1,000-lb.-thrust JATO units mounted internally on either side near the tail.

Pilot, co-pilot, and navigator-bombardier make up the crew, with the pilot and co-pilot riding tandem under a plastic bubble that gives them 360 degree visibility. The crew compartment is pressurized, temperature controlled, and is equipped with catapult ejection seats.

An Air Force ribbon type "deceleration parachute" has been used successfully on landings to make use of shorter runways.

On Feb. 8, 1949 a Stratojet flown by Maj. R. E. Schlech and Maj. J. W. Howell set an unofficial transcontinental speed record of 3 hr. 46 min. from Moses Lake Air Force Base, Wash. to Andrews Field, Md., averaging 607.8 mph for the 2,289 mi. First delivery was Dec. 2, 1948. Air Force procurement for B-47's stands at fifteen from fiscal 1949 and prior funds. All other data is classified.

## STRATOFREIGHTER

**TYPE: Cargo. DESIGNATION: (AF) C-97A.**

### DATA

**POWERPLANT: Four Pratt and Whitney R-4360, 3,500 hp at takeoff. FUEL CAPACITY: 7,790 gal. PROPELLERS: Four-bladed Hamilton Standard or Curtiss Electric full feathering reversible thrust. GEAR: Tricycle, dual-wheel retractable.**

### SPECS

**SPAN: 141 ft. 3 in. LENGTH: 110 ft. 4 in. HEIGHT: 38 ft. 3 in. DESIGN GROSS WEIGHT: 150,000 lb.**

### PERFORMANCE

**CRUISING SPEED: Over 300 mph. SERVICE CEILING: 30,000 ft. RANGE: Over 4,000 mi.**

### REMARKS

The C-97 is a military version of the Boeing Stratocruiser (See Civil Section), and is now in production for the Air Force as a standard long-range cargo transport with a 20 to 25 ton cargo capacity. As a military passenger plane it can be equipped to carry 137 troops with combat equipment or 83 litters. Self-contained ramps under the tail allow tanks, trucks, heavy guns, and similar equipment to be loaded with a minimum of effort. An aerial delivery system used in the plane can drop 25,000 lb. of supplies through the rear hatch in 12¾ secs. Fifty C-97's have been ordered by the Air Force from fiscal 1949 and prior funds. PRODUCTION: As of Nov. 1, 1949, 6 (C97A's). All other data is classified.

# CHASE AIRCRAFT CO., INC.

West Trenton, N. J.


**Chase troop-cargo 122-B**

## YC-122

TYPE: Cargo. DESIGNATION: (AF) YC-122.

DATA

POWERPLANT: Two Wright R-1820-101, 1,425 hp each. FUEL CAPACITY AND CONSUMPTION: 1,300 gal., 100 gal. per hr. OIL CAPACITY: 74 gal. PROPELLERS: Curtiss C532S-E100; 836-29C2-24 blades. FLAPS: Slotted, 75 degrees travel. GEAR: Tricycle; main gear fixed, nose gear retractable.

SPECS

SPAN: 95.7 ft. LENGTH: 61.6 ft. HEIGHT: 22.2 ft. WEIGHTS: EMPTY, 19,250 lb.; GROSS, 32,000 lb.; USEFUL LOAD, 12,750 lb.; MAXIMUM PAYLOAD, 10,000 lb. WING LOADING, 39.4 lb. per sq. ft. POWER LOADING, 11.2 lb. per bhp.

PERFORMANCE

SPEEDS AT SEA LEVEL: MAXIMUM, 236 mph; CRUISING, 180 mph; STALLING, 82 mph. RATE OF CLIMB, 1,320 ft. 1st min. SERVICE CEILING, FULLY LOADED, 25,000 ft. RANGE: 2,360 mi.

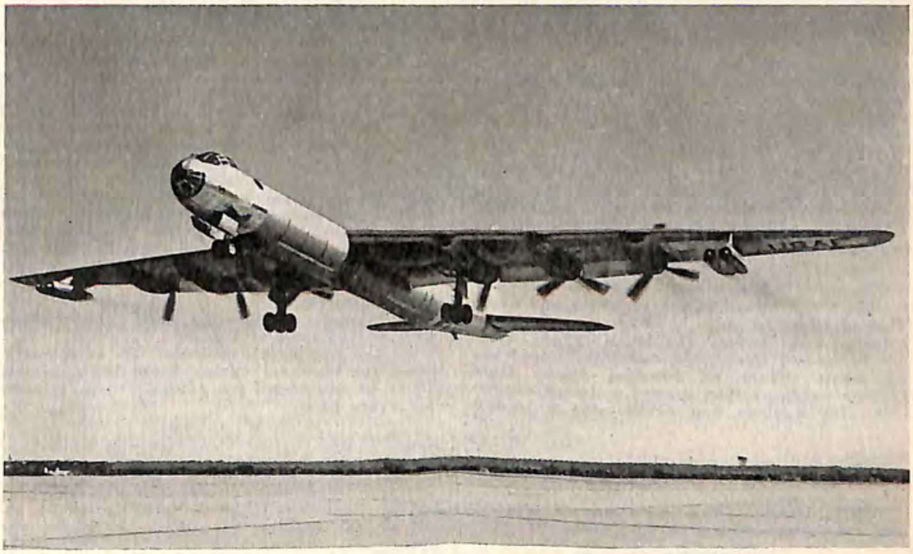
REMARKS

The YC-122 (Avitruc) is a powered version of the cargo glider manufactured by Chase Aircraft during the war. Michael Stroukoff, president and chief engineer, developed the high aspect ratio wing which gives this 2-place cargo plane good short field performance. Other personnel include: L. J. Stowe, project engineer, and test pilots R. K. Wheatley and W. F. Sauers. The MS-7B (manufacturer's model designation) was first flown Nov. 18, 1948.

Chase is about set with the XC-123 as we go to press. It will use the same wing as the 122, but will have a greater cruising speed, improved loading system, and other new features. The Air Force ordered 12 YC-122's.

# CONSOLIDATED VULTEE AIRCRAFT CORP.

San Diego, Cal.

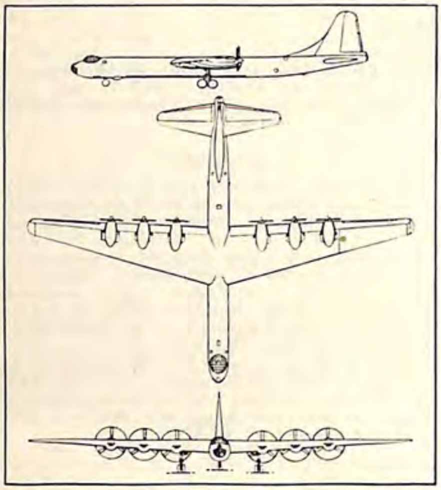


**Consolidated B-36 with jets cut in for takeoff**

TYPE: Heavy bomber. DESIGNATION: (AF) B-36.

DATA

POWERPLANT: Six Pratt and Whitney pusher-type, R-4360-25, 3,500 hp each. "D" and "E" series also have four General Electric J-47 jets, 5,200 lb. static thrust each. These replace the Allison J-35-19 first used on the B-36. FUEL CAPACITY: 21,116 gal. carried



in integral fuel tanks within the main wing box spar. OIL CAPACITY: 1,200 gal. PROPELLERS: Six Curtiss Electric, reversible, 3-bladed, 19 ft. diameter. GEAR: Tricycle, dual-wheel nose gear, 4-wheel truck main gear.

### SPECS

SPAN: 230 ft. LENGTH: 162 ft. HEIGHT: 46 ft. 9 in. WEIGHTS: MAX. GROSS, 326,000 lb. WING LOADING, 58.3 lb. per sq. ft. POWER LOADING, 15.4 lb. per hp.

### PERFORMANCE

MAXIMUM SPEED: Over 350 mph (AF figure). SERVICE CEILING: 40,000 plus ft. RANGE: 10,000 mi. with 10,000 lb. bomb load. TAKE-OFF DISTANCE MAXIMUM GROSS: 6,000 ft.

### REMARKS

The world's largest bomber, the B-36 Peacemaker, was designed to get anywhere and back. Tied in with the atom bomb, it was given top priority even before December, 1941. The Air Force had already decided there would not be much chance of bombing Japan from Chinese bases, so they opened a design competition for a plane that could carry a 10,000 lb. bomb load 10,000 miles. Consolidated won out with the Peacemaker. Later in the war, when Pacific bases were captured for use by B-29's, the B-36 lost its top priority rating.

This held up the first procurement contract until Aug. 19, 1944, which called for 100 B-36's. Two years later, on Aug. 8, 1946, the XB-36 made its first flight. The first production model, the YB-36, first flew Dec. 4, 1947. Both the A and B models showed up well in tests, and it was decided to continue the program. On Dec. 5, 1947, the AF approved the B-36C program. This series was to have tractor props instead of the pushers, in hope of raising top performance to over 400 mph. Inadequate cooling at altitude, and the interference to the airfoil by having six breaks on the leading edge of the wing, led to cancellation before the first plane was built. Emphasis is now on the D series, which uses four jet engines arranged in pods of two each on either wing outboard of the piston engines. The jets are cut in only on takeoff, or when increased speed is needed. Their use shortens the take-off run to 3,500 ft., a saving of over 1,500 ft.

The plane has a pressurized nose and tail section which are connected by a pressurized tunnel. The 15 crew members can get back and forth by pulling themselves along on a dolly in the passage. There are four bomb bays. A load of 10,000 lb. for a long mission is normal, but this can be upped to 84,000 lb. if the mission is short. Most of the guns are remotely controlled by the latest in electronic devices.

Some of the most notable achievements of the B-36 to date are as follows: A 36A flight of 6,922 mi. with two engines out most of the way and with a 10,000 lb. bomb load dropped at the half way mark. A 36B flight of 8,062 mi. in 36 hr. with one engine out most of the time, and with a bomb load of 10,000 lb. half way. A bomb load of 84,000 lb. dropped from a 36B; 42,000 lb. bomb from 35,000 ft., and another from 40,000 ft. A 4,406 mi. mission at 319 mph above 40,000 ft. Altitude missions close to 50,000 ft. On Dec. 7-8, 1948, a B-36B flew non-stop from Ft. Worth to Hawaii and return, a distance of 8,200 mi. A bomb load of 10,000 lb. was dropped at the half-way mark.

Additional specification and performance data on the B-36 is classified.

Of the 154 B-36's on order, 75 were certificated for purchase during fiscal 1949, leaving 79 to be considered for 1950-51 under present Air Force plans.

## L 13

TYPE: Liaison. This is a 3-place, closed, land monoplane with a folding wing.

### DATA

POWERPLANT: Franklin, O-425-9, 245 hp at takeoff. FUEL CAPACITY: 60 gal. FUEL CONSUMPTION: 11.5 gal. per hr. OIL CAPACITY: 3.9 gal.

### SPECS

SPAN: 40 ft. 5½ in. LENGTH: 31 ft. 9 in. HEIGHT: 8 ft. 5 in. WEIGHTS: EMPTY, 2,067 lb.; GROSS, 2,900 lb.; MAXIMUM PAYLOAD, 833 lb. WING LOADING: 10.74 lb. per sq. ft. POWER LOADING: 12,08 lb. per hp.

### PERFORMANCE

MAXIMUM SPEED: 115 mph. CRUISING SPEED: 110 mph. STALLING: 43 mph (with flaps). RATE OF CLIMB: 1,050 ft. 1st min. CEILING: 15,000 ft. RANGE: 368 mi. with 46 gal,. gas.

### REMARKS

Consolidated delivered 154 of this model during the year through Oct. 31. (See p. 288)


**"Flying Classroom" Convair T-29**

## T-29

**TYPE: Trainer. DESIGNATION: (AF) T-29.**

**REMARKS**

**The T-29 is a military version of the Convair-Liner 240 (see Civil Section) and is similar in outward appearance except for the four plastic astradomes on top of the fuselage. The first production model of the original 36 ordered from 1949 fiscal funds was scheduled for completion late in 1949. The first 29's will be equipped as navigational trainers seating sixteen students with their equipment, which includes some of the latest in radio and radar. In addition to the regular crew of pilot, co-pilot, and crew chief, there will be two instructors, one each for radio and navigation. Unlike the 240, the trainer will not be pressurized but will carry oxygen outlets for all members. Later models may be equipped for bombardier training.**

**All other data is classified.**

**Prediction**

"Writing in the new French magazine Je Sais Tout (I Know Everything), M. Santos Dumont, the famous French aeronaut, prophesies that before many years have passed a complete revolution will have taken place in modern methods of traveling.

"Transcontinental aerial expresses will 'fly between St. Petersburg and Paris.' Men in this generation will take their seats in them as naturally as their grandfathers did in the first railway carriages.

"Paris will be transformed by aerial stations at which passengers will alight and embark on flying omnibuses.

"Winged warships will menace modern fleets and wage war with submarines—perhaps put whole armies to flight. Very possibly some bold explorer will reach the north pole without much difficulty in a dirigible balloon.

" 'What would you say,' adds M. Santos-Dumont, 'if I told you that next summer I am confident of giving a new impulse to aerial navigation; that I myself hope to be able, before ending my experiences, to cruise over Europe for a week at a time—without descending to earth—in a yacht that will be in itself a flying house?' "

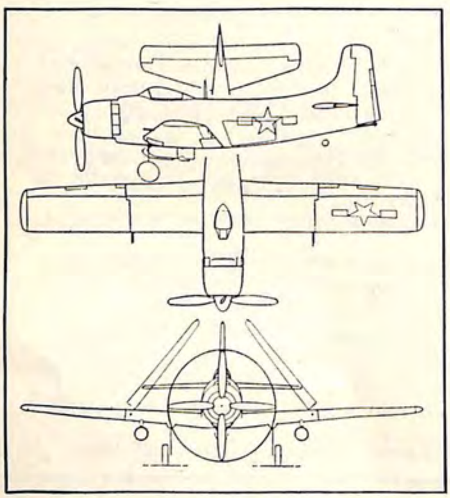
—*Mail and Express,* New York, Nov. 30, 1905

# DOUGLAS AIRCRAFT CO., INC.

Santa Monica, Cal.

**Douglas Skyraider, multi-purpose attack plane**

## SKYRAIDER



**TYPE: Attack. DESIGNATION: (N) AD-4.**

**DATA**

**POWERPLANT: One Wright Aero Corp. R3350-26W, 2,700 hp at takeoff and 2,900 rpm. FUEL CAPACITY: 350 gal. with provisions for two 150 gal. drop wing-tip tanks. PROPELLER: Aeroproducts. GEAR: Conventional retractable.**

**SPECS**

**SPAN: 50 ft. 3/16 in. LENGTH: 38 ft. 10 in. HEIGHT: 15 ft. 7½ in. WEIGHTS: EMPTY, 10,950 lb.; GROSS, 16,667 lb.**

**REMARKS**

**Manufacturing began on the first AD in Nov. 1944. On Mar. 18, 1945, the prototype (XBT2D) made its first flight. Carrier qualification tests were completed in May 1946 and the first squadron operated from the USS *Boxer* CV21 under Comdr. Harry Cook who headed Group 19. Comdr. Bill Craven was squadron leader.**

**Over 500 AD's have been produced at Douglas' El Segundo plant, starting with AD-1's and followed by 2's, 3's, and 4's, now being delivered. About twenty-two versions have been designed and produced, ranging from an AD**

equipped as a target-towing utility plane to AD's in the Q, N, and W electronic special-purpose series. AD's are single-place except for the Q model that requires a radar operator, the 3N's and 8N's which also use a radar operator and a "counter-measures" operator, and the 4W and 3W which have provisions for two AEW operators.

Basic AD-4's have auto-pilots, improved radar, redesigned windshield and cockpit enclosure for greater pilot protection, modified arresting hook, and other internal adjustments. These are added to the major improvements found on the AD-3's, which strengthened the landing gear and changed the propeller. The AD-2 remains the basic modification of the original model with the installation of the R-3350-26W engine replacing the 3350-24W. Improved cockpit lighting and landing gear doors were also added.

The plane has two 20 mm guns and can carry 12 five-inch HVAR rockets. For long range missions with its ammo load and a 150 gal. drop tank on its center external rack, the AD can carry two 2,000-lb. bombs or two 1,300-lb. "Tiny Tim" aircraft rockets. On short missions it can haul two "Tiny Tims" and one 2,000 lb. torpedo, or three 1,000 lb. bombs and twelve five-inch rockets, or three 2,000 lb. bombs.

All other data is classified.

**Twin-jet Skyknight by Douglas**

## SKYKNIGHT

**TYPE:** Fighter. **DESIGNATION:** (N) F3D.

### DATA

**POWERPLANT:** Two Westinghouse J-34 (24C). **GEAR:** Nose-wheel type.

### REMARKS

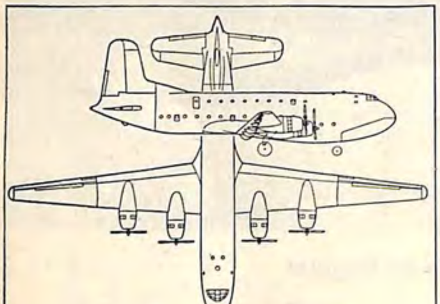
Preliminary design was begun on this two-place monoplane in Sept. 1945, and on Mar. 23, 1948, it made its first flight. It can fly at high speeds for great distances, making it adaptable as an attack fighter, long-range patrol or reconnaissance plane, or as a long-range escort fighter.

A special system of cockpit lighting to prevent glare is used. All instrument letters and numbers are etched in transparent lucite on panels lighted from the rear with a red light. Emergency pilot escape is by an underside bail-out chute similar to a slide fire escape. Speed-brakes are hydraulically operated and extend outward from the fuselage just forward of the tail.

Twenty-eight were under production contract when we went to press. All other data is classified.


**Air Force's new Douglas C-124 Globemaster cargo transport**

## GLOBEMASTER II



**TYPE: Cargo DESIGNATION: C-124A.**

### DATA

**POWERPLANT: Four Pratt and Whitney R-4360-20W, 3,500 hp at takeoff. FUEL CAPACITY: 11,100 gal. OIL CAPACITY: 330 gal. PROPELLERS: Curtiss Electric 3-blade, reversible. FLAPS: Douglas full span, deflector vane, double slotted 40 degrees. GEAR: Tricycle, dual main and nosewheel.**

### SPECS

**SPAN: 173 ft. 3 in. LENGTH: 127 ft. 1 in. HEIGHT: 48 ft. 3.6 in. WEIGHTS: EMPTY, 95,707 lb.; DESIGN GROSS, 175,000 lb.; DESIGN USEFUL LOAD, 79,293 lb.; DESIGN PAYLOAD, 50,000 lb. WING LOADING: 69.7 lb. per sq. ft. POWER LOADING: 12.5 lb. per bhp.**

### PERFORMANCE

**SPEEDS: MAXIMUM, 298 mph at 20,800 ft.; CRUISING, 264 mph at 13,600 ft.; STALLING, 99.5 mph with 160,000 lb. gross; RATE OF CLIMB SEA LEVEL, 800 ft. per min. with 175,000 lb. gross. SERVICE CEILING FULLY LOADED: 22,050 ft. RANGE: 6,280 ft.**

### REMARKS

**The C-124A is the largest heavy cargo transport in production today. It is equipped to handle pieces of cargo as large as 130 in. wide by 140 in. high through the opening in the nose. A hydraulically operated ramp to the door provides a 17-degree slope for easy loading. The ramp can be varied in width to accommodate vehicles of different tread. It is stowed in the fuselage nose below the crew compartment.**

**There is another loading door amidships in the underside of the fuselage which can take cargo measuring 89 in. wide, 155 in. long and 85 in. high. This cargo hold is stressed for 16,000 lb. Loading is speeded by the use of an electrically operated elevator. A folding upper deck, hinged at the fuselage, is divided into segments and is supported by stanchions. With the upper deck in position a truck can back into the nose opening and load both the**

upper and lower levels at the same time. Included in the loading facilities are two electrically powered traveling cranes, each able to lift 8,000 lb.

The Globemaster can be converted into a two-deck troop carrier able to carry 200 troops and their equipment, or as a hospital plane, 136 litter patients and their attendants.

The C-124 is a development of the C-74 and uses basically the same landing gear and wing and tail surfaces. The fuselage is new and the engines more powerful than in the 74. The Globemaster was begun in Oct., 1947, a contract received in Apr., 1948, and the first flight scheduled for late Nov., 1949, a month ahead of schedule.

The Air Force has ordered 29 production models and one for static tests.

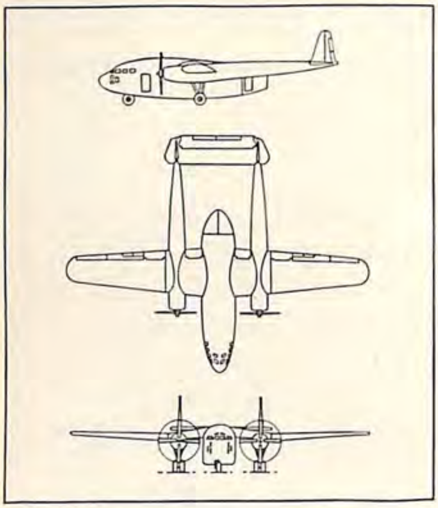
# FAIRCHILD AIRCRAFT DIVISION

## FAIRCHILD ENGINE AND AIRPLANE CORP.

Hagerstown, Md.

**Standard troop-carrier, Fairchild C119-B**

# PACKET



TYPE: Cargo. DESIGNATION: (AF) 119-B, (N) R4Q-1.

DATA

POWERPLANT: Two Pratt and Whitney R-4360-20, 3,250 hp at takeoff. FUEL CAPACITY: 2,670 gal. in four tanks. OIL CAPACITY: 120 gal. in two tanks. PROPELLERS: Hamilton Standard, hub number 24260. FLAPS: Slotted. GEAR: Tricycle, electrically retractable.

SPECS

SPAN: 109 ft. 3 in. LENGTH: 85 ft. 10 in. HEIGHT: 26 ft. 8 in. WEIGHTS: EMPTY, 37,961 lb.; DESIGN GROSS, 64,000 lb.; USEFUL LOAD, 36,309 lb. (based on alternate gross weight of 74,000 lb.); DESIGN LANDING, 60,000 lb. (alternate, 66,500 lb.). WING LOADING, 51.2 lb. per sq. ft. POWER LOADING, 13.9 lb per hp.

PERFORMANCE

SPEEDS: MAXIMUM, (placard), 258 mph; CRUISING (placard), 177 mph.; STALLING, (landing) 101 mph (with flaps), 106.3 mph (without flaps). RATE OF CLIMB, 800 ft. 1st min. USABLE CEILING: 23,900 ft. RANGE: 2,430 mi. with 2,670 gal. of gas.

REMARKS

The first of the Packets, XC-82, started on the drafting boards in 1941. The development, engineering, and preliminary testing of the prototype, which first flew Sept. 10, 1944, took less than 21 months after the mock-up approval by the U. S. Army. The result was the first all-cargo twin engine transport. It is the standard troop carrier plane of the Air Force and the only one used for paratroop and equipment drops.

Production of the C-82 was started by Fairchild and additional production was assigned North American, but was continued only by Fairchild after the war. North American had built three C-82N's before the contract was cancelled. Fairchild built 220 of this model before it went out of production in Sept. 1948.

Late in 1947 a new version of the C-82 was flown. Designated the C-119, this new model was a larger, faster, and heavier load-carrier than the 82. One of the most noticeable changes was the relocation of the flight deck from the top of the fuselage to the nose.

The square-shaped unobstructed fuselage and the twin tail boom construction allows loading similar to a railway flatcar or boxcar. Reinforced floors are at truck-bed level and can be reached through a door on the left side of the fuselage or through the main cargo clam shell doors at the rear. These are opened on a vertical hinge, providing an entrance opening as wide as the cargo hold. Two ramps for loading vehicles can be carried in each plane.

Packets were used to good advantage on the Berlin Airlift, carrying cargo too bulky for the conventional side-door transports, including earth graders, jeeps, aircraft engines, dump trucks, steam showels, snowplows, and cement mixers.

The Packet can also be used to carry 42 fully-equipped combat troops or 36 litter patients with attendants. There is an electrically operated monorail used for discharging paracans through a hatch in the bottom of the fuselage. Twenty 500-lb. bundles can be released with this equipment.

Normal crew: Pilot, co-pilot, navigator, and radio operator.

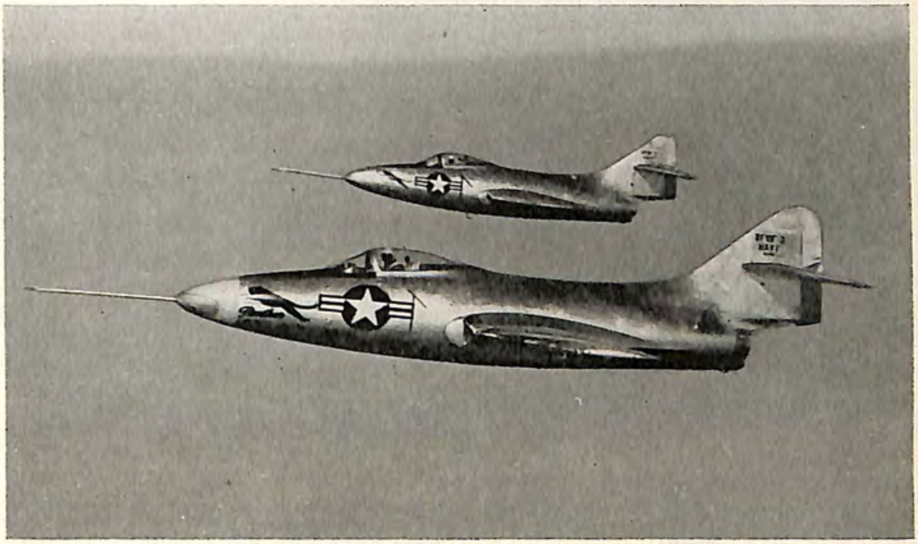
The Packet line so far has included the following: C-82A, powered by two Pratt and Whitney R-2800-85 engines. This was the production model of the XC-82. The C-82 was followed by the C-119A, a prototype modified from the standard C-82A to test the new nose configuration and powerplant. The C-119A first flew in Nov. 1947. The current Packet, C-119B, became the production version of the C-119A. PRODUCTION: To date 135 of this model have been ordered for the Air Force, 99 from 1949 fiscal funds, and 36 from 1948 or prior.

Engineering personnel for the C-119B included Armand J. Thieblot, chief engineer and Mike Cozzoli, project engineer. Richard Hensen was chief test pilot.

A new Packet with detachable cargo unit is now under development. Dubbed the Pack-Plane, it will carry a detachable pod or pack that can be loaded before being hoisted into position against the bottom of the fuselage. Figured as a great time saver, since it doesn't have to be idle during loading and unloading operations, the Pack-Plane seems assured of a good future. Design specifications call for a loaded gross of 64,000 lb., a useful load of 23,535 lb., and a cargo capacity of 2,700 cu. ft. This model had not reached the production stage by the time we went to press.

# GRUMMAN AIRCRAFT ENGINEERING CORP.

Bethpage, L. I., N. Y.



**Grumman Panther formation**

## PANTHER

**TYPE: Fighter. DESIGNATION: (N) F9F-2, -3.**

**DATA**

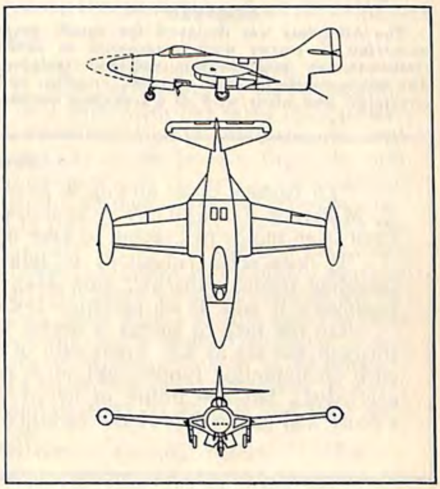
**POWERPLANT: Pratt and Whitney model of the Rolls Royce NENE jet or the Allison J-33. Each is capable of 5,000 lb. thrust, and are interchangeable. GEAR: Tricycle.**

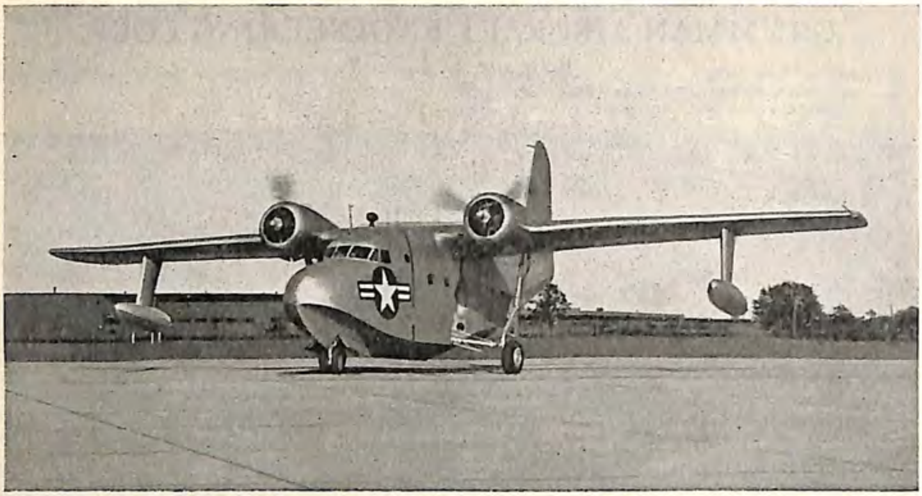
**REMARKS**

**The first experimental Panther was powered with the Rolls Royce NENE turbo-jet and flew in late 1947. The XF9F-3, with an Allison J-33A engine, first flew Aug. 16, 1948.**

**The Panther is in the 600 mph class and is designed for carrier operation without a catapult assist. It has the Grumman square wing tips which fold upward, and also features a wing whose leading edge moves in conjunction with the wing flaps in landing and takeoff. Known as the "droop snoot," it provides added lift and improved stall characteristics. The cockpit has been designed around the standards determined by Naval medical studies as being most ideal from the standpoint of physical and psychological requirements of pilots.**

**C. H. Meyer handled most of the test flying. Contracts for over 300 were on hand when we went to press. Additional data is classified.**





**Grumman's transport and utility, Albatross**

## ALBATROSS

**TYPE: Transport and utility. DESIGNATION: (AF) SA-16A, (N) UF.**

**DATA**

**POWERPLANT: Two Wright R-1820-76 engines, 1,425 hp at takeoff. PROPELLERS: Hamilton Standard, 3 blade. GEAR: Tricycle retractable.**

**SPECS**

**SPAN: 80 ft. LENGTH: 61 ft. 4 in. HEIGHT: 24 ft. 5 in. SPEEDS: MAXIMUM, 270 mph; CRUISING, 225 mph.**

**REMARKS**

**The Albatross was designed for rough water operation in rescue work, personnel or cargo transport, or multi-engine seaplane training. The plane carries a crew of pilot, co-pilot, and navigator, and when used as a transport accommodates 14 passengers, or 16 litter patients in rescue operations, or 4,100 lb. of cargo. The range varies from 600 mi. with a full rescue load to 1,400 mi. as a cargo carrier. Ferry range is approximately 2,600 mi.**

**Special features for the type operation involved include a 58 in. x 63 in. overhead hatch for cargo loading, and a "dutch type" door on the side for rescue work. The bottom half of the door remains closed, allowing greater free-board in rough water.**

**An additional feature of the Albatross is its JATO units which give it a 12-second water takeoff. F. Rowley and C. Alber of Grumman have done most of the test flying of this model. First delivery to the Navy was scheduled for the latter part of '49. All other data on this model is classified.**

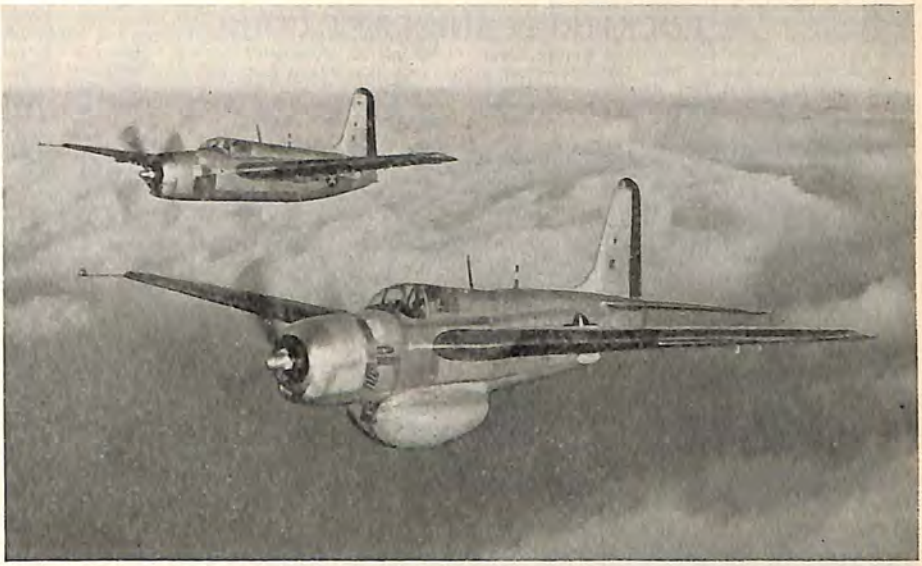
**Prediction**

"To Europe in an airship in four days is the prediction made by Maj. C. J. S. Miller of Franklin, Pa., the millionaire enthusiast on airships, who has retired from motor car racing to take up the new sport.

'It does seem ridiculous to talk about covering 3,000 miles in that time traveling through the air,' said Maj. Miller, 'yet I believe ten or fifteen years from now it will be an accomplished fact.

'On the face of things it seems improbable that we shall be able to travel through the air at any great rate of speed, but the gasoline engine, which has such an unlimited future, will solve the problem. Gas bags will do for general ascensions, but the future of aerial navigation rests with the use of gasoline motors and an airship of the dirigible type or with the aeroplane.'"

—*Pioneer Press,* St. Paul, March 15, 1906



**Radar-equipped Grumman Guardian and partner**

## GUARDIAN

**TYPE:** Attack. **DESIGNATION:** (N) AF-1S and AF-2S.

**DATA**

**POWERPLANT:** Pratt and Whitney, R-2800, 2,250 hp. **PROPELLER:** Hamilton Standard. **GEAR:** Conventional.

**REMARKS**

Claimed the largest single-engined aircraft in the world, the Guardian operates from carrier decks. The Navy says this plane's "mission will be to seek out and destroy enemy submarines." Most of the test flying was done by M. M. M. Ritchie. It carries the latest in submarine radar equipment. Armament details and other data are classified.

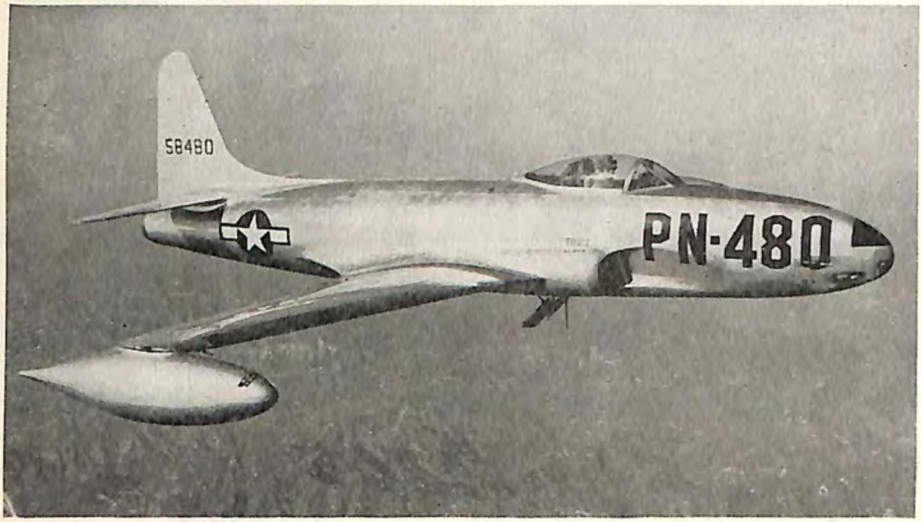
**Prediction**

"Prof. Alexander Graham Bell, the inventor of the telephone, gives his authoritative name to the statement that in the near future the flying machine will be perfected. This is the prediction of a man who has done things—who has overcome impossibilities and worked miracles. Flying machines, he says, will before long be as common as telephones are at the present time. As telephones are much cheaper than flying machines ever can be, we may take this as a rhetorical flourish from the inventor of the former 'modern inconvenience.' The great advantage of a flying machine is that it will need neither track nor road. It will have the freedom of the air. It can cut across lots and rush along without regard to highways or rights of way. Certainly if the flying machine can be made practicable the ordinary man will have at his command an unparalleled conveyance. Railway stock will go down with a slump, and toll-gates on roadways wear a ridiculous look. It would be a wonderful thing if this new invention should dispose of 'the railway problem,' which is looming so large in politics; for it is no more absurd to expect flying machines to carry freight than it would have appeared to our ancestors to be told that iron ships would carry tons of produce across the ocean."

—*Herald and Star,* Montreal, Canada, March 21, 1906

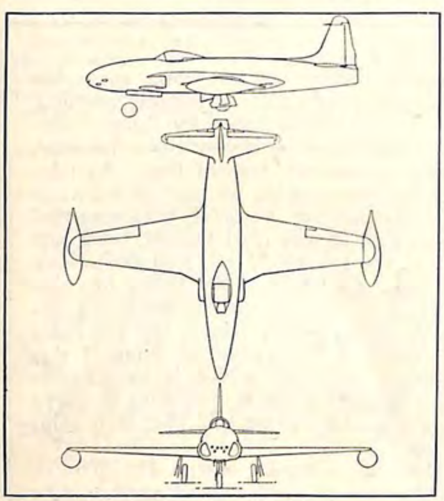
# LOCKHEED AIRCRAFT CORP.

Burbank, Cal.




**Lockheed's F-80, the Shooting Star**

## SHOOTING STAR



**TYPE: Fighter. DESIGNATION: (AF) F-80.**

**DATA**

**POWERPLANT: Allison J-33-A-23, model 400 C-5, 4,600 lb. thrust at takeoff. FUEL CAPACITY: 755 gal. with wing-tip tanks. GEAR: Tricycle, fully retractable.**

**SPECS**

**SPAN: 38 ft. 10½ in. LENGTH: 34 ft. 6 in. HEIGHT: 11 ft. 4 in. WEIGHTS: EMPTY, 8,215 lb.; GROSS, 15,336 lb.; USEFUL LOAD, 7,121 lb. WING LOADING: 64.6 lb. per sq. ft. POWER LOADING: 3.5 lb. per lb. of thrust.**

**PERFORMANCE**

**SPEEDS: MAXIMUM, 580 mph; STALLING, 117 mph. RATE OF CLIMB: 5,175 ft. per min. at sea level and gross weight. SERVICE CEILING: 39,300 ft. fully loaded. RANGE: 1,470 mi.**

**REMARKS**

**There are more F-80's flying than any other jet ever developed. It was originally designed as a single engine fighter, but since has been approved for other tactical purposes. It can be equipped to carry two 1,000 lb. bombs or eight five-in. rockets which can be fired singly**

**or in an eight-burst salvo. (See below for trainer version.) The Air Force has also used the F-80 for topographical reconnaissance and aerial mapping. Normal armament is six 50-calibre machine guns mounted in the nose.**

**The first F-80 was designed and constructed in 143 days during the war, and engineering continued for a year after the first successful test flight after which an improved version was begun and finished in 138 days. The jet engine was developed under Air Force sponsorship by General Electric as the I-40. The basic unit was a Whittle design. This was turned over to the Allison Division of General Motors Corp. in Oct., 1945. Allison has been responsible for the designs since then, and has improved the model to the J33-21 with 4,000 lb. thrust up to the present J-33-23 with 4,600 lb. thrust.**

**The Shooting Star became the first U. S. standard tactical jet plane, and since has seen service in almost every U. S. theatre of operations. They have flown long over-water flights in mass formation, brought the world's official speed record back to this country for the first time in 24 years with a dash of 623.8 mph at Muroc in California, and flown non-stop coast-to-coast in 4 hr. 13 min. and 26 sec.**

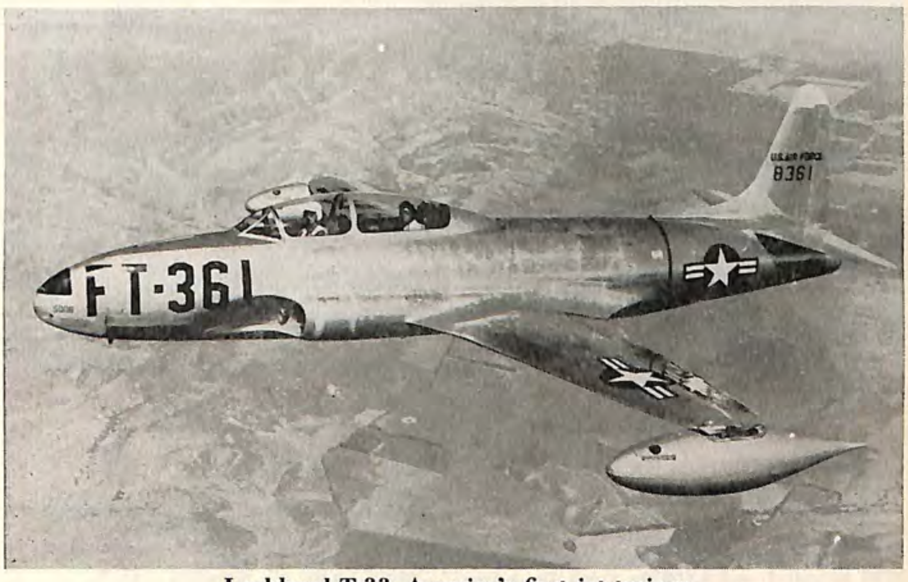
**Maintenance of the F-80 is relatively simple. During the first six months of 1949 all Shooting Stars in the U. S. military services were "on the line" and ready for immediate operational duty 70 percent of the time. The entire engine can be changed in under 30 min., and the tail section removed by disconnecting three bolts.**

**Orders for the F-80 have been coming from the Air Force, the Air National Guard, and Marines. Over 1,400 have been manufactured. Production is at the rate of one plane a day. 557 F80-C's have been ordered by the Air Force. All other data is classified.**

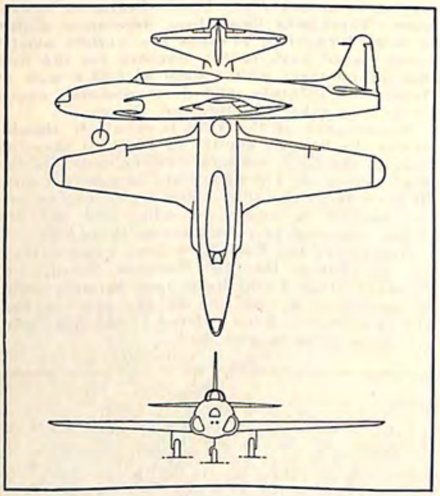
**Prediction**

"The air for the last few days has been metaphorically humming with aeroplanes, motor kites and other heavier than air flying machines. Santos-Dumont's partially successful experiments in Paris and the Wright brothers' apparently far greater successes in America, to which, by the way, little attention was paid here until the enthusiastic admiration of the Hon. Charles Stewart Rolls was cabled over, have given a strong fillip to the interest in air-travel and led to the publication of numerous interviews with aeronauts and engineers. There is a consensus that the year 1907 will see unprecedented developments and that 'ere long automobiles will be discarded as a slow and old fashioned pastime for the more novel and more exciting tours of the air." . . .

—Special cable dispatch to the *Sun*, N. Y., Nov. 17, 1906




**Lockheed T-33, America's first jet trainer**



## T-33

TYPE: Trainer. DESIGNATION: T-33A.

DATA

POWERPLANT: Allison J-33-A-23, model 400 C-5, 4,600 lb. thrust at takeoff. FUEL CAPACITY: 683 gal. GEAR: Tricycle, fully retractable.

SPECS

SPAN: 38 ft. 10½ in. LENGTH: 37 ft. 8½ in. HEIGHT: 11 ft. 8-1/3 in. WEIGHTS: EMPTY, 8,084 lb.; GROSS, 14,442 lb.; USEFUL LOAD, 6,358 lb. WING LOADING: 60.8 lb. per sq. ft. POWER LOADING: 3.3 lb. per lb. of thrust.

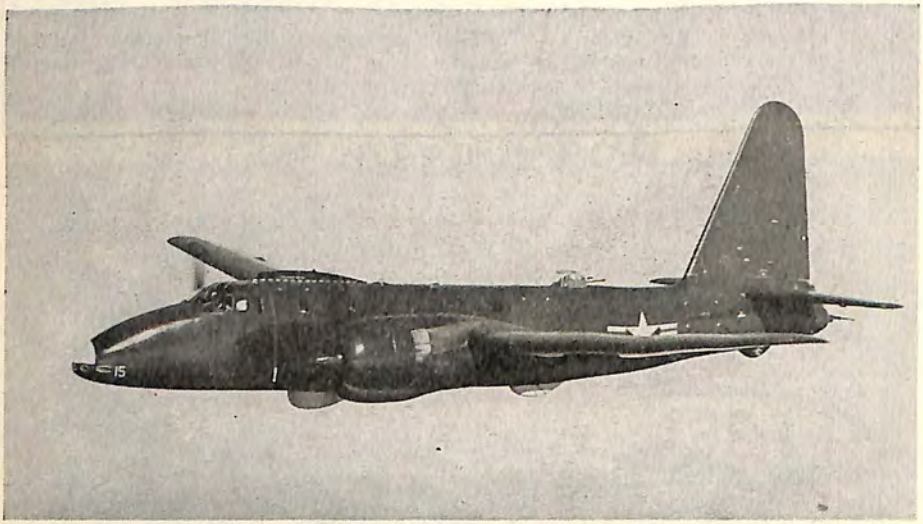
PERFORMANCE

SPEEDS: MAXIMUM, 580 mph; STALLING, 117 mph. RATE OF CLIMB: 5,525 ft. per min. SERVICE CEILING: 40,000 ft. fully loaded. RANGE: 1,345 mi.

REMARKS

The T-33A is the only jet trainer now in production or use by the U. S. military services.

1949 Air Force procurement called for 128. All other data is classified.



**Heavy-equipped Lockheed Neptune**

## NEPTUNE

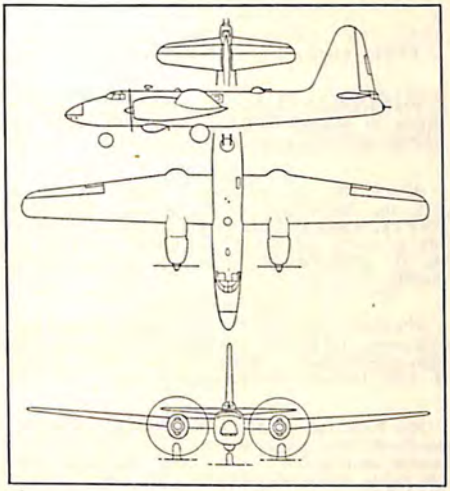
TYPE: Patrol. DESIGNATION: (N) P2V-3.

DATA

POWERPLANT: Two Wright R-3350-26W, 2,700 hp (dry) and 3,200 hp (wet) for takeoff. FUEL CAPACITY: 3,260 gal. PROPELLERS: Hamilton Standard 24260-2J17C3-36S. GEAR: Tricycle retractable.

SPECS

SPAN: 100 ft. LENGTH: 77 ft. 11 in. HEIGHT: 28 ft. 1 in. WEIGHTS: EMPTY,



**41,371 lb.; GROSS, 71,650 lb.; USEFUL LOAD, 30,279 lb. WING LOADING: 71 lb. per sq. ft. POWER LOADING: 9 lb. per bhp.**

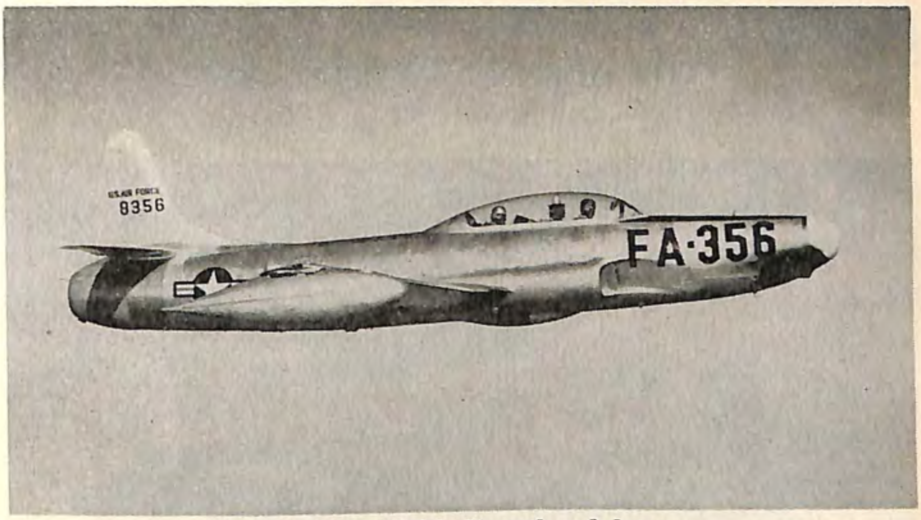
**PERFORMANCE**

**SPEEDS AT SEA LEVEL: MAXIMUM, 312 mph; STALLING, 109 mph (power off at full gross). RATE OF CLIMB: 1,640 ft. per min. at sea level and gross weight. SERVICE CEILING: 28,000 ft. fully loaded. RANGE: 4,100 mi.**

**REMARKS**

**The Neptune, equipped as a search plane, carries the latest in radar in addition to its armament which can include: six 20 mm cannon in the nose, two 50 calibre machine guns in the top turret and two in the power tail turrret, sixteen 5-in. rockets mounted under the wings, an 8,000 lb. bomb load, two 2,165-lb. aerial torpedoes, and twelve 325-lb. depth charges carried in the bomb bay.**

**Other models have included the P2V-1 with R-3350-8 engines rated at 2,300 hp; P2V-2 with R-3350-24W engines rated at 2,500 hp; the P2V-4 with R-3350-30WA rated at 3,400 hp. A P2V-3C has been designed to operate from carriers with a JATO assist. All other data is classified.**

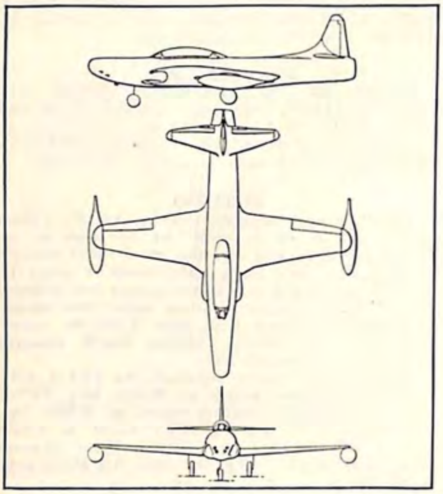



**Lockheed F-94 all-weather fighter**

**Prediction**

"The results of the latest international competition in aeronautics seem to be in favor of the old-fashioned style of balloon. The great desideratum in an ordinary balloon is strength and buoyancy, combined with maximum comfort and ballast carrying capacity. The less complicated the better it is. Any addition in the way of steering or propelling mechanism necessarily adds to the weight and is a step in the wrong direction."

—*Herald,* Boston, Mass., Oct. 3, 1906



## F-94

**TYPE:** Fighter. **DESIGNATION:** (AF) F-94A.

**DATA**

**POWERPLANT:** Allison J-33-A-23, 4,600 lb. thrust at takeoff. **FUEL CAPACITY:** 648 gal. **GEAR:** Tricycle retractable.

**SPECS**

**SPAN:** 38 ft. 10½ in. **LENGTH:** 40 ft. 1½ in. **HEIGHT:** 12 ft. 8 in. **WEIGHTS:** EMPTY, 9,638 lb.; GROSS, 15,710 lb.; USEFUL LOAD, 6,072 lb. **WING LOADING:** 64.5 lb. per sq. ft. **POWER LOADING:** 3 lb. per lb. of thrust.

**PERFORMANCE**

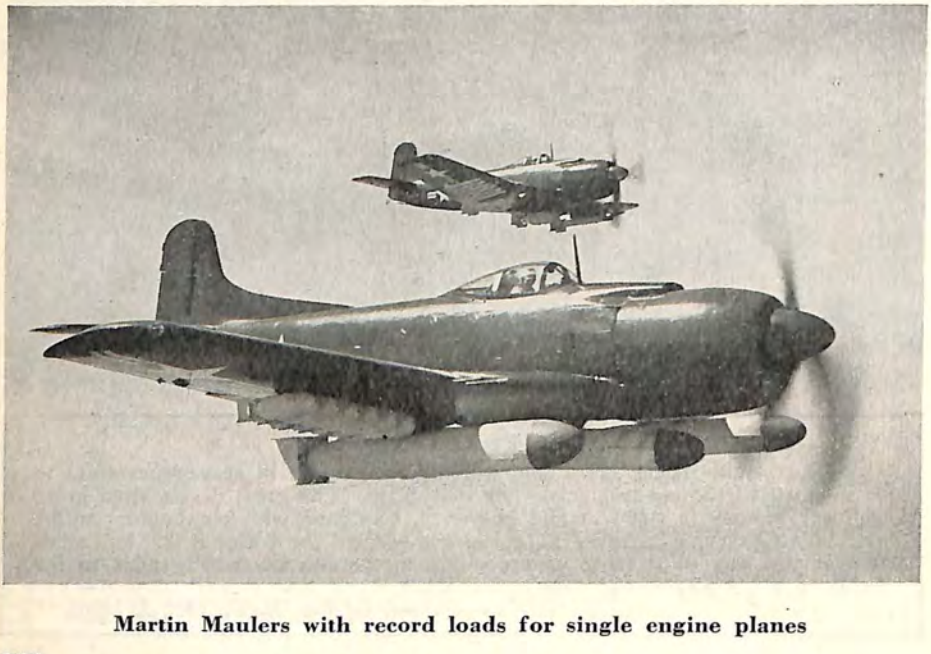
**SPEEDS:** MAXIMUM, 607 mph; STALLING, 122 mph. **RATE OF CLIMB:** 7,350 ft. per min. with afterburning. **SERVICE CEILING:** 46,000 ft. fully loaded. **RANGE:** 1,080 mi.

**REMARKS**

The F-94 is an all-weather fighter version of the F-80. The major modifications are an afterburner and space for a radar operator. The Air Force has ordered 110. All other data is classified.

# THE GLENN L. MARTIN CO.

Baltimore, Md.



**Martin Maulers with record loads for single engine planes**

## MAULER

**TYPE:** Attack. **DESIGNATION:** (N) AM-1.

### DATA

**POWERPLANT:** One Pratt and Whitney R-4360, 3,000 hp. **FUEL CAPACITY:** Over 900 gal. **PROPELLER:** Curtiss Electric, 4-blade, 14 ft. 8 in. diameter. **GEAR:** Conventional retractable.

### SPECS

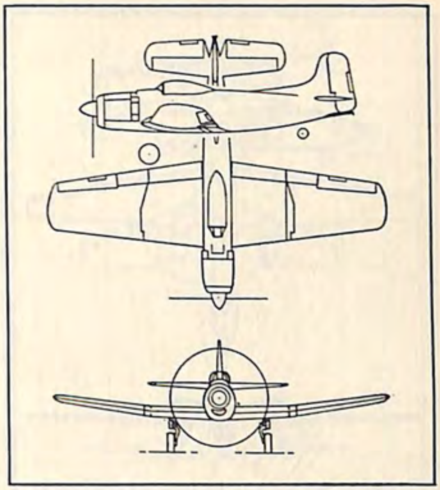
**SPAN:** 50 ft. 1 in. **LENGTH:** 41 ft. 6 in. **HEIGHT:** 16 ft. 11 in. **WEIGHT:** A total gross of 29,332 lb. has been carried. Payload weight has exceeded 9,500 lb. and is claimed by the manufacturer to approach 6 tons.

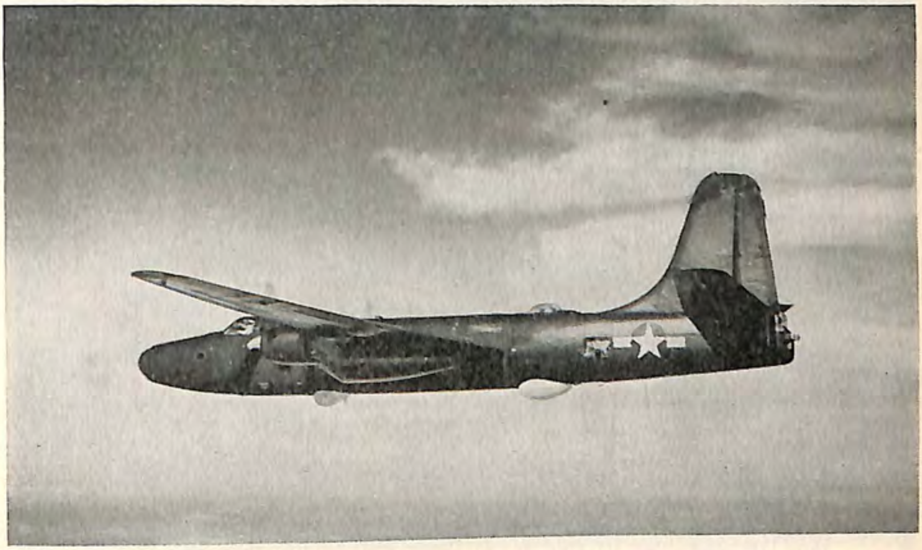
### PERFORMANCE

**MAXIMUM SPEED:** Over 350 mph. **RATE OF CLIMB:** Over 2,500 ft. per min. **SERVICE CEILING:** Over 25,000 ft.

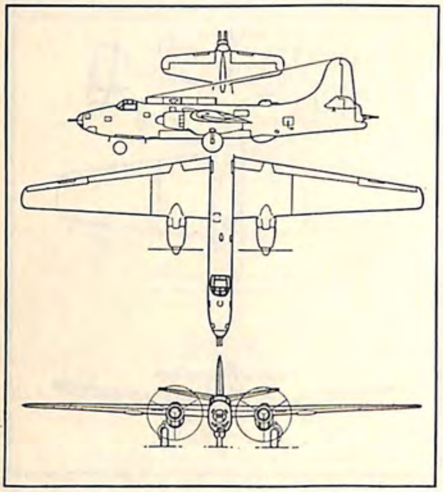
### REMARKS

More than 100 of these single-place planes have been delivered to the Navy to act as carrier-based dive-torpedo bombers. In one load a Mauler has carried three 2,200 lb. torpedoes, twelve 250-lb. bombs, and four 20 mm. aerial cannons with 800 rounds of ammunition. Another load combination is a one 2,000-lb. bomb, two "Tiny Tim" rockets (about half the weight of a torpedo), and 12 five-inch rockets. Other uses for the Mauler include operation as a mine layer or long (2,000 mi.) range scout. A fast-opening brake is used to slow the plane during dives. All other data is classified.





**Four-engine Martin patrol plane, the Mercator**



## MERCATOR

**TYPE: Patrol search. DESIGNATION: (N) P4M.**

**DATA**

**POWERPLANT: Two Pratt and Whitney R-4360 engines and two Allison J-33 jets, one in each nacelle aft of the conventional engine. The jet units are used for takeoff and for additional bursts of speed.**

**SPECS**

**SPAN: 114 ft. LENGTH: 85 ft. GROSS WEIGHT: Over 80,000 lb.**

**REMARKS**

**The Mercator is the Navy's first jet-powered patrol plane. It will be used chiefly for anti-submarine work and is equipped with a heavy load of the latest electronic search devices. High speed, fast rate of climb, good maneuverability, and heavy armament have brought a sizeable order from the Navy.**

**All other data is classified.**

# McDONNELL AIRCRAFT CORP.

St. Louis, Mo.


**McDonnell twin-jet Banshee**

## BANSHEE

**TYPE:** Fighter. **DESIGNATION:** (N) F2H-2.

**DATA**

**POWERPLANT:** Two Westinghouse J-34 turbojets, approximately 3,000 lb. thrust each. **FUEL:** Over 5,000 lb. in five self-sealing internal tanks. **GEAR:** Tricycle retractable.

**SPECS**

**SPAN:** 41 ft. 7.4 in. **LENGTH:** 40 ft. 1.8 in. **HEIGHT:** 14 ft. **GROSS WEIGHT:** Approximately 1,400 lb.

**PERFORMANCE**

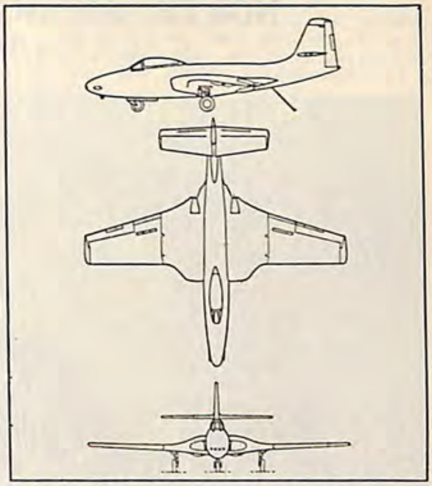
**MAXIMUM SPEED:** Reported close to 600 mph. **RATE OF CLIMB:** Over 9,000 ft. per min. **CEILING:** Approximately 48,000 ft. **RANGE:** Over 2,000 mi. (max.)

**REMARKS**

Original Banshee orders totaled 235, including 24 night fighters. A total of 56 F2H-1's were ordered and in May, 1948, came an order for 179 F2H-2's. The range of the H-2's was increased with the use of droppable wing-tip tanks, giving it one of the longest ranges for a carrier-based plane. The first Banshee went to the Naval Air Test Center, Patuxent River, Md., for operational trials before being sent with Navy and Marine jet outfits.

The Banshee is the outgrowth of the Phantom, first Navy carrier-based jet, which is out of production. The Banshee has almost double the power, thinner wings and tail, smoother outer surfaces, heavier guns, better pilot visibility, and a number of maintenance improvements.

The Banshee, like the Phantom, has one jet in each slightly thickened wing root. This lessens the drag over the conventional nacelle placement, and also gives better single-engine performance. It was found that a greater range was possible with twin jets, one being shut off for cruising, than if one jet was used at half power in a single jet installation.



The plane is equipped with speed brakes that fit into the wing, giving a fast rate of deceleration. There are four cannons in the nose, a bullet-proof windshield, and armor plate in back of the pilot. For greater carrier utility the Banshee is equipped with folding wings and a "kneeling" feature which allows 25 percent more planes to be stored. A switch in the cockpit folds the nose wheel, and allows the nose to rest on a small dolly.

No late procurement figures are available, but the order for 235 planes was originally set for completion in the middle of June, 1950.

All other data is classified.

**News Item**

"Lincoln Beachey, the California aviator, made a remarkable flight in a Curtiss aeroplane here when he was scheduled to fly across the Niagara river at Fort Erie to the northern part of the city and thence to Niagara Falls.

"At the hour scheduled for the flight a storm of great violence blew from the south. Beachey made a quick trip over the housetops and started for the falls on the very rim of the storm. Five minutes after he left the ground at the driving park rain fell in torrents and fully 40,000 people got a drenching.

"Beachey was barely two minutes ahead of the downpour and going like the wind. He covered the eighteen miles, air line, on the last leg of the trip in a fraction over sixteen minutes. He escaped the storm at the falls by three minutes.

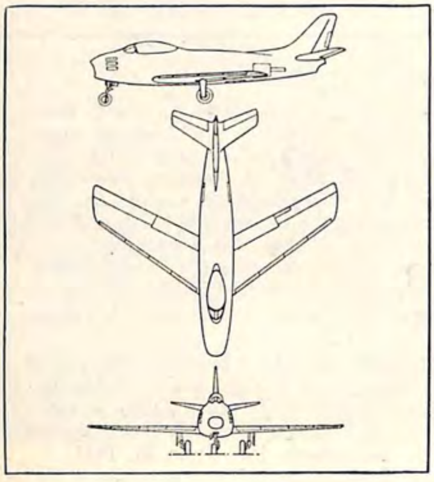
"Tomorrow and Wednesday Beachey will sail over Niagara Falls and undertake to make a dip under the upper steel arch bridge, which clears the water by 168 feet and has a lateral spread of barely 100 feet." Editor's note: He made it.

—*Globe,* S. Bethlehem, Pa., June 26, 1911

# NORTH AMERICAN AVIATION, INC.

Los Angeles, Cal.


**North American's 670.981 mph Sabre**



## SABRE

**TYPE: Fighter. DESIGNATION: (AF) F-86.**

### DATA

**POWERPLANT: General Electric Jet, J-47A (TG-190), 5,200 lb. thrust. GEAR: Tricycle, retractable, steerable nosewheel.**

### SPECS

**SPAN: 37 ft. LENGTH: 37 ft. HEIGHT: 14 ft. GROSS WEIGHT: 13,715 lb.**

### PERFORMANCE

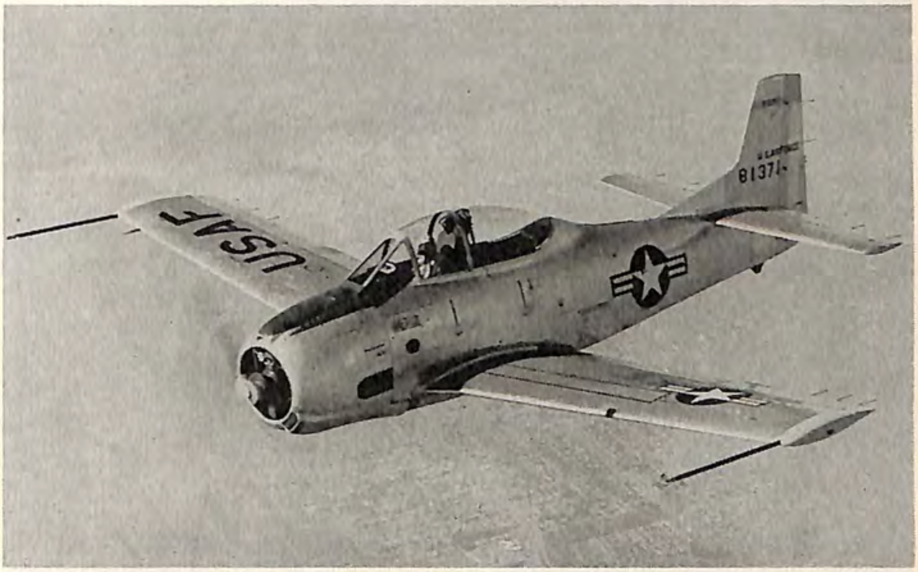
**SPEEDS: Set official world's record of 670.981 mph, Sept. 15, 1948, and unofficial record of 710 mph, Feb. 11, 1949. SERVICE CEILING: Over 40,000 ft. TACTICAL RADIUS: Over 500 mi.**

### REMARKS

**The Sabre was the first operational plane with swept-back wings to fly in this country. The 35 degree sweepback delays the formation of compressibility shock waves, and, along with the thin wing, gives a high rate of speed.**

**The F-86 uses the single straight ram duct in the nose, which was first used in this country by North American on the Navy FJ-1 Fury. Other features include a pilot ejection seat, clear bubble canopy, and the latest in radio, radar and navigational aids.**

**First flight of the XF-86 was Oct. 1, 1947, the production model, May 20, 1948. First delivery, May 28, 1948. Air Force procurement called for 333 F-86A's. Additional data is classified.**




**North American advanced trainer T-28**

**TYPE: Advanced trainer. DESIGNATION: (AF) T-28.**

**DATA**

**POWERPLANT: One Wright 7 cyl., R-1300-1, 800 hp. FUEL CAPACITY: 125 gal. PROPELLER: Aero Products, 2-bladed, constant speed. GEAR: Tricycle, hydraulically retractable.**

**SPECS**

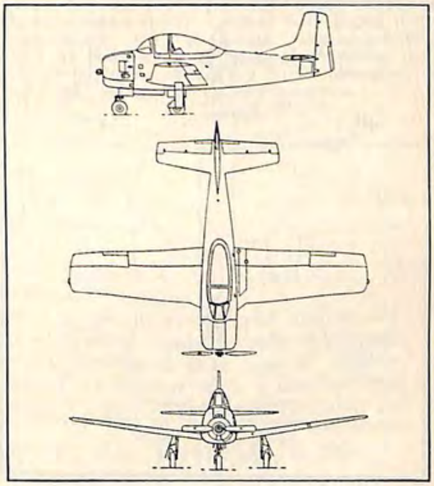
**SPAN: 40.1 ft. LENGTH: 32 ft. HEIGHT: 12.66 ft. WEIGHTS: EMPTY, 5,111 lb.; GROSS, NORMAL 6,365 lb.; GROSS, MAXIMUM TAKE-OFF, 6,759 lb. WING LOADING, 23.8 lb. per sq. ft. POWER LOADING, 7.96 lb. per hp.**

**PERFORMANCE**

**SPEEDS: MAXIMUM (at 5,900 ft.), 228 mph; CRUISING, 166 mph; STALLING, 72 mph; RATE OF CLIMB, 2,570 ft. per min. SERVICE CEILING: 29,800 ft. RANGE: 1,008 mi.**

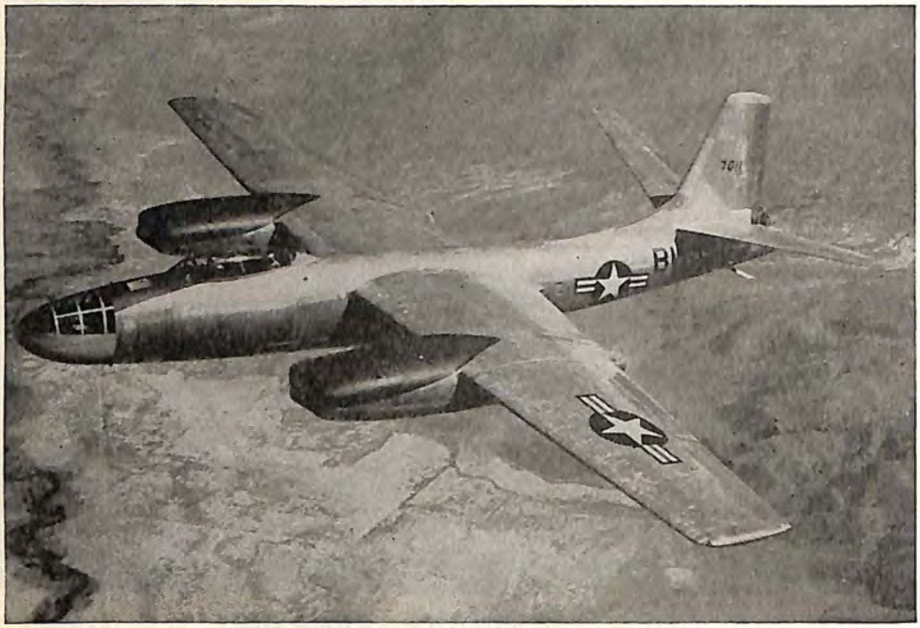
**REMARKS**

**The Air Force's new T-28 was designed to replace the AT-6 used during the war. With a top speed of 288 mph as against 205 mph for the old type, this new trainer is expected to fill**

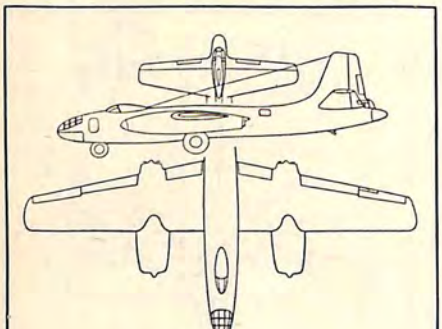


the gap between the slow trainer and the jets. It is the first U. S. training plane to use a tricycle gear. Additional improvements include a 12½ degree visibility over the nose (11 degrees is required), a movable taxi light fastened to the nosewheel, easier accessibility for maintenance (there is an access port directly back of the engine nacelle underneath the fuselage), and special lighting on the instrument panel for use of the "view-limiter" for simulated instrument flying. The instruments are lighted with ultra-violet and infra-red light, and show when the student wears a special set of goggles, which cut off his vision outside the cockpit.

Procurement figures for fiscal 1949 called for 266. Additional data is classified.



**First U. S. 4-jet plane, North American's B-45**



TYPE: Bomber. DESIGNATION: (AF) B-45.

DATA

POWERPLANT: Four General Electric J-47 (TG-190) 5,200 lb. thrust each. GEAR: Tricycle, hydraulically retractable.

SPECS

SPAN: 89 ft. 6 in. LENGTH: 74 ft. HEIGHT: 25 ft. GROSS WEIGHT: 82,600 lb. WING LOADING: 70.3 lb. per sq. ft. BOMB LOAD: Over 10 tons.

PERFORMANCE

MAXIMUM SPEED: In 550 mph class (unofficial speed record of 675 mph set by Capt. Louis H. Stokes and Col. Charles Overstreet on Mar. 1, 1949). SERVICE CEILING: Over 40,000 ft. RANGE: Tactical radius over 800 mi.

REMARKS

The B-45 was the first four-jet plane to fly in United States. The four jets are arranged in pairs in single nacelles on each wing. The engines are located entirely ahead of the leading edge of the wing. The only protuberance is the plastic bubble covering the pilot and co-pilot, who sit in tandem in a pressurized cockpit.

There are two other crew members. The pilot gets a 95 percent assist from hydraulic boost action on the elevator, aileron, and rudder controls.

The Air Force has ordered 139 B-45's, 96 in 1947 and 43 in 1948 (includes 33 RB-45C, a reconnaissance version). There was a contract for 51 B-45's in 1949, but the contract was cancelled Jan. 12, 1949. Production continued on prior orders. All other data is classified.

**Carrier-based North American AJ-1**

## TORNADO

**TYPE:** Carrier-based bomber. **DESIGNATION:** (N) AJ-1.

### DATA

**POWERPLANT:** Two Pratt and Whitney Double Wasp and one G. E.-Allison turbo-jet. **PROPELLERS:** Hamilton Standard, 4-bladed. **GEAR:** Tricycle, retractable.

### REMARKS

The AJ-1 was designed as a carrier-based bomber for atomic bomb duty. Its jet engine is located in the tail of the fuselage, and can be cut in over the target. The outer wing panels fold inboard and vertical tail section folds horizontally for shipboard accommodation. Crew of three rides in pressurized cabin. Initial procurement called for North American to build 40. Additional data is classified.

**News Item**

"This is the day on which the realization of Tennyson's version of 'the nations' airy navies grappling in the cental blue' becomes legally permissible. Mr. Julius Chambers calls attention to the fact that the Hague Conference forbade aerial devices for throwing or dropping explosives for a period of five years from July 29, 1899. The closed season expires today.

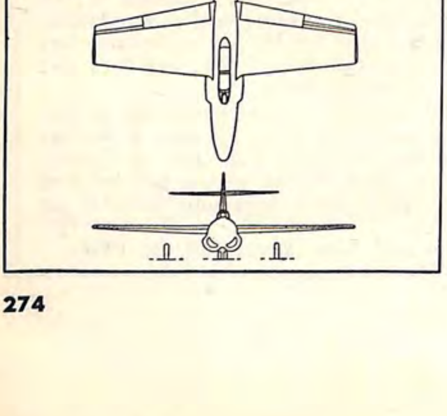
"It would not be surprising to find that a people as resourceful and as hospitable to novel ideas as the Japanese had something ready to take advantage of the occasion. Even a machine no further developed than one of Santos-Dumont's airships would be able to sail over Port Arthur with a few hundred pounds of (literally) high explosives and make it seem extremely desirable for the Russian fleet to get out of the harbor."

—*World*, New York, July 29, 1904

# NORTHROP AIRCRAFT, INC.

Hawthorne, Cal.

**Northrop's "blue ribbon" all-weather fighter, Scorpion**



**TYPE:** Fighter. **DESIGNATION:** (AF) F-89.

**DATA**

**POWERPLANT:** Two General Electric J-47 turbojets carried in separate nacelles on the lower section of the fuselage, each rated at 5,200 lb. thrust. **GEAR:** Tricycle retractable.

**SPECS**

**SPAN:** Approximately 50 ft. **LENGTH:** Approximately 50 ft. **HEIGHT:** Approximately 15 ft. **GROSS WEIGHT:** Over 30,000 lb.

**PERFORMANCE**

**MAXIMUM SPEED:** Over 600 mph. **OPERATIONAL CEILING:** Over 40,000 ft.

**REMARKS**

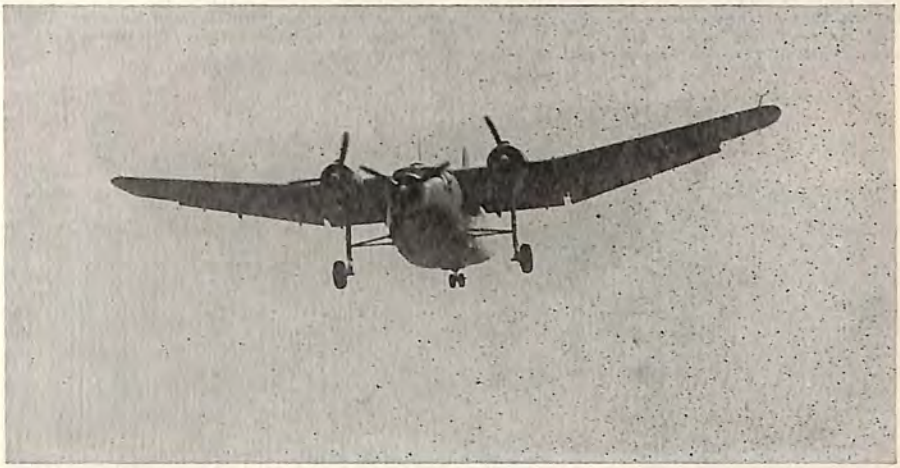
Known as the "all-weather interceptor," the Scorpion was designed as a twin-jet successor to the Black Widow, F-61. In addition to the pilot, a radar operator is carried to handle the complex electronic equipment used for search missions. The cockpit is equipped with ejection seats, is pressurized, and has a power-operated canopy.

The Scorpion's thin wing prevented the installation of regular spoilers, so a split aileron was designed. Known as "decelerons," the lower portion is split and can be used as a dive or maneuvering flap. The regular inboard flap panels are the slotted type.

The name, Scorpion, was derived from the appearance of the tail section, which is swept-up to keep it away from wing turbulence and the hot jet exhaust.

The first flight was made Aug. 16, 1948, and on Jan. 17, 1949, Northrop was awarded a contract for 48. Project Engineers were C. W. Harris and W. R. Clay; Test Pilot, Fred Bretcher.

All other data is classified.



**Northrop Raider's first flight**

## RAIDER

TYPE: There are two versions of this model. One is the light assault transport (A model), primarily a cargo carrier and secondarily for personnel. The other version is the Arctic rescue type (B model). DESIGNATION: (AF) C-125.

### DATA

POWERPLANT: Three Wright R-1820-99 engines. Normal rated hp, 1,000 at 2,300 rpm, sea level to 5,200 ft. Hp at take-off, 1,200 at 2,500 rpm. 1,300 hp at 2,600 rpm, sea level to 1,800 ft. Engine supercharger (impeller) gear ratio, 7 to 1. PROPELLERS: Three-bladed, full-feathering, reversible. FLAPS: Double-slotted trailing edge type operated hydraulically. GEAR: Fixed main gear and dual swivel tail wheel.

### SPECS

SPAN: 86 ft. 6.4 in. LENGTH: 67 ft. 1 in. HEIGHT: 23 ft. 1.8 in. WEIGHTS: EMPTY, 26,690 lb.; MAXIMUM TAKE-OFF, 38,000 lb.; MAXIMUM LANDING, 38,000 lb.; USEFUL LOAD, 11,310 lb.

### PERFORMANCE

SPEEDS: MAXIMUM CRUISE, 201 mph at 5,200 ft. and 35,400 lb. gross; CRUISING, 169 mph at 5,200 lb., 36,000 lb. gross, and 70 percent maximum power. STALLING: 71 mph with full flaps and 38,000 lb.; 69 mph with full flaps and 35,400 lb. RATE OF CLIMB: 1,155 ft. per min. at take-off power and 35,400 lb.; 825 ft. per min. at maximum take-off power and 35,400 lb. SERVICE CEILING: 15,200 ft. with 36,000 lb.; 6,250 ft. with two engines and 35,400 lb.

### REMARKS

This three-engine, all-metal monoplane was designed specifically for rugged and economical operations on short and unimproved fields. The ground run for take-off with 29,410 lb. at sea level is 825 ft.; to clear a 50 ft. obstacle with the same load, 1,310 ft. By using the reverse thrust propellers and brakes, the ground run for landing at sea level with a gross of 35,400 lb. is only 430 ft.; without reversing the props, 1,415 ft. A 50 ft. obstacle can be cleared and the plane set down in 920 ft. at sea level.

As an assault transport, the Raider will take over most of the work previously performed by gliders. Landings will be made in advanced areas, personnel or cargo discharged, and a take-off made from the same field. The basic gear is designed to take the load of landing in rutted terrain where solid obstructions up to six inches high might be found, and in case of

**soft ground a second wheel can be installed on each strut to distribute the weight over a larger area. Sixteen double seats attached to cargo tie-down fittings can be used to carry troops.**

**Cargo facilities include a ramp door which allows for loading military vehicles and liaison planes measuring up to 9 ft. wide by 6 ft. 6 in. high by 24 ft. long. Added height is available by jacking up the rear end of the fuselage. An auxiliary door, 5 ft. 6 in. by 3 ft. 5½ in., is installed within the large ramp door. It opens inward and can be used to drop personnel or cargo while in flight. There is another door on the left side of the fuselage beneath the wing which is used for loading personnel or light cargo. Part of this door drops down to make steps, and can also be jettisoned.**

**Another cargo feature is the location of the crew access hatch in such a way that a rope or cable can be strung longitudinally through the plane and cargo pulled up the ramp door by outside power in front of the plane.**

**Dimensions of the cargo area are: maximum depth, 10 ft. 10 in., maximum width, 10 ft. 8 in., total length, 39.03 ft., length forward of ramp loading door, 24 ft. Thirty-two passengers can be carried.**

**Northrop has 23 Raiders on order for the Air Force and has also licensed Canadair, Ltd., of Montreal, to manufacture the plane for the world market.**

## PIASECKI HELICOPTER CORP.

Morton, Pa.

**Navy shipboard helicopter, Piasecki Retriever**

**TYPE: Helicopter. DESIGNATION: (N) HUP-1.**

**DATA**

**POWERPLANT: Continental R-975-34, 525 hp at takeoff. FUEL CAPACITY: 100 gal. GEAR: Tricycle.**

**SPECS**

**LENGTH: 31 ft. 7 in. HEIGHT: 12 ft. 6 in. WEIGHTS: EMPTY, 3,800 lb.; NORMAL GROSS, 5,350 lb.; OVERLOAD GROSS, 5,800 lb.**

**PERFORMANCE**

**SPEEDS AT SEA LEVEL: MAXIMUM, 130 mph; CRUISING, 110 mph. RATE OF CLIMB FULLY LOADED: Over 1,600 ft. 1st min. ABSOLUTE CEILING: 16,500 ft. RANGE: 400 mi.**

**REMARKS**

**The Retriever, a twin tandem rotor, was especially designed for shipboard operation. It is a 7-place all-metal strongly built machine that has withstood high "G" forces. During a test demonstration test pilot Jim Ryan looped the Retriever for the first maneuver of that kind performed by a helicopter. The model is now being built in quantity.**

**Another Piasecki model, the HRP Rescuer has been in service with the Navy, Marine Corps, and Coast Guard. This is no longer a production model, but is being replaced by the HRP-2, an improved all-metal version.**

# REPUBLIC AVIATION CORP.

Farmingdale, L. I., N. Y.


**F-84E, the latest Thunderjet**

## THUNDERJET

**TYPE: Fighter. DESIGNATION: (AF) F-84.**

**DATA**

**POWERPLANT: Allison J-35-17, 5,000 lb. thrust. GEAR: Tricycle retractable.**

**SPECS**

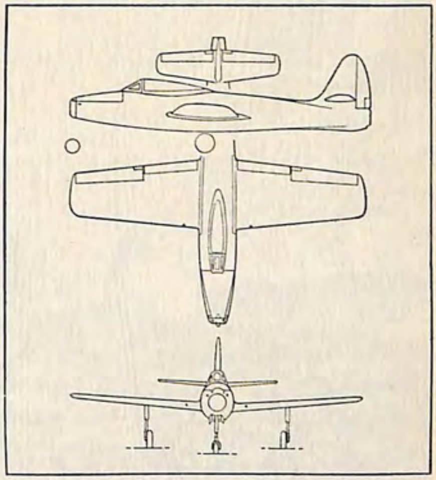
**SPAN: 37 ft. LENGTH: 37 ft. HEIGHT: 12 ft. 10 in. WEIGHTS: EMPTY, 9,000 lb.; GROSS, 18,000 lb.**

**PERFORMANCE**

**MAXIMUM SPEED: Over 625 mph. SERVICE CEILING: Over 45,000 ft. RANGE: Over 850 mi. radius.**

**REMARKS**

**The F-84E, the newest model of the Thunderjet series, has a 25 percent increase in power over previous models. Improved maintenance and accessibility features have been added including a retractable battery lift, hinged gun deck, guide rails, snap-on electrical leads, throttle disconnects for rapid engine change, and a number of new access doors bringing the total up to over 180. The wing tip tanks have aerodynamic fins allowing the plane to go through maneuvers usually restricted when carrying external tanks. The nose of the E Model has been lengthened by 15 in. to give the pilot a larger cockpit than he had in the previous models. The cockpit also has a pressurization and air-conditioning system.**



**Republic, working with the NACA, has developed flush side inlet ducts for the F-84. The**

development, intended to allow the installation of radar equipment in the nose section, has been achieved with no performance loss to the plane according to the engineers and the pilots who have flown it. There are no definite plans for its use on present 84's now on order.

Firepower includes six 50-cal. machine guns, eight 5 in. HVAR (high velocity aircraft rockets), two thousand lb. of bombs, two 100 or 500 lb. fragmentation clusters, aircraft depth charges, incendiary bombs, and napalm tanks. Any combination of these can be used, depending on the mission. Rocket and bomb holders are either jettisonable or retractable. Rockets with a maximum velocity of more than 950 mph have been fired from a Thunderjet flying over 500 mph.

The Air Force has ordered 409 F-84E's. There is no current production on other Thunderjet models. All other data is classified.

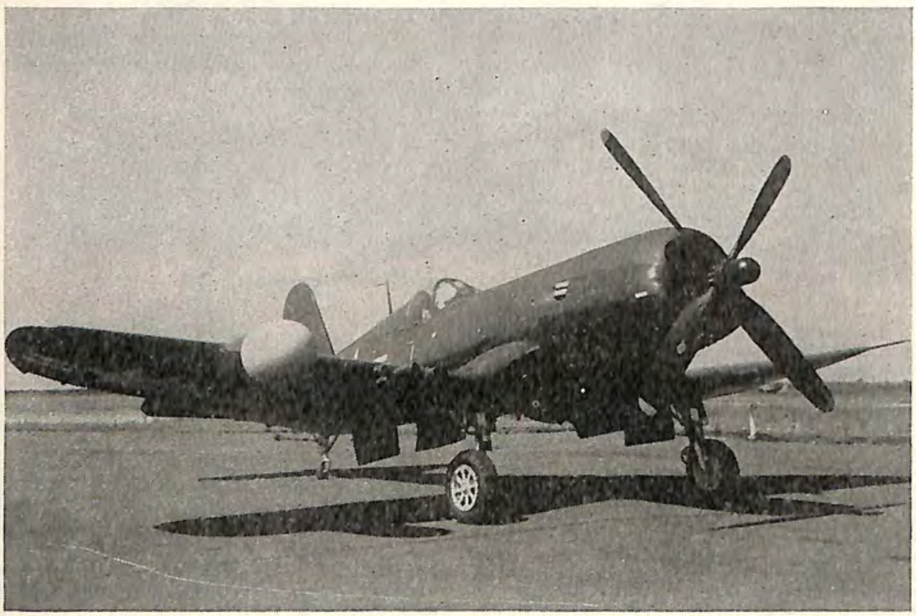
# SIKORSKY AIRCRAFT
## DIVISION OF UNITED AIRCRAFT CORP.
Bridgeport, Conn.

### H-5H

**TYPE:** Helicopter. **DESIGNATION:** (AF) H-5H, (N) H03S.

These are military versions of the S-51. (See Civil Section.) Modifications consist of canvas seats, and minor changes for special work. The basic specifications are the same. The Air Force had sixteen on order from funds prior to 1949.

# UNITED AIRCRAFT CORP.
## CHANCE VOUGHT AIRCRAFT DIVISION
Dallas, Tex.



**The new F4U-5**

## CORSAIR

**TYPE: Fighter. DESIGNATION: (N) F4U-5.**

**DATA**

**POWERPLANT: Pratt and Whitney R-2800-32W, 2,300 hp at take-off. FUEL CAPACITY: 234 gal. OIL CAPACITY: 33 gal. PROPELLER: Hamilton Standard. FLAPS: Slotted, 50 degree travel. GEAR: Conventional retractable.**

**SPECS**

**SPAN: 40 ft. 11¾ in. LENGTH: 34 ft. 6¼ in. HEIGHT: 14 ft. 9½ in. WEIGHTS: EMPTY, 10,099 lb.; GROSS, 13,297 lb.; USEFUL LOAD, 3,198 lb. WING LOADING, 42.35 lb. per sq. ft. POWER LOADING, 8.86 lb. per bhp.**

**PERFORMANCE**

**SPEEDS AT SEA LEVEL: MAXIMUM, 379 mph; CRUISING, 227 mph; STALLING, 110 mph. RATE OF CLIMB: 4,340 ft. per min. SERVICE CEILING: 41,100 ft. RANGE: 1,270 mi.**

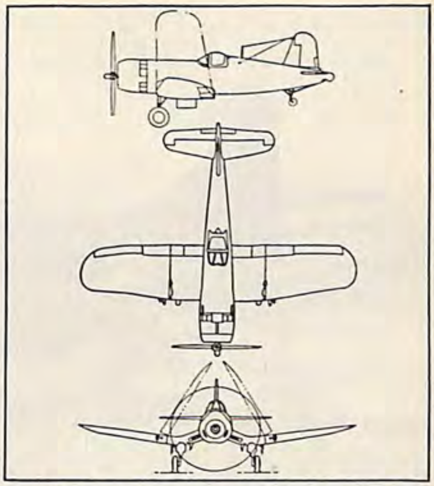
**REMARKS**

**The F4U is the oldest fighter-bomber in first line service with the Navy. The present model is the product of over 20,030 production changes since the F4U-1 made its first appearance back in 1938. The first Corsair was the O2U-1 built for the Navy in 1926. Corsair production continued up through 1934 with the O3U-6 being the last model until 1938 when the F4U, with an inverted gull wing, was built.**

**The present model, the F4U-5, can be used as a fighter equipped with 20 mm guns and rockets, or as a bomber carrying one bomb externally.**

**Major changes over the F4U-4 are: a new engine cowl with air-intake scoops at "four o'clock" and "eight o'clock" positions, metal outer panels, and a large access door on the right side of the fuselage just aft of the pilot's seat. Spring tabs for elevator and rudder control is also a new feature. Access to the single-place cockpit is by a telescoping step on the right side of the fuselage and below the regular folding step. Both steps are cable-connected to the tail wheel and are automatically operated with the tail wheel. Trimming has been simplified by the use of an electric controller unit and indicator, and the use of a spring mechanism on the rudder and elevator which automatically deflects the tabs to assist in control operation when the loads reach certain values.**

**Chance Vought was working on two contracts for 180 F4U-5's at year's end. All other data is classified.**



### News Item

"In the North River, off 79th street, yesterday afternoon, two hundred New Yorkers saw a thrilling spectacle in ballooning.

"From the roadway leading to the dock, after a half-dozen failures, a creaking fragile aeroplane shot into the air, as if propelled from the muzzle of a cannon. In the center, enmeshed in piano-wire girders and guys and a network of frail bamboo poles, clung the young aeronaut, C. K. Hamilton.

"With hands and legs outspread, like a monkey, man and machine went up, propelled by nothing; but drawn by a rope attached to a tug, which far out in the river was heading downstream, against the wind as fast as its screw could send it.

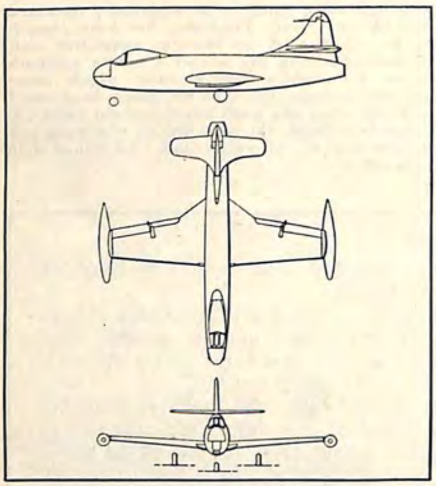
"Up went the aeroplane to the height of 300 feet, rocking like a kite in a gale.

"As the machine dived to the right the lad, in the meshes of the aeroplane, jumped to the left and vice versa.

"The tug was obliged to slow up, because a ferry-boat got in its course; and the aeroplane gradually settled into the waters of the river. The launch Arcadia rescued the coatless and hatless Hamilton, just as his machine was sinking under his weight. Had Hamilton missed one jump, or mis-timed one, there would, probably, have been a tragedy."

—*Journal,* Ithaca, N. Y., Oct. 23, 1905


**The Pirate, Chance Vought's first jet**



**TYPE:** Fighter. **DESIGNATION:** (N) F6U-1.

**DATA**

**POWERPLANT:** Westinghouse J-34-WE-30A jet. **FUEL CAPACITY:** 700 gal. **OIL CAPACITY:** 5 gal. **GEAR:** Tricycle retractable. **FLAPS:** Slotted, 30 degrees travel.

**SPECS**

**SPAN:** 32 ft. 10 in. **LENGTH:** 37 ft. 8 in. **HEIGHT:** 12 ft. 11 in. **WEIGHTS:** EMPTY, 7,560 lb.; GROSS, 11,300 lb.; USEFUL LOAD, 3,740 lb. **WING LOADING**, 55 lb. per sq. ft. **POWER LOADING:** 3.6 lb. 1 lb. thrust.

**PERFORMANCE**

**SPEEDS AT SEA LEVEL:** MAXIMUM, 550 plus mph; CRUISING, 290 mph; STALLING, 91 mph. **RATE OF CLIMB:** 7,800 ft. per min. **SERVICE CEILING:** 38,000 plus ft. per min.

**REMARKS**

The F6U-1 is Chance Vought's first entry in the jet field. The original X Model used the conventional axial flow jet unit, and later on was modified to use an afterburner which became the first installation of its kind in this country. This added power can be used for

**Prediction**

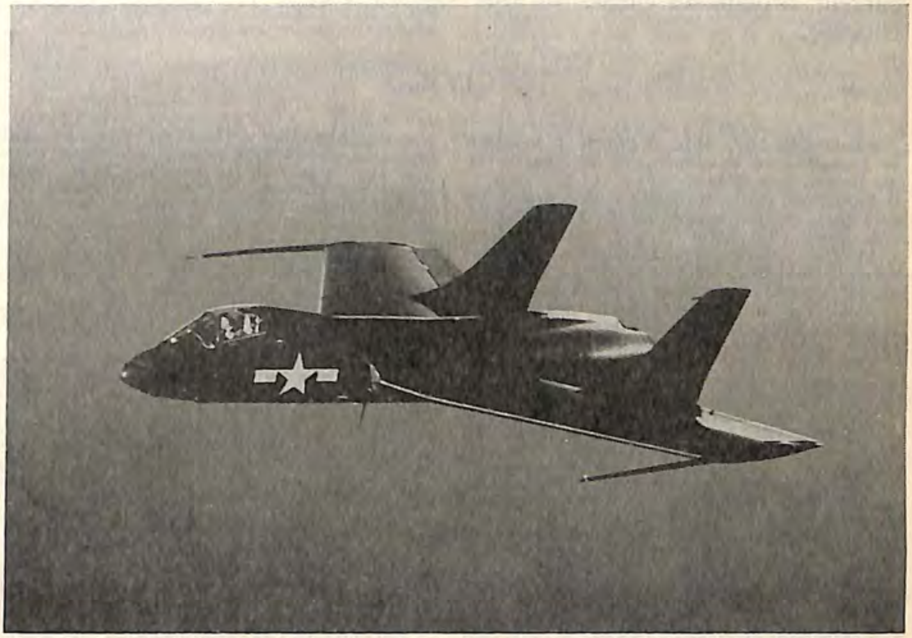
"The day the airship went circulating about the Monument and afterward over the Capitol, Champ Clark of Missouri remarked: 'That means the end of war. Fighting with those kinds of machines will become so dangerous that the civilized countries of the world will have to stop war. A fellow with dynamite could sail over a fort or a city in one of those things and destroy either.'"

—*Times,* Buffalo, N. Y., Dec. 30, 1906

combat, take-off, and wave-off operations. The entire powerplant can be removed through a belly hatch.

Metalite, a new structural material that can be molded in large units, is used on the wings, cockpit area of the fuselage, and the stabilizer. Its two thin sheets of high-strength aluminum alloy bonded to a balsa wood core is lighter than the usual metal covering, and is also claimed to lick the "wrinkling" problem.

The first production model of the Pirate flew from the Carswell Air Force base in Fort Worth, Tex., during July, 1949. There was a contract for 30 as of Nov. 1, 1949.



**Chance Vought twin-jet Cutlass**

TYPE: Fighter. DESIGNATION: (N) F7U.

DATA

POWERPLANT: Two Westinghouse J-34-22 turbo jets. GEAR: Tricycle, retractable, 15 in. stroke.

REMARKS

This 600-mph-plus twin engine Navy carrier-based jet fighter started on the design board in Oct., 1945, and by July 1946, the Navy had approved construction of three X models. On Sept. 29, 1948, Bob Baker, Chance Vought's chief test pilot, made the first flight.

There are many features of this plane that do not conform to the conventional type. Probably the most noticeable are two vertical tails and the absence of a horizontal tail surface, replaced by "ailavators" which act as elevator and ailerons at the same time. "Slats" are used instead of flaps. They are located in the leading edge of the wing and become operative when pushed forward. Fins and rudders are conventional.

All controls are hydraulically operated. This system is more than a boost, since all that is required of the pilot is essentially a signal to complete control movement. This almost eliminated any "feel" control a pilot experiences in a conventional set-up, so a system was designed to simulate ordinary control forces.

After trying to place the engines one on top of the other, one in each wing, and several other arrangements, Chief Engineer Paul S. Baker and his group came up with the solution by spreading the fuselage laterally to house the twin jets. This gives a short path for the air flow—always a desirable characteristic for a jet engine. Afterburners were installed for additional power.

The wing configuration of the Cutlass combines swept wings with a low aspect ratio which tends to overcome negative control characteristics. These larger-than-usual wings give the plane a decided maneuverability advantage.

An ejection pilot's seat is used for quick bail out. Both pilot and seat are ejected at a rate calculated to clear all parts of the plane, and during the final descent the seat is jettisoned for a normal parachute landing.

All other data is classified.

# PLANES IN USE

The following lists of civil and military planes include those no longer in production. The number of approved models is too extensive for complete listing so only some of those better-known ones are included. For current production planes in use, see PLANES IN PRODUCTION Chapter.

## CIVIL

AERONCA, 50F, 50L. 2-PCLM, 1 Franklin or Lycoming 50 hp. Span, 36 ft. Length, 21 ft. Height, 6 ft. 3 in.

AERONCA, 50C. 2-PCLM, 1 Continental 50 hp. Span, 36 ft. Length, 21 ft. 1 in. Height, 6 ft. 3 in.

AERONCA, 65TC, TL, TF. 2-PCLM, 1 Continental, Franklin, or Lycoming 65 hp. Span, 35 ft. Length, 22 ft. 4 in. Height, 9 ft. 5 in.

AERONCA, 65LB. 2-PCLM, 1 Lycoming 65 hp. Span, 36 ft. Length, 20 ft. 10 in. Height, 9 ft.

AERONCA, 0-58 (L-3B). 2-PCLM, 1 Continental 65 hp. Span, 35 ft. Length, 21 ft. 10 in. Height, 9 ft. 1 in.

AKRON (See FUNK)

BEECHCRAFT, E17-B. 5-PCLB, 1 Jacobs 285 hp. Span, 32 ft. Length, 24 ft. 5 in. Height, 8 ft. 2 in.

BEECHCRAFT, F17-D. 5-PCLB, 1 Jacobs 330 hp. Span, 32 ft. Length, 25 ft. 11 in. Height, 8 ft.

BEECHCRAFT, D17-A. 5-PCLB, 1 Wright 350 hp. Span, 32 ft. Length, 24 ft. 11 in. Height, 8 ft.

BEECHCRAFT, D17-R. 5-PCLB, 1 Wright 450 hp. Span, 32 ft. Length, 24 ft. 11 in. Height, 8 ft.

BEECHCRAFT, D17-S. 5-PCLB, 1 Pratt and Whitney Wasp Jr. 450 hp. Span, 32 ft. Length, 25 ft. 11 in.

BEECHCRAFT, 18A. 8-10-PCLM, 2 Wright 350 hp each. Span, 47 ft. 8 in. Length, 34 ft. 3 in. Height, 9 ft. 5 in.

BEECHCRAFT, 18R. 8-10-PCLM, 2 Wright 450 hp each. Span, 47 ft. 8 in. Length, 34 ft. 3 in. Height, 9 ft. 5 in.

BEECHCRAFT, 18S, C18S. 6-8-PCLM. 2 Pratt and Whitney 450 hp each. Span, 47 ft. 8 in. Length, 34 ft. 3 in. Height, 9 ft. 5 in.

BELL 47B helicopter. 2-PCLH, 1 Franklin 178 hp.

BELLANCA (Cruisair), 14-9. 3-PCLM, 1 Rearwin LeBlond, or Ken-Royce 90 hp. Span, 34 ft. 2 in. Length, 21 ft. 3 in. Height, 6 ft. 3 in.

BOEING, A75, A75L3, E75. 2-POLB. 1 Lycoming 225 hp. Span, 32 ft. 2 in. Length, 24 ft. 9 in. Height, 9 ft. 5 in.

BOEING, B75N1, D75N1. 2-POLB, 1 Continental 220 hp. Span, 32 ft. 2 in. Length, 24 ft. 9 in. Height, 9 ft. 5 in.

CESSNA, C-165. 4-PCLM, 1 Warner 165 hp. Span, 34 ft. 2 in. Length, 25 ft. Height, 7 ft.

CESSNA, T-50. 5-PCLM, 2 Jacobs 225 hp. Span, 41 ft. 11 in. Length, 32 ft. 9 in. Height, 9 ft. 11 in.

COMMONWEALTH (See Rearwin.)

CONSOLIDATED VULTEE, BT-13A -13B, SNV-1 -2. 2-PCLM, 1 Pratt and Whitney R-985 450 hp. Span, 42 ft. Length, 28 ft. 10 in. Height, 12 ft. 4 in.

CONSOLIDATED VULTEE, B-15. 2-PCLM, 1 Wright 420 hp. Span, 42 ft. Length, 28 ft. Height, 12 ft. 4 in.

CONSOLIDATED VULTEE, L-5. 2-PCLM, 1 Lycoming 185 hp. Span, 34 ft. Length, 24 ft. 1 in. Height, 7 ft. 1 in.

CULVER, V. 2-PCLM, 1 Continental 85 hp. Span, 29 ft. Length, 21 ft. 5 in. Height, 6 ft. 9½ in.

DOUGLAS, DC-3. 21-PCLM, 2 Pratt and Whitney 1,200 hp or 2 Wright 1,000 hp each. Span, 95 ft. 6 in. Length, 63 ft. 9 in. Height, 17 ft.

DOUGLAS, C-54. 42-PCLM. 4 Pratt and Whitney 1,100 hp each. Span, 117 ft. 6 in. Length, 93 ft. 10 in. Height, 27 ft. 6 in.

ERCOUPE, 415-C, 415-CD. 2-PCLM, 1 Continental 75 hp. Span, 30 ft. Length, 20 ft. 9 in. Height, 5 ft. 11 in.

FAIRCHILD, M-62A (PT-19). 2-POLM, 1 Ranger 175 hp. Span, 36 ft. Length, 27 ft. 8 in. Height, 7 ft. 9 in.

FAIRCHILD, M-62A3. 2-POLM, 1 Ranger 200 hp. Span, 36 ft. Length, 27 ft. 8 in. Height, 7 ft. 6 in.

FAIRCHILD, 24W-41. 4-PCLM, 1 Warner 145 hp. Span, 36 ft. 4 in. Length, 23 ft. 9 in. Height, 8 ft.

FAIRCHILD, 24W-41A. 4-PCLM, 1 Warner 175 hp. Span, 36 ft. 4 in. Length, 23 ft. 9 in. Height, 8 ft.

FAIRCHILD, 24 C8D. 3-PCLM, 1 Ranger or Warner 145 hp. Span, 36 ft. 4 in. Length, 23 ft. 9 in. Height, 7 ft. 3 in.

FAIRCHILD, 24G and 24J. 4-PCLM, 1 Warner 145 hp. Span, 36 ft. 4 in. Length, 23 ft. 9 in. Height, 7 ft. 3 in.

FAIRCHILD, 24R-46. 4-PCLM, 1 Ranger 175 hp. Span, 36 ft. 4 in. Length, 24 ft. 10 in. Height, 8 ft.

FLEET, 2. 2-POLB, 1 Kinner 100 hp. Span, 28 ft. Length, 21 ft. Height, 7 ft. 10 in.

FUNK, B75L. 2-PCLM, 1 Lycoming 75 hp. Span, 35 ft. Length, 20 ft. 5 in. Height, 6 ft.

FUNK, B85C. 2-PCLM. 1 Continental 85 hp. Span, 35 ft. Length, 20 ft. 1 in. Height, 6 ft. 1 in.

GLOBE SWIFT, GC-1A. 2-PCLM, 1 Continental 85 hp. Span, 29 ft. 4 in. Length, 19 ft. 7 in. Height, 6 ft. 2 in.

GRUMMAN (Widgeon), G44 and G44A. 4-PCAM, 2 Rangers 200 hp each. Span, 40 ft. Length, 31 ft. Height, 9 ft.

GRUMMAN, G-21A. 8-PCAM, 2 Pratt and Whitney Wasp Jr. 450 hp. each. Span, 49 ft.

Length, 38 ft. 4 in. Height, 12 ft.

HOWARD, DGA-18. 2-POLM, 1 Warner 125 hp. Span, 34 ft. Length, 24 ft. 6 in. Height, 7 ft. 3 in.

HOWARD, DGA-15P. 5-PCLM, 1 Pratt and Whitney Wasp Jr. 450 hp. Span, 38 ft. Length, 24 ft. 10 in. Height, 8 ft. 5 in.

HOWARD, DGA-15J. 5-PCLM, 1 Jacobs 330 hp. Span, 38 ft. Length, 24 ft. 10 in. Height, 8 ft. 5 in.

HOWARD, DGA-15W. 5-PCLM, 1 Wright 350 hp. Span, 38 ft. Length, 24 ft. 10 in. Height, 8 ft. 5 in.

INTERSTATE (Cadet), S1B1. 2-PCLM, 1 Franklin 113 hp. Span, 35 ft. 8 in. Length, 23 ft. 5 in. Height, 7 ft. 3½ in.

LOCKHEED (Electra), 12A. 8-PCLM. 2 Pratt and Whitney Wasp Jr. 450 hp each. Span, 49 ft. 6 in. Length, 36 ft. 4 in. Height, 9 ft. 11 in.

LOCKHEED (Lodestar), 18-56. 17-PCLM. 2 Wright 600 hp each. Span, 65 ft. 6 in. Length, 49 ft. 9½ in. Height, 11 ft. 10½ in.

LUSCOMBE, 8A. 2-PCLM, 1 Continental 65 hp. Span, 35 ft. Length, 20 ft. Height, 5 ft. 10 in.

LUSCOMBE, 8-B1. 2-PCLM, 1 Lycoming 65 hp. Span, 35 ft. Length, 20 ft. Height, 5 ft. 10 in.

LUSCOMBE, 8C and 8D. 2-PCLM, 1 Continental 75 hp. Span 35 ft. Length, 20 ft. Height, 5 ft. 10 in.

MEYERS, OTW 145. 2-POLB, 1 Warner 145 hp. Span, 30 ft. Length, 22 ft. 8 in. Height, 8 ft. 6 in.

MONOCOUPE, 90. 2-PCLM, 1 Lambert 90 hp. Span, 32 ft. Length, 22 ft. 2 in. Height, 8 ft. 1 in.

MONOCOUPE, 90-AF. 2-PCLM, 1 Franklin 90 hp. Span, 32 ft. Length, 25 ft. 6 in. Height, 6 ft. 10 in.

NORTH AMERICAN, AT-6 (SNJ). 1 Pratt and Whitney 600 hp. Span, 42 ft. Length, 29 ft.

PIPER (Cub), J2. 2-PCLM, 1 Continental 40 hp. Span, 35 ft. 2½ in. Length, 22 ft. 6 in. Height, 6 ft. 8 in.

PIPER (Cub), J3. 2-PCLM, 1 Continental 40 hp. Span, 35 ft. 2½ in. Length, 22 ft. 6 in. Height, 7 ft. 7 in.

PIPER (Cub), J3. 2-PCLM, 1 Continental, Franklin, or Lycoming 65 hp. Span, 35 ft. 2½ in. Length, 22 ft. 3 in. Height, 6 ft. 8 in.

PIPER (Cub), J4. 2-PCLM, 1 Continental, Franklin, or Lycoming 75 hp. Span, 36 ft. 2 in. Length, 22 ft. 6 in. Height, 6 ft. 10 in.

PIPER (Cub Cruiser), J5. 3-PCLM, 1 Continental or Lycoming 75 hp. Span, 35 ft. 5½ in. Length, 22 ft. 6 in. Height, 6 ft. 10 in.

PIPER (Super Cruiser), J5-C. 3-PCLM, 1 Lycoming 100 hp. Span, 35 ft. 5½ in. Length, 22 ft. 6 in. Height, 6 ft. 10 in.

PORTERFIELD, CP-55. 2-PCLM, 1 Continental 55 hp. Span, 34 ft. 9 in. Length, 22 ft. 4½ in. Height, 7 ft.

PORTERFIELD, CP-65, LP-65, and FP-65. 2-PCLM, 1 Continental, Franklin, or Lycoming 65 hp. Span, 34 ft. 9 in. Length, 22 ft. 4½ in. Height, 7 ft.

REARWIN (Skyranger), 185. 2-PCLM, 1 Continental 85 hp. Span 34 ft. Length, 21 ft. 5 in. Height, 6 ft. 7 in.

REARWIN (Cloudester), 8135. 2-3-PCLM, 1 Ken-Royce 120 hp. Span, 34 ft. 1¾ in. Length, 21 ft. 6 in. Height, 7 ft. 4 in.

REARWIN (Sportster), 7000. 2-PCLM, 1 Ken-Royce 70 hp. Span, 35 ft. Length, 22 ft. 3 in. Height, 6 ft. 9 in.

REARWIN, 175. 2-PCLM, 1 Continental 75 hp. Span, 34 ft. Length, 21 ft. 9 in. Height, 6 ft. 7 in.

REPUBLIC (Seabee), RC-3. 4-PCAM, 1 Franklin 215 hp. Span, 37 ft. 8 in. Length, 28 ft. Height, 9 ft. 7 in.

RYAN, ST-3. 2-POLM, 1 Kinner, 125 or 160 hp; or Menasco, 125 or 150 hp. Span, 30 ft. 1 in. Length, 22 ft. 5 in. Height, 7 ft. 2 in.

STEARMAN, PT-17. 2-POLB, 1 Continental 220 hp. Wing area, 297.6 sq. ft.

STINSON, SM-8A. 4-PCLM, 1 Lycoming 215 hp. Span, 41 ft. 8 in. Length, 29 ft. Height, 8 ft. 9 in.

STINSON, SR9C and SR10C (Reliant), 5-PCLM, 1 Lycoming 260 hp. Span, 41 ft. 10½ in.

STINSON, 10, HW75. 3-PCLM, 1 Continental 80 hp. Span, 34 ft. Length, 22 ft. 2 in. Height, 7 ft. 2 in.

STINSON, 10A (Voyager), 3-PCLM, 1 Franklin 90 hp. Span, 34 ft. Length, 21 ft. 8 in. Height, 6 ft. 6 in.

STINSON, 108 and 108-1 (Voyager). 4-PCLM, 1 Franklin 150 hp. Span, 34 ft. Length, 24 ft. 6 in. Height, 7 ft.

STINSON, 108-2 (Voyager). 4-PCLM, 1 Franklin 165 hp. Span, 34 ft. Length, 25 ft. 2 in. Height, 7 ft. 6 in.

STINSON, AT-19. 3-PCLM, 1 Lycoming 295 hp. Span, 41 ft. 10½ in. Length, 25 ft. 6 in. Height, 9 ft. 2½ in.

TAYLORCRAFT, A. 2-PCLM, 1 Continental 40 hp. Span, 36 ft. Length, 22 ft. Height, 6 ft. 8 in.

TAYLORCRAFT, BC, BF, and BL. 2-PCLM, 1 Continental, Franklin, or Lycoming 50 hp. Span, 36 ft. Length, 22 ft. Height, 6 ft. 8 in.

TAYLORCRAFT, D Series. 2-PCLM, 1 Continental, Franklin, or Lycoming 65 hp. Span, 35 ft. 5¼ in. Length, 22 ft. 9 in. Height, 7 ft.

TIMM, PT-220. 2-POLM, 1 Continental 220 hp. Span, 36 ft. Length, 24 ft. 6½ in. Height, 10 ft. 8 in.

WACO, S Series. 4-5-PCLM, 1 Jacobs 225 or 285 hp or Continental 240 or 250 hp. Span, 33 ft. 3 in. Length, 25 ft. 3 in. Height, 8 ft. 6 in.

WACO, UPF-7. 2-POLM. 1 Continental 220 hp. Span, 30 ft. Length, 23 ft. Height, 8 ft. 5 in.

## AIR FORCE

### BOMBERS

B-17, Boeing Flying Fortress. 4 Pratt and Whitney R-1820, 1,200 hp. Span, 103 ft. 9 in. Length, 74 ft. 9 in. Height 19 ft. 1 in.

B-25, North American Mitchell. 2 Wright R-2600, 1,700 hp. Span, 65 ft. 6 in. Length, 54 ft. 1 in. Height, 14 ft. 10 in.

B-26, Douglas Invader (formerly A-26). 2

Pratt and Whitney R-2800, 2,000 hp. Span, 70 ft. Length, 51 ft. 2 in. Height, 18 ft. 6 in.

B-29, Boeing Superfort. 4 Wright R-3350, 2,200 hp. Span, 141 ft. 3 in. Length, 99 ft. Height, 27 ft. 9 in.

FIGHTERS

F-47, Republic Thunderbolt. 1 Pratt and Whitney R-2800, 2,100 hp. Span, 42 ft. 7 in. Length, 36 ft. 1 in. Height, 14 ft. 7 in.

F-51, North American Mustang. 1 Rolls Merlin 1,490 hp. Span, 37 ft. Length, 33 ft. 3 in. Height, 13 ft. 8 in.

F-61, Northrop Black Widow. 2 Pratt and Whitney R-2800, 2,000 hp. Span, 66 ft. 9 in. Length, 49 ft. 7 in. Height, 14 ft. 8 in.

F-82, North American Twin Mustang. 2 Allison 1,500 hp. Span, 51 ft. 3 in. Length, 38 ft. 1 in. Height, 13 ft.

TRAINERS

T-6, North American Texan (600 of these are being modernized for further service). 1 Pratt and Whitney R-1340, 600 hp. Span, 42 ft. Length, 29 ft.

LIAISON

L-5, Consolidated Vultee Sentinel. 1 Lycoming 190 hp. Span, 34 ft. Length, 24 ft. 1 in. Height, 7 ft. 11 in.

L-15, Boeing Scout (Ground Forces). 1 Lycoming O-290, 130 hp. Span, 40 ft. Length, 26 ft. 3 in. Height, 8 ft. 8 in.

L-16, Aeronca (Ground Forces). 1 Continental O-190. 85 hp. Span, 35 ft. 2 in. Length, 21 ft. 6 in. Height, 7 ft.

TRANSPORTS

C-45, Beechcraft Expeditor. 2 Pratt and Whitney R-985, 450 hp. Span, 47 ft. 8 in. Length, 34 ft. 3 in. Height, 9 ft. 8 in.

C-46, Curtiss Commando. 2 Pratt and Whitney R-2800, 1,000 hp each. Span, 108 ft. Length, 76 ft. 4 in. Height, 21 ft. 9 in.

C-47, Douglas Skytrain. 2 Pratt and Whitney R-1830, 1,200 hp. Span, 95 ft. 6 in. Length, 63 ft. 9 in. Height, 17 ft.

C-54, Douglas Skymaster. 4 Pratt and Whitney R-2000, 1,350 hp. Span, 117 ft. 6 in. Length, 93 ft. 10 in. Height, 27 ft. 6 in.

C-82, Fairchild Packet. 2 Pratt and Whitney R-2800, 2,000 hp each. Span, 106 ft. 5 in. Length, 77 ft. 1 in. Height, 26 ft. 4 in.

C-118, Douglas. 4 Pratt and Whitney R-2800, 2,100 hp each. Span, 117 ft. 6 in. Length, 107 ft. Height, 34 ft.

C-121, Lockheed Constellation. 4 Wright R-3350, 2,500 hp each. Span, 123 ft. 5 in. Length, 95 ft. 3 in. Height, 23 ft.

## NAVY

| | | |
|---|---|---|
| | FIGHTERS | |
| FH | McDonnell | Phantom |
| FJ | North American | Fury |
| F7F | Grumman | Tiger Cat |
| F6F | Grumman | Hellcat |
| | ATTACK | |
| SB2C | Curtiss | Helldiver |
| TBM | General Motors | Avenger |
| | PATROL | |
| PB4Y | Convair | Privateer |
| PB | Boeing | Fortress |
| P2B | Boeing | Super Fortress |
| PBM | Martin | Mariner |
| PBY | Convair | Catalina |
| PV | Lockheed | Harpoon |
| | TRANSPORT | |
| JRM | Martin | Mars |
| R4D | Douglas | Skytrain |
| R5D | Douglas | Skymaster |
| R5C | Curtiss | Commando |
| R5O | Lockheed | Lodestar |
| | UTILITY | |
| J2F | Grumman | Duck |
| JRF | Grumman | Goose |
| JRB | Beech | Expediter |
| JD | Douglas | Invader |
| | TRAINING | |
| SNB | Beech | Navigator |
| SNJ | North American | Texan |
| N3N | Naval Aircraft Factory | |
| | OBSERVATION | |
| SC | Curtiss | Seahawk |
| OY | Convair | Sentinel |

In addition to the above planes there is another group, both civil and military, that has received attention in and out of aviation circles because of advanced design and/or other innovations. These are the ones not yet operational by reason of CAA certification tests to be run or completed for the civil models, or evaluation tests for the military. Some of these are listed below along with research models not intended as production types at this time.

AERO DESIGN AND ENGINEERING CORP. of Culver City, Cal., was putting their 5-7 place Aero Commander through CAA certification tests as we went to press. The plane was designed primarily for executive transport and small feeder-line operation. The prototype is powered with 2 Lycoming O-435-A, 190 hp engines. These will probably be replaced by 2 Lycoming GO-435-A with a 260 hp rating at takeoff. Fuel consumption is quoted at 20 gal. per hr. with a cruise of 185 mph at 10,000 ft. and 70 percent power, and an initial rate of climb for the first minute of 1,400 ft. Price is expected to be $30,000.

ANDERSON, GREENWOOD AND CO., Houston, Tex. The AG-14, a 2-place, side-by-side, pusher-type monoplane, is this company's contribution to the light plane field. Type certification tests are still being conducted with limited production slated for spring, 1950. The wing has been placed behind the cabin, allowing good forward visibility. Comfort features include a low-level sound cabin possible by the placement of the engine behind the cabin. A low-to-the-ground cabin floor easily accessible through large car-like doors should be a popular feature. The tail is carried on twin booms. The plane is essentially two-control without the use of a rudder although there is one installed. Powerplant is a Continental C-90, 95 hp at takeoff. Measured cruising speed on the prototype is over 110 mph and the top speed over 120. Estimated landing speed is 44 mph with flaps. Price has not been set.

AMERICAN HELICOPTER CO., INC., Los Angeles, Cal. This company's main project deals with the XA-5 Top Sergeant, powered with pulse jet engines at the rotor blade tips. The following general specifications apply; gross weight, 1,400 lb.; rotor diameter, 33 ft., powerplant, 2 AJ-8.75 pulse jet engines (American's design), maximum speed (estimated), 80 mph; endurance (estimated), 2½ hr. The company is working under an Air Force prime contract which calls for further research and development on the project.

BAUMANN AIRCRAFT CORP., Pacoima, Cal. The Baumann people plan to have their number one production model in the air about Mar. 1, 1950. The prototype of this 5-place monoplane first flew in June, 1947, and since has been undergoing further development. The plane is twin-engine powered with Continental C-145s as pushers, carries 5 people 155 mph (cruising) for 750 mi. Designed for light transport work, the Brigadier can carry a payload of 800 lb. with a 15 gal. per hr. fuel consumption. Gear is tricycle retractable, and like the flaps operates hydraulically. Price: $23,500 f.a.f. (See Piper Aircraft Corp. below.)

BEECH AIRCRAFT CORP., Wichita, Kan. In addition to its production models Beech is working on a Twin Bonanza, the Model 34 Twin Quad Transport, and has completed Model 45, the Mentor (USAF T-34) which is still in an evaluation stage.

The Twin Bonanza, Model 50, was designed primarily as a 5-place plane, but will be able to carry six on short hops. Preliminary estimates for this tricycle-gear monoplane indicate a cruising speed of over 180 mph at a range of 1,000 mi. with good single engine performance at full gross. The plane is powered with 2 GO-435 Lycoming engines rated at 260 hp. A single tailfin replaces the "Vee" tail of the single engine version. The first flight was early in Nov. Price is expected to be around $30,000.

Information on the Twin Quad is limited. The plane is still in an experimental stage and undergoing extensive testing. It is designed as a 20-passenger air carrier with four engines operating two propellers. It will be a high-wing monoplane with the familiar "Vee" tail configuration of the Bonanza.

The Mentor is an all-metal, 2-place, low-wing monoplane designed as a tandem trainer for the Air Force. As yet there has been no official word on a contract for this model. The 45 is powered with a Continental E-185-8 engine, grosses 2,650 lb., and has a cruise of 160 mph at 10,000 ft. Gear is tricycle retractable and flaps are NACA slotted with 30 degrees travel. The plane was announced publicly Dec. 11, 1948.

BELL AIRCRAFT CORP., Buffalo, N. Y. Four additional X-1's were being built during 1949 for the Air Force as a further development of the X-1 which had been designed to fly in the transonic and supersonic ranges. The X-1 has passed the speed of sound, and possibly flown close to 1,000 mph. It is powered with Reaction Motors' 6000 C4 liquid propellant rocket engine with a rated thrust at sea level of 6,000 lb. The new models will have an improved fuel system of increased capacity giving a higher range and speed. Bell is also building two X-2 supersonic planes for the Air Force and NACA. These have been designed for higher speeds and greater altitudes than those possible with even the improved version of the X-1.

The XH-15 is a 2-place liaison helicopter being developed under contract to the Air Force. It has a top speed of over 100 mph, a service ceiling of 20,000 ft., and a combat radius of 100 mi. Its 2-bladed rotor system has a diameter of 36 ft. 10 in. and is 36 ft. 10 in. long. Powerplant is a Continental XO-470-9 rated at 275 hp.

BOLLINGER AND KOPPEN Helioplane. This much-publicized plane was designed to move air-travel closer to the center of town. The 2-place design was dropped during the year but not before it was run through a series of tests that included clearing a five-story building 100 yards from the starting point. Included among the unconventional features is a large Aeromatic prop driven by a v-belt. Full-span slots and flaps are used. The plane is almost noiseless due to the large slow prop and an improved muffler system. Lateral control is by differential flap action with adverse yaw taken care of by an "automatic" rudder linked to the ailerons. The designers announced a 4-place model now in the design stage which will be ready in 1950.

CHASE AIRCRAFT CO., West Trenton, N. J. The Avitruc, XC-123, is a refinement of the C-122 (See Planes in Production). Powered by 2 Pratt and Whitney R-2800 rated at 2,400 hp each, it has a maximum speed of 247 mph, a cruise of 200 mph, and stalls at 82 mph. Gross weight is 45,800 lb., with a useful load of 21,008 lb. and a maximum payload of 8 tons. Gear is tricycle retractable. First delivery of this model to the Air Force was scheduled for the last quarter of 1949.

CONSOLIDATED VULTEE AIRCRAFT CORP., San Diego, Cal. The XF-92A, formerly Convair Model 7002, was undergoing flight tests during the year at Muroc Air Force Base, Cal. The plane was built to test the configuration of the Delta wing in the transonic and supersonic speed ranges. It uses "elevons" on the trailing edge of the wing for aileron and elevator action. An Allison J-33A-23 jet engine has been used with a rated 5,400 lb. thrust. Approximate dimensions are: span, 31 ft. 4 in.; length, 42 ft. 6 in.; height, 17 ft. 10 in.

Another Consolidated Vultee project still under wraps is the XB-46. It is powered by 4 General Electric J35 engines rated at 4,000 lb.

thrust each. Approximate dimensions are: span, 113 ft.; length, 106 ft.; height, 24 ft.

Although the XC-99 has been accepted by the Air Force and assigned to the Strategic Air Command for operational missions, the model still carries an experimental designation. Plans for further development or production had not been announced when we went to press. The XC-99 is akin to the B-36. It has a span of 230 ft., the same as the 36, but its 182 ft. 6 in. length makes it 19½ ft. longer. It has two decks and can carry 400 troops with combat equipment or more than 300 litter patients plus medical attendants and 5-man flight crew. Its six Pratt and Whitney pusher-type engines give it a total of 18,000 hp with a top speed of over 300 mph. During the year it lifted a record payload of 100,000 lb.

**DOMAN HELICOPTER, INC., Danbury, Conn.** The Doman company announced early in the year their plans for a 7-place utility helicopter. The new machine will be called the Pelican and designated LZ-2A by the company. Power will be a 245 hp Franklin engine. General configuration will be similar to most helicopters. A single four-bladed main rotor system is used with a tail rotor for directional control. Design gross is 3,200 lb. and useful load at least 1,400 lb. with a cruise of approximately 75 mph. Performance figures and weight calculations for the new utility model are based on results of more than a year's flight testing on the Doman LZ-1A which is a converted Air Force R-6 helicopter using the Doman dynamically-balanced rotor. Estimates call for a base price of around $20,000 with deliveries planned for 1950 pending CAA certification.

**DOUGLAS AIRCRAFT CO., INC., Santa Monica, Cal.** The new Douglas airfreighter, the DC-6A Liftmaster, made its first flight Sept. 29, 1949. It is 5 ft. longer than the passenger version DC-6 and can carry a 28,800 lb. payload on long hauls at 300 mph. The Liftmaster is powered by 4 Pratt and Whitney Double Wasp engines each rated at 2,400 hp (with water injection) at takeoff. Douglas started a sales flight with this model late in the year. See Chapter on the Industry.

Another Douglas development is the revival of the DC-3 as a Super DC-3. This is a conversion project with major differences between this and the old model being new engine installation, new wing design, an increase in speed, and greater seating capacity. See Chapter on the Industry.

**FAIRCHILD ENGINE AND AIRPLANE CORP., Hagerstown, Md.** A major development at Fairchild was design of the T-31 basic trainer. Originally planned for the Navy as the XNQ-1, the Air Force became interested, and conducted some evaluation tests on a borrowed Navy model, and on the strength of the results ordered 100. This was cancelled late in the year when the Air Force revised its trainer evaluation method.

The powerplant is a Lycoming R-680-13 rated at 295 hp at takeoff, giving the plane a cruising speed of 142 mph, a service ceiling of 19,500 ft., and a range of 900 mi. The Bureau of Aeronautics originally sponsored the T-31 safety cockpit which was designed to conform to standard instrument arrangements, making it easier for the student to move into more advanced planes with a minimum of transition time. One of the cockpit features is the method of identifying instruments with their functions. An example is the landing gear lever which has been made in the shape of a wheel.

Another in the Packet line is the Pack-Plane, a cargo carrier based on the trailer-truck principle. The plane will serve as the prime mover with a detachable pack serving as the cargo area. Design specifications include a 64,000 lb. gross, a useful load of 23,535 lb. and a cargo capacity of 2,700 lb. (See Chapter on the Industry.)

**GOODYEAR AIRCRAFT CORP., Akron, O.** Goodyear continued development work on small amphibians and during the latter part of the year came out with the 3-place GA-2B Duck. It carries type certificate number 784, but has not gone into large-scale production. Power is a Franklin 6A4-165B3 with a cruising speed of 108 mph at a gross of 2,300 lb.

**JAMIESON AIRCRAFT CO., Deland, Fla.** The 3-place all-metal Jupiter was about finished with its certification tests at the end of the year. Production is expected to start on orders all ready in as soon as CAA certification has been obtained. The plane was designed by C. M. Jamieson, formerly with Beech and Culver. Powered by a Lycoming O-235-C1, the Jupiter has a cruising speed of over 150 mph with a landing speed of "under 40 mph." In test the plane has left the ground after a run of 100 ft. with an initial rate of climb of 1,050 ft. per min. Gross weight is 1,600 lb. with a maximum payload of 630 lb. Wings are the folding type. Standard equipment includes: hydraulic brakes, generator, battery, navigation lights, landing lights, cabin heater, and two jump seats. The Jupiter is priced at $2,500.

**JOHNSON AIRCRAFT CORP., Tyler, Tex.** A new Johnson model called the Bullet appeared during the year. It is an all-metal, low-wing, 4-place monoplane powered with a Continental 185 hp engine. The plane grosses 2,300 lb. with a maximum payload of 1,050 lb., cruises 175-190 mph, and has a service ceiling of 13,000 ft. Range with normal fuel capacity is 730 mi. Standard equipment includes: battery, starter, generator, Hartzell Hydro-Selective propeller, Bendix VHF 2-way radio, landing lights, and primary blind flying instruments. Gear and flaps are operated hydraulically. Certification was not yet completed at the end of the year. Price at the factory, $4,995.

**KELLETT AIRCRAFT CORP.** Development continued on the XH-10 during the first part of the year. It had been delivered to the Air Force in June, 1948, for evaluation and returned to the company in July, 1949. The prototype was lost during testing maneuvers and as we went to press no other model had been built although the design was still active. The powerplant was 2 Continental R-975-15, rated at 525 hp. It had twin, 3-bladed, counter-rotating and intermeshing rotors. Present plans for further development and production had not been announced at year end.

**LOCKHEED AIRCRAFT CORP.** The XF-90 is a 35-degree swept-wing fighter designed as a penetration fighter. The twin-jet Westinghouse J-34's are arranged side-by-side in the fuselage. Span is 40 ft., length, 55 ft., and height, 15 ft. It has a gross weight of approximately 25,000 lb., making it one of the heaviest fighters ever built. Evaluation tests were still being conducted during the latter half of the year.

**GLENN L. MARTIN CO.,** Baltimore, Md. In addition to its regular production models Martin had the XP5M-1 Navy flying boat up for evaluation. Powered by 2 Curtiss-Wright R-3350 engines, it has a top speed of over 200 mph. An initial Navy production contract was announced Dec. 14, 1949. (See Chapter on the Industry.)

The Martin 51, another X model, made its appearance in the latter half of the year. It features sharply swept-back wings, tandem landing gear, and "T" shaped control surfaces. Power is supplied by 3 turbo-jet engines, 2 mounted on pylons on the lower sides of the fuselage, and the third in the rear of the fuselage. Wings have a span of approximately 55 ft., with a length of about 80 ft. (See Chapter on the Industry.)

The 3-place Martin bomber, XB-48, an older model than the 51, is powered with six General Electric J-35 engines each rated at 4,000 lb. thrust. Maximum speed is reported over 480 mph, with a service ceiling about 40,000 ft. The gear is dual wheel tandem for the main with an outrigger on each wing. Reported maximum gross is 102.600 lb. Dimensions: span, 108 ft. 4 in.; length, 85 ft. 9 in.; height, 27 ft. 6 in. Future plans had not been announced as we went to press.

**McDONNELL AIRCRAFT CORP.,** St. Louis, Mo. The twin-jet fighter the Voodoo (XF-88) was still undergoing evaluation tests by the Air Force as we went to press. Power is 2 Westinghouse J-34's with a static thrust of 3,000 lb., each, and it was designed to operate as a penetration fighter or bomber escort. Both the wing and tail assembly are swept back. Approximate dimensions are: Span, 40 ft.; length, 55 ft.; height, 15 ft. Evaluation tests were still being conducted at the end of the year.

**NORTHROP AIRCRAFT, INC.,** Hawthorne, Cal. The YB-49 Flying Wing is described by the Air Force as the "world's longest range jet aircraft." The 49 is powered by 8 TG-180 (J-35) turbojet engines which give it a speed in the 500 mph range. The plane grosses 213,000 lb., has a 172 ft. span and is 53 ft. 1 in. long. The Air Force is continuing to evaluate flying wing designs. (See Chapter on the Industry.)

Northrop also built the X-4, a research plane powered by 2 gas turbine jet engines. Dimensions: span, 25 ft.; length, 29 ft.; height, 15 ft. Its main purpose is to investigate the characteristics of the transonic range. (See Chapter on the Industry.)

**NORTH AMERICAN AVIATION, INC.,** Inglewood, Cal. The Air Force ordered two XF-93's for evaluation purposes. This plane is essentially the same as the F-86C except for a longer nose to house radar to make it an all-weather fighter.

**PIASECKI HELICOPTER CORP.,** Morton, Pa. The XH-16 is a large twin-engine utility-transport of Piasecki tandem rotor configuration under development for Air Force and Marines as a joint Air Force Navy project. It is a 40-place, all-metal construction with a detachable capsule. It can be used without capsule with low gear as a transport and long range air rescue unit and with high gear as a "flying crane."

**PIPER AIRCRAFT CORP.,** Lock Haven, Pa., is working on a production model of the Bauman 290. Major difference between this and the Baumann Model is the powerplant arrangement. The Piper version will be a tractor type with 2 190 hp Lycoming engines replacing the 125 hp Continentals in the prototype.

**REPUBLIC AVIATION CORP.** The XF-91 made its first flight May 9, 1949. It was designed for the Air Force as a high altitude interceptor. It is the first U. S. plane to use inverse wing taper. Both wings and tail surfaces are swept back. Length is over 45 ft. and span is about 30 ft. The main landing gear wheels are arranged in tandem, the two wheels under each wing placed one ahead of the other instead of in a parallel position. This allows for a smaller gear which can be accommodated in the thin wing.

# MILITARY AIRCRAFT DESIGNATIONS

## AIR FORCE

A—Amphibian (formerly Attack. Attack models now designated B or F).

B—Bombardment (includes light, medium, and heavy).

C—Cargo (UC designation for light transport no longer used).

F—Fighter (formerly P).

G—Glider.

H—Helicopter (formerly R).

L—Liaison (formerly O for observation).

Q—Target aircraft or drones.

R—Reconnaissance (formerly F).

S—Search and rescue.

T—Trainer (AT, BT, and PT no longer used).

X—Special research or experimental.

V—Used as staff administrative transport.

Y—Service test status. (The Y model is normally the production prototype. Although "hand-made," it is the aircraft which will be reproduced on the production line. Y models are put through service testing to collect information for tech orders, and pilot's operating manuals, and to determine performance under all possible flight conditions.)

## NAVY

**Naval aircraft are divided into types as follows:**

**V—Heavier-than-air (fixed wing).**
**H—Heavier-than-air (rotary wing).**
**K—Pilotless.**
**M—Guided missiles.**
**Z—Lighter-than-air.**

**The above types are subdivided into classes in accordance with their mission as follows:**

### HEAVIER-THAN-AIR (FIXED WING)

**VF—Fighter.**
**VA—Attack.**
**VP*—Patrol.**
**VO—Observation.**
**VR*—Transport.**
**VU—Utility.**
**VT—Training.**
**VG—Glider.**

### HEAVIER-THAN-AIR

**HH—Air-sea rescue.**
**HO—Observation.**
**HT—Training.**
**HU—Utility.**

### PILOTLESS AIRCRAFT

**KD—Aerial target.**

### GUIDED MISSILES

**AAM—Air to air.**
**ASA—Air to surface.**
**AUM—Air to underwater.**
**SAM—Surface to air.**
**SSM—Surface to surface.**
**SUM—Surface to underwater.**
**UAM—Underwater to air.**
**USM—Underwater to surface.**
**TV—Test vehicle.**

### LIGHTER-THAN-AIR

**ZP—Patrol and escort.**
**ZH—Search and rescue.**
**ZT—Training.**
**ZU—Utility.**

***For administrative purposes Class VP and VR aircraft are further classified into four-engine landplane, two-engine landplane, four-engine seaplane and two-engine seaplane and are identified by adding the letters HL, ML, and HS respectively to the basic class designation.**

**Convair's all-metal L-13**

**Lockheed PO-1W, Navy's electronic Constellation**

**U. S. Aviation Today**

Today I think no reasonable person questions the vital part played by aviation in the last war. If there is a next war, aviation will play an even more important role. Aside from national security, we must also realize that, if we can maintain our past position in air transport, it will constitute a valuable addition to our economy.

Certain general research can be accomplished by direct government agencies. But the down-to-earth designing and developing of power plants will only be done successfully in the industry itself. To carry the burden without the most liberal government support seems beyond the resources of any single company. If industry is given the opportunity in this country, I have no fear of meeting the present nationalized French and Russian programs, or the almost wholly nationalized British program. We successfully competed with them for twenty-five years in both military and commercial types; we can meet the challenge again.

The American people are more than willing, I am sure, to support any well-conceived program for national defense. More than ever in the period ahead, air power—as represented by both our Air Force and our sea-air Navy—will undoubtedly constitute our real first line of defense. It must be on hand. You cannot make a wish or snap your fingers and conjure up air power. You must build it. And to build it, I am convinced, the first step is the adoption of a national air policy, defining the goals we should and must achieve.

—FREDERICK B. RENTSCHLER, Chairman,
United Aircraft Corporation

# CHAPTER SEVEN

## Engines in Production

The following list of aircraft engines includes only those in production during the year. Unless otherwise noted the specifications are the manufacturers'.

### AEROJET ENGINEERING CORP.

Azusa, Cal.

**MODEL: 14AS-1000D-4 & D-5** **TC 249**

DATA

**TYPE:** Rocket, 1 cylinder, solid bi-propellant, JATO unit.

SPECS

**DIAMETER:** 10.25 in. **LENGTH:** 35.4 in. **WEIGHTS:** EMPTY, 120 lbs. LOADED, 200 lbs.

PERFORMANCE

**RATING (NORMAL):** 1,000 lbs. thrust at any altitude; **FUEL GRADE:** ALT-161 solid.

EQUIPMENT

Assembly consists of 1 steel cylinder closed at front end to provide container for propellant cartridge, with combustion chamber, exhaust nozzle, igniter, and safety valve at rear end. Thrust taken through three mounting lugs welded to cylinder for attaching unit to airplane.

REMARKS

The JATO is installed on an airplane with a three-point suspension and may be dropped after firing or reloaded and used again. It has been adapted to both military and civilian use as a take-off aid.

### AIRCOOLED MOTORS, INC.

Syracuse, N. Y.

**MODEL: Franklin 6AG4-185-B12.**

DATA

**TYPE:** 6 cylinder, air-cooled, horizontally opposed. **CAA TYPE CERTIFICATE:** 238.

SPECS

**LENGTH:** 40 19/32 in. **FUEL GRADE:** 80 octane. **BORE:** 4.5 in. **STROKE:** 3.5 in. **DISPLACEMENT:** 335 cu. in. **COMPRESSION RATIO:** 7.5:1. **DRY WEIGHT:** 369 lbs. with hub and accessories. **WEIGHT PER HP:** 1.86 lbs.

PERFORMANCE

**TAKE-OFF POWER,** 183 hp at 3,100 rpm. **CRUISE:** 135 hp. **FUEL CONSUMPTION:** .51 lbs. per hp hr. **OIL CONSUMPTION:** .002 lbs. per hp hr.

EQUIPMENT

**CARBURETOR:** Marvel-Schebler MA4-5 or Bendix PS5-C. **IGNITION:** Dual Scintilla. **STARTER:** Delco-Remy. **GENERATOR:** Delco-Remy. **FUEL PUMP:** A.C. Spark Plug Co.

---

**MODEL: Franklin 6A4-165-B3.**

DATA

**TYPE:** 6 cylinder, air-cooled, horizontally opposed. **CAA TYPE CERTIFICATE:** 238.

SPECS

**LENGTH:** 37 13/32 in. **FUEL GRADE:** 80 octane. **BORE:** 4.5 in. **STROKE:** 3.5 in. **DISPLACEMENT:** 335 cu. in. **COMPRESSION RATIO:** 7:1. **DRY WEIGHT:** 324 lb. with hub and accessories. **WEIGHT PER HP:** 1.97 lb.

PERFORMANCE

**TAKE-OFF POWER:** 165 hp at 2,800 rpm. **CRUISE:** 124 hp at 2,800 rpm. **FUEL CONSUMPTION:** .5 lb. per hp hr. **OIL CONSUMPTION:** .002 lb. per hp hr.

EQUIPMENT

**CARBURETOR:** Marvel-Schebler MA4-5 or Bendix PS5-6. **IGNITION.** Dual Scintilla S6RN21. **STARTER:** Delco-Remy. **GENERATOR:** Delco-Remy. **FUEL PUMP:** AC.

---

**MODEL: Franklin 4A4-100-B3.**

DATA

**TYPE:** 4 cylinder, air-cooled, horizontally opposed. **CAA TYPE CERTIFICATE:** 239.

SPECS

**LENGTH:** 27 15/16 in. **FUEL GRADE:** 80 octane. **BORE:** 4.5 in. **STROKE:** 3.5 in. **DISPLACEMENT:** 225 cu. in. **COMPRESSION RATIO:** 7:1. **DRY WEIGHT:** 230 lb. with hub and accessories. **WEIGHT PER HP:** 2.3 lb.

PERFORMANCE

**TAKE-OFF POWER:** 100 hp at 2,550 rpm. **CRUISE:** 75 hp at 2,320 rpm. **FUEL CON-**

SUMPTION: .5 lb. per hp hr. OIL CONSUMPTION: .002 lb. per hp hr.

EQUIPMENT

CARBURETOR: Marvel-Schebler MA3SPA. IGNITION: Dual Eisemann LA-4. STARTER: Auto Lite or Delco-Remy. GENERATOR: Auto Lite or Delco-Remy. FUEL PUMP: A. C. Spark Plug Co.

MODEL: Franklin 6A8-215-B8F.

DATA

TYPE: 6 cylinder, air-cooled, horizontally opposed; hp 215; CAA TYPE CERTIFICATE: 242.

SPECS

LENGTH: 66 in. FUEL GRADE: 80 octane. BORE: 5 in. STROKE: 4.5 in. DISPLACEMENT: 500 cu. in. COMPRESSION RATIO: 7:1. DRY WEIGHT: 487 lb. with hub and accessories. WEIGHT PER HP: 2.26 lb.

PERFORMANCE

TAKE-OFF POWER: 215 hp at 2,500 rpm. CRUISE: 161 hp at 2,270 rpm. FUEL CONSUMPTION: .55 lb. per hp hr. OIL CONSUMPTION: .002 lb. per hp hr.

EQUIPMENT

CARBURETOR: Marvel Schebler MA4-5 or Bendix PS5-C. IGNITION: Dual Scintilla 6SL(R)N-31. STARTER: Auto Lite. GENERATOR: Auto Lite. FUEL PUMP: A. C. Spark Plug Co.

MODEL: Franklin 6V4-200-C32.

DATA

TYPE: 6 cylinder, air-cooled, horizontally opposed. CAA TYPE CERTIFICATE: 244.

SPECS

LENGTH: 29 1/32 in. FUEL GRADE: 91 octane. BORE: 4.5 in. STROKE: 3.5 in. DISPLACEMENT: 335 cu. in. COMPRESSION RATIO: 8.5:1. DRY WEIGHT: 333 lb. with hub and accessories. WEIGHT PER HP: 1.66 lb.

PERFORMANCE

TAKE-OFF POWER: 200 hp. FUEL CONSUMPTION: .52 lb. per hp hr. OIL CONSUMPTION: .002 lb. per hp hr.

EQUIPMENT

CARBURETOR: Marvel-Schebler MA4-5 or Bendix PS5-C. IGNITION: Dual Scintilla S6-RN21. STARTER: Delco-Remy. GENERATOR: Delco-Remy. FUEL PUMP: A. C. Spark Plug Co. or Weldon.

REMARKS

This model was designed for helicopter installations.

MODEL: Franklin 6V4-178-B32 and B-33.

DATA

TYPE: 6 cylinder, air-cooled, horizontally opposed; hp 178; CAA TYPE CERTIFICATE: 244.

SPECS

LENGTH: 34¾ in. FUEL GRADE: 80 octane. BORE: 4.5 in. STROKE: 3.5 in. DISPLACEMENT: 335 cu. in. COMPRESSION RATIO: 7:1. DRY WEIGHT: 308 lb. with hub and accessories. WEIGHT PER HP: 1.73 lb.

PERFORMANCE

TAKE-OFF POWER: 178 hp. FUEL CONSUMPTION: .52 lb. per hp hr. OIL CONSUMPTION: .002 lb. per hp hr.

EQUIPMENT

CARBURETOR: Marvel-Schebler MA4-5 or Bendix PS5-C. IGNITION. Dual Scintilla S6RN21. STARTER: Delco-Remy. GENERATOR: Delco-Remy. FUEL PUMP: A. C. Spark Plug Co.

MODEL: Franklin 6A4-150-B3.

DATA

TYPE: 6 cylinder, air-cooled, horizontally opposed. CAA TYPE CERTIFICATE: 238.

SPECS

LENGTH: 37⅝ in. FUEL GRADE: 80 octane. BORE: 4.5 in. STROKE: 3.5 in. DISPLACEMENT: 335 cu. in. COMPRESSION RATIO: 7:1. DRY WEIGHT: 321 lb. with hub and accessories. WEIGHT PER HP: 2.14 lb.

PERFORMANCE

TAFE-OFF POWER: 150 hp at 2,600 rpm. CRUISE: 113 hp at 2,350 rpm. FUEL CONSUMPTION: .5 lb. per hp hr. OIL CONSUMPTION: .002 lb. per hp hr.

EQUIPMENT

CARBURETOR: Marvel-Schebler MA-3SPA. IGNITION: Dual Eisemann LA-6 or Scintilla S6RN21. STARTER: Delco-Remy. GENERATOR: Delco-Remy. FUEL PUMP: A. C. Spark Plug Co.

MODEL: Franklin 6V6-245-B16F.

DATA

TYPE: 6 cylinder, air-cooled, horizontally opposed. CAA TYPE CERTIFICATE: 258.

SPECS

LENGTH: 39 7/32 in. FUEL GRADE: 80 octane. BORE: 4.75 in. STROKE: 4 in. DISPLACEMENT: 425 cu. in. COMPRESSION RATIO: 7.5:1. DRY WEIGHT: 353 lb. with hub and accessories. WEIGHT PER HP: 2.26 lb.

PERFORMANCE

TAKE-OFF POWER: 245 hp at 3,275 rpm. FUEL CONSUMPTION: .52 lb. per hp hr. OIL CONSUMPTION: .002 lb. per hp hr.

EQUIPMENT

CARBURETOR: Bendix PS-7BD. IGNITION: Dual Eisemann LA-6.

REMARKS

A light weight engine developed for helicopter installations.

# ALLISON DIVISION
## GENERAL MOTORS CORP.
Indianapolis, Ind.

**TYPE: Model J35-A-9, -11, -13, turbojet.**

SPECS

**WEIGHT: 2,425 lb. FRONTAL AREA: 7.7 sq. ft. LENGTH: 145 in. DIAMETER: 40 in. COMPRESSOR: 11 stage, axial flow. AIR MASS FLOW: 70 lb. per sec. at 7,770 rpm, sea level. FUEL GRADE: Kerosene JP-2 or 100/130 gasoline.**

PERFORMANCE

**TAKE-OFF THRUST: 3,750 lb. at 7,770 rpm, sea level. NORMAL RATING: 3,270 lb. thrust at 7,400 rpm, sea level. CRUISE RATING: 2,540 lb. at 6,882 rpm, sea level.**

**TYPE: Model J33-A-23 turbojet.**

SPECS

**WEIGHT: 1,775 lb. FRONTAL AREA: 13.9 sq. ft. LENGTH: 103 in. DIAMETER: 50.5 in. COMPRESSOR: Centrifugal type, single stage. AIR MASS FLOW: 86 lb. per sec. at 11,750 rpm, sea level. FUEL GRADE: Kerosene JP-1 or 100/130 gasoline.**

PERFORMANCE

**TAKE-OFF (w/a injection) THRUST: 5,400 lb. at 11,750 rpm, sea level; 4,600 lb. without injection. NORMAL RATING: 3,900 lb. at 11,250 rpm, sea level. CRUISE RATING: 3,600 lb. at 11,000 rpm, sea level.**

# CONTINENTAL MOTORS CORPORATION
Muskegon, Mich.

**MODEL: A65-8F.**

DATA

**TYPE: 4 cylinder, air-cooled, horizontally opposed. CAA TYPE CERTIFICATE: 205.**

SPECS

**LENGTH: 30.41 in. FUEL GRADE: 73 octane. BORE: 3.875 in. STROKE: 3.625 in. DISPLACEMENT: 171 cu. in. COMPRESSION RATIO: 6.3:1. DRY WEIGHT: 176 lb. with hub and accessories. WEIGHT PER HP: 2.7 lb.**

PERFORMANCE

**TAKE-OFF POWER: 65 hp at 2,350 rpm. CRUISE: 53 hp at 2,150 rpm. FUEL CONSUMPTION: .49 lb. per hp hr. OIL CONSUMPTION: .75 pt. per hr.**

EQUIPMENT

**CARBURETOR: Stromberg NA-S3B. IGNITION: Eisemann AM4 or J. I. Case 4-CAM. FUEL PUMP: A. C. Spark Plug Co.**

---

**MODEL: C85-12F.**

DATA

**TYPE: 4 cylinder, air-cooled, horizontally opposed. CAA TYPE CERTIFICATE: 233.**

SPECS

**LENGTH: 32 in. FUEL GRADE: 73 octane. BORE: 4.062 in. STROKE: 3.625 in. DISPLACEMENT: 188 cu. in. COMPRESSION RATIO: 6.3:1. DRY WEIGHT: 182 lb. with hub and accessories. WEIGHT PER HP: 2.14 lb.**

PERFORMANCE

**TAKE-OFF POWER: 85 hp at 2,575 rpm. CRUISE: 63 hp at 2,400 rpm. FUEL CONSUMPTION: 5.4 gal. per hr. OIL CONSUMPTION: 1 pt. per hr.**

EQUIPMENT

**CARBURETOR: Bendix-Stromberg NA-S3A1. IGNITION: Scintilla S4LN-21. STARTER: Delco-Remy. GENERATOR: Delco-Remy. FUEL PUMP: A. C. Spark Plug Co.**

**MODEL: C90-12F.**

DATA

**TYPE: 4 cylinder, air-cooled, horizontally opposed. CAA TYPE CERTIFICATE: 252.**

SPECS

**LENGTH: 31¼ in. FUEL GRADE: 80 octane. BORE: 4.062 in. STROKE: 3.875 in. DISPLACEMENT: 200.91 cu. in. COMPRESSION RATIO: 7:1. DRY WEIGHT: 186 lb. with hub and accessories. WEIGHT PER HP: 2.07 lb.**

PERFORMANCE

**TAKE-OFF POWER: 90 hp at 2,475 rpm. CRUISE: 68 hp at 2,350 rpm. FUEL CONSUMPTION: .52 lb. per hp hr. OIL CONSUMPTION: .010 lb. per hp hr.**

EQUIPMENT

**CARBURETOR: Bendix-Stromberg NA-S3A1. IGNITION: Scintilla S4LN-21. STARTER: Delco-Remy. GENERATOR: Delco-Remy. FUEL PUMP: A. C. Spark Plug Co.**

---

**MODEL C125-2.**

DATA

**TYPE: 6 cylinder, air-cooled, horizontally opposed. CAA TYPE CERTIFICATE: 236.**

SPECS

**LENGTH: 41 in. FUEL GRADE: 73 octane. BORE: 4.062 in. STROKE: 3.625 in. DISPLACEMENT: 282 cu. in. COMPRESSION RATIO: 6.3:1. DRY WEIGHT: 257 lb. with hub and accessories. WEIGHT PER HP: 2.05 lb.**

PERFORMANCE

**TAKE-OFF POWER: 125 hp at 2,550 rpm. CRUISE: 98 hp at 2,400 rpm. FUEL CONSUMPTION: .5 lb. per hp hr. OIL CONSUMPTION: 2.35 pt. per hr.**

EQUIPMENT

**CARBURETOR: Marvel MA-3SPA. IGNITION: Scintilla S6LN-21. STARTER: Delco-Remy. GENERATOR: Delco-Remy. FUEL PUMP: A. C. Spark Plug Co.**

MODEL: C145-2.

DATA

TYPE: 6 cylinder, air-cooled, horizontally opposed. CAA TYPE CERTIFICATE: 253.

SPECS

LENGTH: 41 in. FUEL GRADE: 80 octane. BORE: 4.062 in. STROKE: 3.875 in. DISPLACEMENT: 301.37 cu. in. COMPRESSION RATIO: 7:1. DRY WEIGHT: 265 lb. WEIGHT PER HP: 1.77 lb.

PERFORMANCE

TAKE-OFF POWER: 145 hp at 2,700 rpm; CRUISE: 108 hp at 2,450 rpm; FUEL CONSUMPTION: .5 lb. per hp hr. OIL CONSUMPTION: .017 lb. per hp hr.

EQUIPMENT

CARBURETOR: Marvel MA-3SPA. IGNITION: Scintilla S6LN-21. STARTER: Delco-Remy. GENERATOR: Delco-Remy. FUEL PUMP: A. C. Spark Plug Co.

---

MODEL: E185-8.

DATA

TYPE: 6 cylinder, air-cooled, horizontally opposed. CAA TYPE CERTIFICATE: 246.

SPECS

LENGTH: 46.66 in. FUEL GRADE: 80 octane. BORE: 5 in. STROKE: 4 in. DISPLACEMENT: 471 cu. in. COMPRESSION RATIO: 7:1. DRY WEIGHT: 350 lb. WEIGHT PER HP: 1.89 lb.

PERFORMANCE

TAKE-OFF POWER: 205 hp at 2,600 rpm. CRUISE: 130 hp at 2,050 rpm. FUEL CONSUMPTION: .5 lb. per hp hr. OIL CONSUMPTION: 2.72 pt. per hr.

EQUIPMENT

CARBURETOR: Bendix-Stromberg PS-5C. IGNITION: Scintilla S6LN-21. STARTER: Provisions for direct cranking starter. GENERATOR: Delco-Remy. FUEL PUMP: Thompson or Romec.

REMARKS

The E185-3 engine is similar to the E185-8 with the exception of a wet sump, a 326 lb. weight, and a Delco-Remy starter.

---

MODEL W670-23.

DATA

TYPE: 7 cylinder, radial. CAA TYPE CERTIFICATE: 162.

SPECS

LENGTH: 35 9/16 in. DIAMETER: 42½ in. FUEL GRADE: 80 octane. BORE: 5.125 in. STROKE: 4.625 in. COMPRESSION RATIO: 6.3:1. DRY WEIGHT: 519 lb. WEIGHT PER HP: 2.12 lb.

PERFORMANCE

TAKE-OFF POWER: 240 hp at 2,200 rpm. CRUISE: 175 hp at 2,000 rpm. FUEL CONSUMPTION: .52 lb. per hp hr.

EQUIPMENT

CARBURETOR: Bendix-Stromberg NA-R6G. IGNITION: Single Scintilla VMN-7DFA.

REMARKS

Length and diameter measurements are not the manufacturer's.

## GENERAL ELECTRIC CO.

Schenectady, N. Y.

TYPE: Model TG-190 (J-47) turbojet.

SPECS

NET WEIGHT: 2,500 lb. (approx.). FRONTAL AREA: 7.35 sq. ft. LENGTH: 144 in. DIAMETER: 36¾ in. EXHAUST DIAMETER: 18 in. COMPRESSOR DRIVING TURBINE: Axial, single stage. COMPRESSOR: Axial, 12 stage. INLET AIR FLOW: 90 lb. per sec. FUEL GRADE: JP-1 kerosene or 100/130 gasoline.

PERFORMANCE

THRUST: Over 5,200 lb. at sea level, static conditions. Water injection system available for take-off.

## JACOBS AIRCRAFT ENGINE CO.

Pottstown. Pa.

MODEL: R-755A Series.

DATA

TYPE: 7 cylinder, air-cooled. CAA TYPE CERTIFICATE: 237.

SPECS

DIAMETER: 44 in. LENGTH: 39.5 in. FUEL GRADE: 80 octane. BORE: 5.25 in. STROKE: 5 in. DISPLACEMENT: 757 cu. in. COMPRESSION RATIO: 6:1. DRY WEIGHT: 505 lb. WEIGHT PER HP: 1.68 lb.

PERFORMANCE

TAKE-OFF POWER: 300 hp at 2,200 rpm. FUEL CONSUMPTION: .45 lb. per hp hr. OIL CONSUMPTION: .010 lb. per hp hr.

EQUIPMENT

CARBURETOR: Bendix-Stromberg NA-R7A. IGNITION: 1 Scintilla VMN-7DF5. STARTER: Eclipse. GENERATOR: Eclipse.

REMARKS

Material not supplied by the manufacturer.

# LYCOMING DIVISION

## AVCO MFG. CORP.

Williamsport, Pa.

MODEL: O-145-B2.

DATA

TYPE: 4 cylinder, air-cooled, horizontally opposed. CAA TYPE CERTIFICATE: 210.

SPECS

LENGTH: 24.62 in. FUEL GRADE: 73 octane. BORE: 3.625 in. STROKE: 3.5 in. DISPLACEMENT: 144.49 cu. in. COMPRESSION RATIO: 6.5:1. DRY WEIGHT: 163.4 lb. with hub and accessories. WEIGHT PER HP.: 2.5 lb.

PERFORMANCE

TAKE-OFF POWER: 65 hp at 2,550 rpm. CRUISE: 49 hp at 2,300 rpm. FUEL CONSUMPTION: .49 lb. per hp hr. OIL CONSUMPTION: .010 lb. per hp hr.

EQUIPMENT

CARBURETOR: Marvel Schebler MA2. IGNITION: Dual Scintilla.

MODEL: O-435-A.

DATA

TYPE: 6 cylinder, air-cooled, horizontally opposed. CAA TYPE CERTIFICATE: 228.

SPECS

LENGTH 46.36 in. FUEL GRADE: 80 octane. BORE: 4.875 in. STROKE: 3.875 in. DISPLACEMENT: 434 cu. in. COMPRESSION RATIO: 6.5:1. DRY WEIGHT: 392 lb. with hub and accessories. WEIGHT PER HP: 2.06 lb.

PERFORMANCE

TAKE-OFF POWER: 190 hp at 2,550 rpm. CRUISE: 145 hp at 2,300 rpm. FUEL CONSUMPTION: .52 lb. per hp hr. OIL CONSUMPTION: .0012 lb. per hp hr.

EQUIPMENT

CARBURETOR: Marvel Schebler MA-4-5. IGNITION: Dual Scintilla SFGLN-8. STARTER: Delco-Remy. GENERATOR: Delco-Remy.

MODEL: O-235-C1.

DATA

TYPE: 4 cylinder, air-cooled, horizontally opposed; 115 hp. CAA TYPE CERTIFICATE: 223.

SPECS

LENGTH: 29.56 in. FUEL GRADE: 80 octane. BORE: 4.875 in. STROKE: 3.875 in. DISPLACEMENT: 233.3 cu. in. COMPRESSION RATIO: 6.75:1. DRY WEIGHT: 236 lb. with hub and accessories. WEIGHT PER HP: 2.05 lb.

PERFORMANCE

TAKE-OFF POWER: 115 hp 2,800 rpm. CRUISE: 86 hp at 2,350 rpm. FUEL CONSUMPTION: .52 lb. per hp hr. OIL CONSUMPTION: .012 lb. per hp hr.

EQUIPMENT

CARBURETOR: Marvel Schebler MA-3A. IGNITION: Dual Scintilla S4LN-21. STARTER: Delco-Remy. GENERATOR: Delco-Remy.

MODEL: GSO-580-B.

DATA

TYPE: 8 cylinder, air-cooled, horizontally opposed. CAA TYPE CERTIFICATE: 256.

SPECS

LENGTH: 67.48 in. FUEL GRADE: 100/130. BORE: 4.875 in. STROKE: 3.875 in. DISPLACEMENT: 578 cu. in. COMPRESSION RATIO: 7.5:1. DRY WEIGHT: 624 lb. with hub and accessories. WEIGHT PER HP: 1.65 lb.

PERFORMANCE

TAKE-OFF: 400 hp at 3,300 rpm. CRUISE: 260 hp at 2,750 rpm. FUEL CONSUMPTION: .5 lb. per hp hr. OIL CONSUMPTION: 16.5 gal. per hr.

EQUIPMENT

CARBURETOR: Stromberg PSH-9BDE. IGNITION: Dual Scintilla SF-8RN.

# PRATT & WHITNEY AIRCRAFT

## DIVISION OF UNITED AIRCRAFT CORP.

East Hartford, Conn.

MODEL: R-985, Wasp, Jr.

DATA

TYPE: 9 cylinder, air-cooled, radial. CAA TYPE CERTIFICATE: 123.

SPECS

DIAMETER: 46.10 in. LENGTH: 47.69 in. FUEL GRADE: 91/98. BORE: 5.187 in. STROKE: 5.187 in. DISPLACEMENT: 985 cu. in. COMPRESSION RATIO: 6:1. DRY WEIGHT: 684 lb., maximum.

PERFORMANCE

TAKE-OFF POWER: 450 hp at 2,300 rpm. FUEL CONSUMPTION: .575 lb. per hp hr. OIL CONSUMPTION: .025 lb. per hp hr.

EQUIPMENT

CARBURETOR: Stromberg NA-R9B. IGNITION: Dual Scintilla SB9RN-3.

MODEL: Twin Wasp C Series, (R-1830).

DATA

TYPE: 14 cylinder, air-cooled, radial. CAA TYPE CERTIFICATE: 186.

SPECS

DIAMETER: 48.19 in. LENGTH: 61.16 in. FUEL GRADE: 91/98. BORE: 5.5 in. STROKE: 5.5 in. DISPLACEMENT: 1,830 cu. in. COMPRESSION RATIO: 6.7:1. PROP SHAFT: .5625 to 1 ratio. DRY WEIGHT: 1467 lb., maximum.

PERFORMANCE

TAKE-OFF POWER: 1,200 hp at 2,700 rpm and 4,900 ft. NORMAL RATED POWER: 1.050 hp at 2,250 rpm and 7,500 ft.

EQUIPMENT

CARBURETOR: Stromberg PD-12H4. IGNITION: 2 Scintilla SF-14LN-3.

---

MODEL: Twin Wasp D Series, (R-2000).

DATA

TYPE: 14 cylinder, air-cooled, radial. CAA TYPE CERTIFICATE: 230.

SPECS

DIAMETER: 49.1 in. LENGTH: 61.02 in. FUEL GRADE: 100/130. BORE: 5.75 in. STROKE: 5.5 in. DISPLACEMENT: 2,004 cu. in. COMPRESSION RATIO: 6.5:1. DRY WEIGHT: 1595 lb., maximum.

PERFORMANCE

TAKE-OFF: 1,450 at 2,700 rpm and 1,000 ft. NORMAL RATED POWER: 1,200 hp at 2,550 rpm and 5,000 ft.

EQUIPMENT

CARBURETOR: Stromberg PD-12F13. IGNITION: 2 Scintilla SF-14LN-8.

---

MODEL: Twin Wasp E Series, (R-2180).

DATA

TYPE: 14 cylinder, air-cooled, radial. CAA TYPE CERTIFICATE: 257.

SPECS

DIAMETER: 54 in. LENGTH: 75.8 in. FUEL GRADE: 100/130. BORE: 5.75 in. STROKE: 6 in. DISPLACEMENT: 2,180 cu. in. COMPRESSION RATIO: 6.7:1. DRY WEIGHT: 1,870 lb., maximum.

PERFORMANCE

TAKE-OFF POWER: 1,800 hp at 2,800 rpm and 1,000 ft. (with water); 1,650 hp (without water). NORMAL RATED POWER: 1,300 hp at 2,600 rpm and 17,500 ft.

EQUIPMENT

CARBURETOR: Stromberg AR-48C1. IGNITION: Dual Scintilla S14LN-15.

---

MODEL: Wasp H Series, (R-1340).

DATA

TYPE: 9 cylinder, air-cooled, radial. CAA TYPE CERTIFICATE: This series is manufactured under the following type certificates: 129, 142, and 143 (See Remarks).

SPECS

DIAMETER: 51.8 in. LENGTH: 43.01 in. FUEL GRADE: 91/98. BORE: 5.75 in. STROKE: 5.575 in. DISPLACEMENT: 1,344 cu. in. COMPRESSION RATIO: 6:1. DRY WEIGHT: from 865 lb. to 953 lb.

PERFORMANCE

TAKE-OFF POWER: 600 hp at 2.250 rpm and 3,000 ft. NORMAL RATED POWER: 550 hp at 2,200 rpm and 5,000 ft.

EQUIPMENT

CARBURETOR: Stromberg NA-V9E1. IGNITION: Dual Scintilla SB9R.

REMARKS

The major differences in the various versions of this model are in engine length and weight. Performance is the same for all models.

---

MODEL: CA Series (R-2800), Double Wasp.

DATA

TYPE: 18 cylinder, air-cooled, radial. CAA TYPE CERTIFICATE: 231.

SPECS

DIAMETER: 52.8 in. LENGTH: 78.4 in. FUEL GRADE: 100/130 or 115/145. BORE: 5.75 in. STROKE: 6 in. DISPLACEMENT: 2,804 cu. in. COMPRESSION RATIO: 6.75 to 1. DRY WEIGHT: 2,317 lb., maximum.

PERFORMANCE

TAKE-OFF POWER: 2,400 hp at 2,880 rpm (with water); 2,300 hp (without water). NORMAL RATED POWER: 1,800 hp at 2,600 rpm.

EQUIPMENT

CARBURETOR: Stromberg PR-58E5. IGNITION: Scintilla DLN-10.

REMARKS

The CA Series includes the following models: 3, 5, 15, 17, 18, and 19. The essential differences in these models are the dry weights, engine dimensions, and impeller gear ratios (high or low). Most parts are interchangeable.

---

MODEL Turbo Wasp JT-6B (J-42).

DATA

TYPE: Turbojet.

SPECS

DIAMETER: 49.5 in. LENGTH: 103.25 in. with tail cone. FUEL GRADE: 100/130 or kerosene. COMPRESSOR: Centrifugal flow, one-stage. TURBINE: Axial flow, single stage. CONE: Stainless steel outer cone, fixed inner cone. DRY WEIGHT: 1,715 lb.

PERFORMANCE

TAKE-OFF POWER: 5,000 lb. thrust at sea level. NORMAL RATED POWER: 4,000 lb. thrust at sea level.

EQUIPMENT

IGNITION: 2 BG igniter plugs with integral fuel nozzles.

REMARKS

This model is the most powerful jet engine to receive CAA certification to date. The Navy version, J-42 is installed in about half the Grumman F9F Panthers. Material was not supplied by the manufacturer.

---

MODEL: Wasp Major B (R-4360).

DATA

TYPE: 28 cylinder, air-cooled, radial. CAA TYPE CERTIFICATE: 247.

SPECS

DIAMETER: 54 in. LENGTH: 101 in. FUEL GRADE: 115/145. BORE: 5.75 in. STROKE: 6 in. DISPLACEMENT: 4,363 cu. in. COMPRESSION RATIO: 6.7:1. DRY WEIGHT: 3,520 lb.

PERFORMANCE

TAKE-OFF POWER: 3.500 hp at 2,700 rpm and 750 ft. (with water); 3,250 hp at 2.700 rpm and 1.500 ft. (without water). NORMAL RATED POWER: 2,650 hp at 2,500 rpm and 6,000 ft. (low blower); 2,300 hp at 2,550 rpm at 16,300 ft. (high blower).

EQUIPMENT

CARBURETOR: Stromberg PR-100B3. IGNITION: 7 Scintilla D4RN-2.

REMARKS

The newest in the Wasp Major line, the externally supercharged Series C used with the VDT (Variable Discharge Turbosupercharger) was still wrapped in security when we went to press but it is known that it will deliver more than 4,000 hp to the shaft and also several hundred pounds of jet thrust.

# RANGER ENGINES DIVISION
## FAIRCHILD ENGINE AND AIRPLANE CORP.
Farmingdale, N. Y.

**Current production and development is in the field of turbine engines for piloted aircraft and guided missiles. Data is classified. The reciprocating types built during the war are being made available by the company from surplus stocks on a factory rebuilt and guaranteed basis. These models are: 6-440C-2, 6-440C-5, and SGV-770C-1B. These are all in-line, inverted, aircooled engines.**

# WESTINGHOUSE ELECTRIC CORP.
## AVIATION GAS TURBINE DIV.
Philadelphia, Pa.

**TYPE: Model 24C4B (J34-WE22) turbojet.**

SPECS

**WEIGHT: 1,200 lb. FRONTAL AREA: 3.2 ft. LENGTH: 120 in. DIAMETER: 24 in. TURBINE: 2-stage axial-flow type. COMPRESSOR: 11-stage axial-flow type. FUEL GRADE: Gasoline AN-F-48.**

PERFORMANCE

**MILITARY STATIC THRUST: 3,000 lb. NORMAL STATIC THRUST: 2,290 lb.**

# WRIGHT AERONAUTICAL CORP.
Wood-Ridge, N. J.

**MODEL: R-1300-1.**

DATA

**TYPE: 7 cylinder, air-cooled, radial.**

SPECS

**LENGTH: 48.12. FUEL GRADE: 91/98 octane. BORE: 6.125 in. STROKE: 6.312 in. DISPLACEMENT: 1,300 cu. in. COMPRESSION RATIO: 6.2:1. DRY WEIGHT: 1,045 lb. WEIGHT PER HP: 1.28 lb.**

PERFORMANCE

**TAKE-OFF POWER: 800 hp at 2,600 rpm. CRUISE: 420 hp. FUEL CONSUMPTION: .48 lb. per hp hr OIL CONSUMPTION: .015 lb. per hp hr.**

EQUIPMENT

**CARBURETOR: Stromberg PD9F1. IGNITION: Dual Bosch SF7LU-2.**

---

**MODEL: 749C18BD1 (R-3350-24W).**

DATA

**TYPE: 18 cylinder, air-cooled, radial. CAA TYPE CERTIFICATE: 218.**

SPECS

**LENGTH: 78.52 in. FUEL GRADE: 100/130. BORE: 6.125 in. STROKE: 6.3125 in. DISPLACEMENT: 3,350 cu. in. COMPRESSION RATIO: 6.5:1. DRY WEIGHT: 2,884 lb. WEIGHT PER HP: 1.1 lb.**

PERFORMANCE

**TAKE-OFF POWER: 2,500 hp at 2,800 rpm. CRUISE: 1,470 hp at 2,300 rpm. FUEL CONSUMPTION: .46 lb. per hp hr. OIL CONSUMPTION: .015 lb. per hp hr.**

EQUIPMENT

**IGNITION: Scintilla DLN-9. CARBURETION: Bendix No. 135091 direct fuel injection.**

---

**MODEL: R-3350-26W.**

DATA

**TYPE: 18 cylinder, air-cooled, radial.**

SPECS

**LENGTH: 81.93 in. FUEL GRADE: 115/145. BORE: 6.125 in. STROKE: 6.312 in. DISPLACEMENT: 3,350 cu. in. COMPRESSION RATIO: 6.5:1. DRY WEIGHT: 2,848 lb. WEIGHT PER HP: 1.05 lb.**

PERFORMANCE

**TAKE-OFF POWER: 2,700 hp at 2,900 rpm. NORMAL RATED POWER: 1,900 hp. FUEL CONSUMPTION: .43 lb. per hp hr. OIL CONSUMPTION: .020 lb. per hp hr.**

EQUIPMENT

**CARBURETOR: Stromberg PR58U1. IGNITION: Dual Bosch DF 18LU-3.**

REMARKS

**The R-3350-30W is a compound version of the R-3350-26W using three small turbines driven by exhaust gas and connected by fluid couplings to the crankshaft. This increases the take-off power to 3,250 hp. Ignition system is Scintilla DLN-9; the carburetor, Stromberg PR58T1.**

---

**MODEL: 736C9HD3 (R-1820-76A).**

DATA

**TYPE: 9 cylinder, air-cooled, radial. CAA TYPE CERTIFICATE: 243.**

SPECS

**LENGTH: 47.69 in. FUEL GRADE: 100/130. BORE: 6.125 in. STROKE: 6.875 in. DISPLACEMENT: 1,820 cu. in. COMPRESSION RATIO: 6.8:1. DRY WEIGHT: 1,365 lb. WEIGHT PER HP: .99 lb.**

PERFORMANCE

**TAKE-OFF POWER: 1,425 hp at 51.5 in. Hg. 2,700 rpm. CRUISE: 890 hp at 33 in. Hg., 2,300 rpm. FUEL CONSUMPTION: .46 lb. per hp hr. at 60% power. OIL CONSUMPTION: .020 lb. per hp hr. at 89% power.**

EQUIPMENT

**CARBURETOR: Stromberg PD12K14. IGNITION: Dual Scintilla S9LU-5.**

REMARKS

**This engine is the latest in a long line of 1820 cu. in. power-plants that were first introduced more than ten years ago. This model is also built with 2-speed supercharger and optional reduction gear ratios.**

# CHAPTER EIGHT

## New Things in the Air

A HUNDRED THOUSAND gadgets and developments, unknown to the general public and for the most part unsung even in the industry except by those who fathered them, each contributed to aviation's progress during the year and combined to become one of the major factors in that progress.

Some of the developments reached a point where they broke into the aviation news headlines. And behind these production-ready products lay a welter of devices and ideas from which, when their full story is revealed, may come some of the outstanding technical developments of the air age of the immediate future.

The Acushnet Process Company of New Bedford, Mass., custom molders of precision rubber products, featured during 1949 a new material—a glass cloth impregnated with silicone which is used for reinforced gasket applications.

The material has a brittle point of approximately minus 90 degrees F. and will withstand heat up to plus 500 degrees for sustained periods. It has excellent dielectric strength. It can be supplied in sheeting .013" to .015" thick, 36" wide and in rolls up to approximately 200 yards long. Die-cut, finished gaskets made from the material are also available.

Aeroquip Corporation of Jackson, Mich., manufacturers of flexible hose lines, self-sealing couplings, automatic shut-off valves, and the hydrauliscope, air electronic analyzer for finding and recording unusual pressure changes, had the best production year—and the most profitable—in its history. All of the company's equipment is used widely in the aircraft industry.

One of the major product developments for 1949 for Air Associates, Inc., of Teterboro, N. J., was the completion of a development program to produce a compact actuator, designed as a "Compactuator." This unit is a linear actuator which resembles an oleo strut—simplicity at its best. By the use of gearing and a system of jack screw combinations, it is possible to get a telescoping effect of the actuator to give a maximum stroke for a minimum retracted length. Its construction is such that through sandwich-type gearing it is possible for the eventual user to change gear ratios to achieve various speed, load combinations within the parameters of the motor power output. This was set up in such a fashion that it can be done by the eventual user.

Furthermore, the actuator provides for pressure limiting devices, anti-rotational features, radio noise filtering, thermal protection, externally adjustable limit switching, and position indication by means of switches. The design is set up so that lubrication is permanent for the life of the equipment.

The actuator as set up can be converted by means of a kit from a linear actuator to a rotary actuator. The rotary actuator can be made to include limit switches, centering switches, position indication by means of switching, torque limiting features, radio noise filtering and thermal protection. Each unit is suitably shielded to prevent the entry of foreign materials detrimental to the operation of precision gears.

For each frame size motor used, a combination of gear ratios and its associated mechanical appendages has been worked out to allow many combinations of speed and load or torque for any individual frame-size motor. It is possible by a slight modification to change the basic design to allow for special requirements to be met by the aircraft builder. Every effort was made to incorporate or to provide for in this equipment every combination and permutation of gearing, switching and miscellaneous features, such as anti-rotational devices and load limiting devices.

Aircraft Radio Corporation, Boonton, N. J., moved forward in design and manufacture of airborne electronic equipment for military and commercial users during 1949. From 1928 until the end of the war, work was almost exclusively as a prime contractor to the military services. Since then, about 20% is commercial and 80% military.

ARC output includes classified equipment for the military and airborne communication and navigation equipment and microwave signal generators for commercial users. All of ARC's commercial airborne products are CAA type-certificated.

These products include: 2-way VHF communication, VHF omni-range and ILS localizer navigation receiving, low and medium frequency radio range navigation receiving, 10-channel isolation amplifier, 900-2100 mc (microwave) signal generator.

Continuing its research and development on a score of projects, AiResearch Manufacturing Company had one of the most successful years of its history. By year-end, the company was in a position to announce that more than seventy planes are now equipped with AiResearch products, including automatic electric flap control systems, floating control thermostats for sensing oil temperature, air expansion turbine for cabin refrigeration, pulsation-free centrifugal compressors for aircraft cabin supercharging, and airborne self-starters for jets. AiResearch has led in all of these device developments.

Near the top of 1949 achievements was an automotive-size, portable gas turbine engine, heretofore shrouded in secrecy, which was publicly exhibited for the first time in October.

The turbine was developed under Navy sponsorship and designed to meet all electrical and heating requirements of a modern transport. It weighs only 98 lb. and delivers 84 hp. The turbine operates at speeds up to 40,000 rpm and is so vibrationless it could literally be put to work hanging on the end of a rope.

Its use for auxiliary power in fields other than aviation may give other forms of enterprise a new tool. For instance, in rural areas where piped-in electricity is unavailable, farmers now rely on a 60-lb. reciprocating engine which produces 1 kw of power, enough for one farm. The AiResearch turbine, for which performance figures are still withheld for security reasons, can furnish enough energy to produce 60,000 watts of electrical power, enough for 60 farms. Lightweight and portable, it should prove a boon wherever standard utilities are inaccessible.

A previously announced compressor-type gas turbine and pneumatic power system, which will take care of all the major auxiliary power demands of large turbine-propelled aircraft, was also publicly displayed for the first time. Along with major components, it is believed that this represents the first equipment of this class developed anywhere in the world.

The compressor-type turbine was designed as an entirely new approach to the major auxiliary power demands brought about by modern jet and turboprop aircraft. The power services include air conditioning, operation of landing gear and flaps, generation of electricity and main engine starting.

The engine has a number of distinct advantages. Air for fluid power transmission has a basic advantage in that it is available everywhere an airplane can fly, does not burn, and cannot get anything wet. The proposed pneumatic system results in the smallest possible engine installations. It is the only system, of comparable weight and efficiency, which is equally suitable for starting the main engines and providing power when the main engines are not operating. And this type system may permit a significant increase in the speed and range of aircraft.

Manufacturing high pressure flexible hose assemblies for Pratt and Whitney's turbo Wasp jet engine was the major 1949 assignment of Avico, Incorporated, Portsmouth, R. I. The assemblies were built with integral angle hose couplings, occupying considerably less space than the standard type and therefore particularly adaptable to jet engines, where standard couplings are too large. The company's flexible hose assemblies are produced for low, medium and high pressure applications for fuel, lubricating oil, high pressure hydraulics, coolant, compressed air and vacuum systems. Principal users are the military.

Avico's future plans include development of hose connections for various types of AN specification hose called for on American aero engines and aircraft, as well as additional products in the field of fireproof and watertight electrical connectors.

The Bendix Radio Division of Bendix Aviation Corporation at Baltimore, Md., continued producing a record variety of aviation radio and radar equipment during 1949.

Commercial types included HF and VHF transmitters and receivers, radio control panels, antennas, indicators, automatic radio compasses, marker beacon receivers, announcing systems, VHF communication and navigation equipment, inter-communication systems, omni-range systems, GCA landing systems, and early-warning radar.

For the government, the company produced all types of radar equipment for both search and navigation.

Bendix products were used widely on the airlines, in private planes, and by federal and foreign agencies, including the Air Forces and the Civil Aeronautics Administration.

One of the outstanding devices produced during the year was the Long Range and Search Radar (LGR-1), a portable, lightweight unit for detecting aircraft and other targets at ranges up to 155 miles. The equipment is packaged in individually portable units, each of which can be carried by two men or transported by truck or airplane. The operating units are contained in boxes whose bases are each two feet square, so that they may be stacked one above the other to form a radar tower approximately twelve feet high. The antenna is then assembled on top of the tower, forming an operating system sixteen feet high.

The Eclipse-Pioneer Division of Bendix at Teterboro, N. J., continued to maintain its role as one of the largest suppliers of aircraft accessory equipment. Research and development programs were carried forward extensively in the field of guided missiles, components for rocket and jet propelled aircraft, and electronic control mechanisms. At the same time, progressive modifications were effected in all of the division's standard products.

Among the year's advances was commercial use of Flight Path Control, a system used in conjunction with the PB-10 Automatic Pilot for making fully automatic landing approaches under conditions of reduced visibility and ceiling. Acceptance of the system, and its subsequent actual use on the airlines, climaxed a series of exhaustive tests which included 700 landing approaches without a single miss or "go around."

Prominent among advances made in the aircraft instrument field were two new high-altitude altimeters. One, a 300,000-foot unit, had already been completed, while the other, a 500,000-foot unit, was in the final stage of development. Known as the "hot wire" altimeter, the 300,000-foot instrument was an all-electric device with a range of from 140,000 feet to 300,000 feet. The 500,000-foot altimeter used the principles of the ionization type vacuum tube with the addition of an amplifier and a servo system.

In solving the problem of measuring fuel quantity aboard high speed planes with droppable fuel tanks and increasingly thinner wings and wing tanks which present difficulties in the use of individual tank gauges, Eclipse-Pioneer developed the first gravimetric type of fuel flow totalizing system. The system was calibrated in pounds per hour, and totalizing indicators were available to indicate the pounds of fuel used up to any given time, or the amount of fuel remaining.

To meet a forthcoming Civil Aeronautics Board requirement that such equipment be installed in all commercial air carriers, a Flight Recorder was designed. The unit produced on a graph a permanent charted record of altitude and maximum plus and minus vertical accelerations, as required by the CAB, plus a recording of airspeed and compass headings. In addition, two on-off solenoids provided a means of recording two additional optional functions such as auto pilot "on" or "off" and landing gear "up" or "down." A companion unit for the Flight Recorder was the Evaluator, a viewing device with a transparent, flexible scale used for subsequent interpretation of the lines drawn on the graph by the recorder.

A new clamp-on method of mounting instruments was devised to permit 360° rotation of individual units in the panel. With this development, it became possible to adjust a group of instruments for related engine functions so that all pointers, during normal operation, would be parallel and point in the same direction. Experiments revealed that entire panels could be read accurately and in a fraction of the time normally required, since any abnormal condition became immediately apparent when any one of the pointers moved out of parallel.

Further refinements were made on the versatile Autosyn, a development which has served as the heart of many remote indicating instruments and automatic control mechanisms.

Instrumentation for many new functions of modern aircraft was developed. A typical example was the Magnesyn oil pressure indicator for helicopters with fore and aft rotors. Proper oil pressure at each of the three gear boxes or transmissions of this type helicopter was of paramount importance. The new three-way indicator with an individual pointer for each of the three transmissions, supplied the required information at a single glance.

A new 30-volt direct current generator with an overhead capacity of 400 amperes was built to meet the ever increasing electrical requirements of the larger military and commercial aircraft. Also developed was a completely automatic control and protective system for direct current aircraft generators.

The complete line of aircraft starters was changed to improve motors and gearing, for assuring an even longer service life than was possible in earlier years. At the same time several new types were completed, or were in various stages of development. Among the completed units was a small but powerful direct cranking starter designed specifically for light plane engines up to 185 horsepower. Also completed was a direct current starter, rated at 16 to 25 horsepower, for use on jet engines, while a 50-horsepower direct current model, also for jets, neared completion. In addition, a program for the development of a-c starters for jet planes was well under way. To meet helicopter needs, several special starters were designed, including one with a right-angle drive, for use in the confined mounting areas of some rotary wing aircraft. Other starter refinements included a Hydrolock Detector, geared through the regular starter, to turn the engine over slowly and safely prior to starting, thus obviating the need for pulling the propeller through by hand to check for hydraulic locks. Work on external design included development of a quick attachment and detachment feature whereby installation and removal of the starter was accomplished by means of a single, readily accessible bolt.

Using engine power to drive off-the-engine equipment was made possible by a special gear box and a flexible drive shaft coupling. Automatic engine controls were developed to a point where they actually took charge of throttles and engine rpm, automatically synchronizing these functions on all engines, and performing the throttle jockeying formerly required of the pilot or flight engineer to maintain optimum values during take-off, climb and cruise conditions. Initial setting of these functions was made by a single lever instead of the multiple throttles and levers heretofore required.

Air and ground position indicating systems were under development, as well as stabilization of radar antennae and associated equipment, and a Bearing Converter Indicator which actually computed the navigator's bearing from an omni-range station.

In the Eclipse-Pioneer foundries, a new process known as the Bendix technique of plaster mold casting came into national prominence. The foundry is now able to cast intricate cylindrical parts in one piece. Precision control, which permitted tolerances to be held as close as plus or minus .005" and which produced surface finishes of 30 rms, eliminated the need for machining surfaces of vanes and internal passages. This paves the way for one-piece casting of parts which previously had to be produced in sections to permit internal machining prior to assembly.

Bendix Products Division, Bendix Aviation Corporation, of South Bend, Ind., continued production of the newest type of fuel metering and landing gear components, as well as extensive research development of these devices, during 1949. Recent purchase of several war-time buildings enabled the division to expand operations and consolidate the fuel metering and strut, wheel and brake divisions in separate plants, each containing complete engineering, test and production facilities.

The Stromberg Injection Carburetor, adopted as standard equipment on the majority of allied military and naval planes during World War II, continued to be one of the most notable engineering accomplishments in the history of the internal combustion engine.

In principle, this carburetor eliminates the usual float chamber vented to atmosphere but instead, has a closed system from engine driven fuel pump to the discharge nozzle. Regardless of the aircraft position, speed or altitude, fuel under pressure continues to discharge into the air stream, supplying the correct fuel/air mixture throughout the entire operating range of the engine.

Using the same fuel injection idea that is used in the larger carburetor, the PS Series of light plane carburetors (50 to 500 hp) have a fuel system that is closed and under pressure from fuel pump to discharge nozzle.

Pressure differentials in the venturi serve to control the quantity of fuel.

Stromberg PS Series Carburetors are made in the single barrel type and since they do not depend on floats or gravity feed, they can be mounted and operated in any position. They are regularly equipped with a vacuum-operated single diaphragm accelerating pump, and a combination manual mixture control and idle cutoff; automatic mixture control and power enrichment features, however, are optional.

The use of water injection has been broadened to include units suitable for jet engine installation. The unit as supplied for use on piston type engines works automatically in connection with the carburetor at all times. Unmetered fuel pressure applied to a diaphragm in the unit regulates a poppet valve which in turn governs the water pressure. As a result unmetered water pressure and unmetered fuel pressure in the carburetor system are equal. The variable jet or main metering needle functions the same as the power enrichment valve in the carburetor. The water injection system is manufactured by Bendix in accordance with specifications furnished by engine manufacturers.

The Stromberg direct fuel injection system as production equipment was first and is still being used on the B-29 bomber. It is now used on the engines of the Lockheed *Constellation* for peacetime airline service.

The operation of the system is fully automatic, changing the amount of fuel to suit the requirements for different engine loads and for variations in air temperature in varying altitudes. Development work is a continuous process at Bendix and as a result the Direct Fuel Injection System may be applied to all types of reciprocating aircraft engines ranging from nine to twenty-eight cylinders. In new designs efforts have been successfully made to combine the master control and pump into a single unit.

With the period of early research and experiment definitely over for starting, fuel metering and burner development, 1949 found Bendix producing in quantity systems which proved to be revolutionary in dealing with problems of jet engine control.

The Bendix fuel control is of the all-speed governor type, in which the steady speed fuel feed is automatically adjusted to give the selected engine speed. However, during change of speed or throttle position the fuel feed is limited according to momentary engine speed and air density, to avoid extreme engine temperatures, "flame blowout," and also the destructive "compressor stall."

The fuel control unit consists of a governor, barometric corrector, a throttle valve, shut-off valve and a pressure relief valve. The principle of operation is such that the metering is not disturbed by a change of nozzle pressure, nor by a change of fuel supply pressure (so long as the latter is adequate for maximum power). The aircraft pilot need only to move the throttle lever and the engine is automatically controlled within the operating limits regardless of the rate of throttle opening or closing and at any altitude within the range of the aircraft.

Differing from previous practice in which fuel was fed to all the engine burners (of which only two have ignition means), during the engine cranking period, which often resulted in extremely hot, explosive starts, the new Bendix Starting System feeds first only the two burners having spark plugs; and on ignition, these operate alone until a predetermined pressure or temperature is attained. Fuel is then turned on to the other burners and the flame travels to them progressively, smoothly and without extreme temperature.

Bendix landing gear shock strut, wheel and brake engineering includes all phases of engineering and technical service. This is divided into two highly specialized groups which are charged with all research and development, experimental design, production design and contact with manufacturing.

Both air and fluid are utilized in the strut to produce controlled resistance to "taxiing," "take-off" and "landing shocks." Nearly all strut designs incorporate a rebound snubbing device. Taxi loads are carried mainly on compressed air in the upper chamber of the strut.

Impact energy of landing is absorbed chiefly by the flow of the oil through an orifice which may vary in size at different points of the stroke.

Connecting members for the installation to the airframe and torque arms to maintain correct alignment of wheels form a part of every strut. Nose struts have centering devices and alignment cams which serve to center the wheel or wheels in the straight ahead position prior to landing. Many of them are provided with the necessary equipment to make them steerable.

To further lighten the dead weight load on the airplane newer requirements may call for the use of aluminum alloys and welding to eliminate sockets.

Bendix landing gear shock struts are used on many planes, including the Boeing Stratojet or B-27, B-50 Superfortress, McDonnell F2H *Banshee,* Grumman F9F *Panther,* Consolidated Vultee Convair-Liner 240 and the famous B-36.

Wheel and brake installations include the Lockheed *Constellation,* Convair B-36, North American F-86, Fairchild C-119 revised Packet, Grumman SA16A and the Grumman AF2S.

Struts, wheels and brakes designed by Bendix have been used on the Douglas DC-3 since 1936. Over 3,000 of these planes are still in service.

After the war, Boots Aircraft Nut Corporation of Stamford, Conn., pioneers of the one-piece all-metal self-locking nut, perfected the Hex-lok, another step forward in developing all-metal self-locking nuts of one-piece construction. This same locking principle is now being adapted to gang channel and plate nuts. Hex-loks, like all Boots products, are fully approved for Army, Navy and CAA applications.

The Boston Insulated Wire & Cable Company, during 1949, followed its policy of manufacturing all types of insulated wires and cables as required in the aircraft industry. At the same time the Company continued to develop manufacturing techniques with new materials to produce the highly specialized cables for the latest type of aircraft, which require performance at extreme temperatures of flight conditions.

Of particular importance was the development and manufacture of high temperature insulation for use as high tension ignition wire, low-loss coaxial cables and power, lighting and instrument wire. This insulation consists of the use of Teflon tape applied in a unique manner and sealed from moisture and air by use of a silicone lubricant. The trade name for this product is "Teflex," for which a patent has been granted. The characteristics of the insulation are such that the cable will withstand temperatures as low as –80° F and up to 500° F for long periods of time with very little deterioration breakdown, power factor, or change in capacity or corona forming voltage. Ignition cable in both the 5 MM and 7 MM size have been produced, approved, and used in jet engines and designated as PFCV-5 and PFCV-7.

For coaxial cables, this insulation has been used to make flexible low-loss RF transmission lines which will stand high and low temperatures encountered in the jet planes. These are supplied by the company in a wide range of sizes from ⅛" to ⅝" diameter.

This form of insulation is particularly adaptable to thin wall insulation as a dielectric for high and low temperature wires made in small diameters. One layer of this insulation has a breakdown voltage in excess of 2.5Kv RMS. It is completely impervious to moisture, gasoline, and cleaning and hydraulic fluids encountered in aircraft maintenance. "Teflex" has been applied to conductors as small as #26 gauge with a finished diameter of .050". As it is little affected by heat it does not require an asbestos layer as a protective covering. For this reason it is more moisture resistant and smaller and lighter in weight than such types and will remain electrically stable. This wire is identified as Type SRHT(GV) having a fiberglas braid cover in any color with an operating temperature rating of –70°C to 200°C.

The company has therefore continued its efforts to supply all of the types of wires and cables required for aircraft and is continuously developing new types required for the advance designs in aircraft construction.

Plans for the coming year include amplification of these products and facilities for manufacture to meet the ever-more exacting requirements of the industry.

Breeze Corporations, Inc., now operating three units in Newark, N. J., and vicinity, reported radio ignition shielding, both for high and low tension electrical circuits, as its most important 1949 production item.

Radio ignition shielding, pioneered by Breeze, is manufactured for all types of aircraft engines, both air and liquid cooled, to meet government specifications. In addition, the corporation built a complete line of control and actuating devices for aircraft, for both mechanical and electrical operations. Tab controls can be furnished to take care of any desired load and units can be designed to operate with flexible shaft drives, torque tube drives or electrical drives.

Also among Breeze's 1949 production items were: electrical connectors, both plug and socket assembly; antenna mounts including all the electrical and mechanical apparatus; flexible shafting, casing and tubing; tachometer and remote control drives; a blasting magneto and Aero-Seal worm-drive hose clamps.

The Collins Radio Company of Cedar Rapids, Ia., manufacturers of high-quality communications equipment of advanced design, did approximately a \$10 million business with commercial and military customers during 1949.

Principal production was concentrated on an airborne 100-watt, 20-channel, high-frequency communications transceiver, a VHF communication navigation receiver with 280 channels, a 20-channel glide slope receiver, an 180-channel VHF airborne transmitter, omnidirectional range and glide slope antennas, a variety of ground communication transmitters and receivers, and a number of specialized installations of all types for military use.

Realizing that super-sonic speeds have brought new vibration and load problems, and that jet engines are bringing new high temperature problems, the Elastic Stop Nut Corporation, Union, N. J., kept abreast of the times by introducing two designs—high-strength and high-temperature nuts, the latter built for temperature ranges from 250° to 550° F. and from 550° to 1200° F.

A new fastener, the Rollpin, was also added to ESNA's product line during the year. Simple in design, it was expected the Rollpin would save considerable time and cost for aircraft engineers. ESNA reported that, as far as they knew, it was the only self-locking pin on the market. It remains tight because it is pressed into a hole smaller than its own diameter. This compressibility means that holes may be drilled to looser tolerances than those required for taper or other types of pins; peening or reaming operations are eliminated. ESNA further felt the pin might be used in place of rivets, for assemblies where dis-assembly would be helpful.

The Exhibit Supply Co., Chicago, Ill., manufacturers of precision electrical switches, experienced a 50% increase in sales during the first three quarters of 1949 as compared to the same period in 1948. New designs—especially an improved basic switch—were largely responsible for the jump. The Exhibit Supply Co. specializes in splash-proof limit switches of small overall size and relatively large capacity, equipped with a variety of actuating means. Since 1943 when the company designed the ES4 limit switch to control electric motors and valves and indicate circuits, Exhibit Supply Co. switches have been in ever-increasing demand by the industry.

The General Electric Company, for years a leader in developing aircraft equipment, introduced a number of new devices during 1949, including two new position indicators, an aircraft circuit breaker, a flight recorder, and a magnetic-drag aircraft tachometer indicator.

The position indicators were in the form of two hermetically sealed instruments which indicate the position of wheels, flaps, trim tabs, cowl flaps, and other airplane components.

Available in two models, the new d-c selsyn position indicators have been designed to meet U. S. Air Force and U. S. Navy specifications.

One model is a new-type landing gear position indicator which can be used to replace the position lights now commonly used on aircraft. By changing the scale plate, this instrument can be used for other indications controlled by switches when an ON-OFF function is desired. The instrument is housed in a square case for panel mounting.

The second model, a round-case instrument, indicates flap position in an airplane regardless of the degree of flap travel. Modifications of this model can be furnished which indicate the position of trim tabs, cowl flaps, and other airplane components. The design of the instrument provides for an adjustment of the scale plate, through the hermetic seal, without breaking the seal. This makes possible the "setting" of the instrument scale plate to conform to the needed flap-travel indication of the particular airplane.

The new aircraft circuit breakers are for both 28- and 120-volt d-c systems. Continuous current ratings are as high as 600 amperes for the 28-volt breakers and 250 amperes for the 120-volt units.

Interrupting ratings for the new devices are 12,000 amperes for the 28-volt breaker and 5,000 amperes for the 120-volt breaker. These ratings extend over the full altitude range from sea level to 50,000 feet.

The breakers have been designed with long-time delay reverse current trip devices for application in generator circuits and with directional or non-directional trip devices for other applications. The electrically and manually closed circuit breakers have trip-free mechanisms. The electrically closed breaker includes an anti-pump control scheme.

A welded aluminum cover and a molded plastic base keep unit weights low and dust-tight for the contacts, operating mechanism and trip devices. Power and control terminals are easily accessible regardless of the position in which the breaker is mounted. A flag-type indicator, behind a transparent window, shows when the manually closed breaker is tripped. A flexible rubber boot covers the closing lever.

Contact tips, both moving and stationary, are made of arc-resistant silver tungsten carbide material to give longer life and freedom from welding. The contacts are assembled in the interrupting chamber in the breaker base, which is closed by an insulating sheet. This sheet and base are made of highly arc-resistant materials.

With instantaneous reverse current or non-directional trips, these breakers are applicable for bus sectionalizing and to single or dual feeder, distributing and load circuits. The continuous carrying ability and the interrupting capacity is adequate for present and proposed 28-volt d-c systems and for proposed 120-volt d-c systems.

The flight recorder automatically records air roughness, altitude, and operation of automatic pilot and de-icing equipment.

The instrument was installed experimentally by Capital Airlines on a DC-3 under a test program directed by the Air Transport Association. Capital is one of several airlines scheduled for this program.

The recorders provide commercial airlines increased information on their flight operations, and make possible greater operational control.

They are so accurate in measuring altitude that they indicate changes as small as 10 feet.

The actual record is made by a stylus, which scratches through a thin coating on a slowly-moving strip of paper and leaves a black trace.

The recorder is the result of more than two years of development and testing by G-E engineers at Schenectady and the company's meter and instrument divisions, West Lynn, Mass.

The new magnetic-drag aircraft tachometer indicator is designed to meet U. S. Air Force and U. S. Navy specifications.

The instrument is used to measure the speed of jet engine turbines. Other versions measure the speed of reciprocating engines (both conventional and helicopter) and miscellaneous equipment in aircraft, and aircraft test equipment.

Housed in a small case, the instrument is hermetically sealed for protection against rain, salt spray, sand, dust, humidity and fungus. Two seals, glass to metal and metal to metal, provide double protection.

The new tachometer indicator is available with or without an adapter flange for panel mounting. The adapter can be installed or eliminated by the adjustment of four screws.

A vernier pointer arrangement is included to provide an expanded scale for good readibility.

The Aeroproducts Division of General Motors Corporation at Dayton, O., continued production of propellers and actuators, begun when the division was formed in 1940. (Aeroproducts' self-contained, hydraulically operated, constant speed propeller, developed with the assistance of the Air Force and flown on a P-39 on March 22, 1940, was the first of its kind to make a successful flight.) The year 1949 saw the completion of propeller deliveries for the Grumman F8F *Bearcat* and the North American F82 *Twin Mustang,* as well as deliveries of electro-mechanical actuators for the Fairchild C-82 *Flying Boxcar.*

Current production deliveries include propellers for the Douglas AD-4 *Raider,* the Martin F4M *Mercator* and the North American T-28, plus actuators for McDonnell's F2H *Banshee.* This year dual rotation propellers for gas turbine engines were delivered in experimental quantities for installation on the Navy's Consolidated-Vultee P5Y, the Douglas and North American shipboard fighters and the Air Force B-35 test-bed airplane.

General Radio Company, Cambridge, Mass., manufacturers of radio and electrical laboratory apparatus, continued to serve the industry during the year with its CAA-approved *Strobotac,* used to calibrate aircraft tachometers, and its *Stroboscope,* used mainly in the field of engine and propeller research. Many other General Radio specialized instruments—too technical for detailed description—helped industry users maintain their communication systems during the year.

The B. F. Goodrich Company of Akron, O., continued its long-established role as one of the leaders in the rubber industry. Scores of products, including de-icers, fuel cells, and tires, as well as such specialized items as rivnuts, and airplane wheels and brakes, were produced for the aviation industry during the year.

Following up research and development of previous years, the company went into increased production on two outstanding developments, a successful and practical tubeless tire, perfected in 1947, and "cold rubber," announced in 1948. The puncture-sealing tubeless tires were offered only in a few localities in 1948, but wider distribution came in 1949, and further expansion is expected in 1950.

Cold rubber, stemming from Goodrich research, is a man-made type. It has a long research history, extending back to before Pearl Harbor, and the process for making it was turned over to the government patent pool to speed the war effort. It is expected to give increased tread wear.

All Goodrich research activities were advanced during 1949, the first full year of operation for the company's new research center at Brecksville, O., midway between Akron and Cleveland. The project, started seven years ago, was dedicated June 15, 1948. The center has six buildings on a 313-acre plot. The buildings, ultra-modern in design and equipment, have a total of 144,500 square feet of floor space.

A key supplier of major components of the airplane, the Goodyear Aircraft Corporation of Akron, O., in 1949 continued to expand in a number of fields. These included cross-wind and belt-truck landing gears, plastic canopies, all-weather stainless steel rotor blades for helicopters, radar and electronics, and a wide range of airplane design problems. Experimental work and production was continued on rubber, plastic, aluminum and fiberglas fuel tanks.

Much of the company's work in radar was confidential, but mention might be made of the radar reflectors and tower supports, with the huge Goodyear Akron zeppelin dock affording one of the few places in the world where prototypes of high towers could be assembled and tested indoors.

The GA-2 "Duck" planes designed by the company during the war to furnish a quick and inexpensive check on design projects, continues a useful part of its research work in the field of amphibious aircraft, particularly during the last year in the matter of the planing tail type hull and improved sound proofing of the passenger cabin.

A number of improvements were effected in the sub-hunting blimps while the war was under way, particularly in propulsion, sea-air rescue, and radio and radar search gear. In the pressure for war production this equipment was installed wherever room permitted and it was not until the war was over that the Navy had time for a completely redesigned, highly functional car which would effect the most efficient use of equipment and reduce fatigue for crews on long cruises. Water ballast pick-up equipment was also added. A dozen big K-ship cars are now being modified and modernized at Wingfoot Lake, the company's operating base. The assembly of the huge helium-containing envelopes went to the Goodyear aircraft plant at Litchfield Park, Ariz., where the company has a million square feet of floor space.

Goodyear aircraft was organized as a subsidiary of the tire company in 1939 with a force of 40 men, grew during the war to a force of 35,000 at the peak, supplying major components for Martin, Consolidated, Grumman, Boeing, Northrop, Curtiss, built 4,000 complete Vought Corsair fighter planes for the Navy, and 134 blimps.

Cutbacks after V-J Day reduced the force to 1,200 men, many of whom were on temporary re-conversion work. By 1949, the corporation had 3,500 employes, 800 of whom are highly skilled engineers.

Greer Hydraulics, Inc., Brooklyn, N. Y., continued working in close harmony with airlines and accessories manufacturers during the year by offering its complete line of aircraft maintenance and service machines. These units perform test operations rapidly and accurately, under severe simulated conditions, and are widely used in the industry.

The Heinemann Electric Company of Trenton, N. J., continued production of its Aero-Magnette, an electric-magnetic circuit breaker for protection of lighting, fire control, motor and radio circuits of military and commercial aircraft. The circuit breaker has been made vibration proof and shock resisting to withstand conditions met in airplane operation. Due to the absence of thermal elements, the current-carrying capacity as well as the minimum and instantaneous trip points are not affected by ambient temperatures and constant protection under all flight conditions is assured. True inverse time delay in a hermetically sealed unit allows the passage of inrush current. However, continued overload above the minimum trip point opens the breaker in time inverse to the ratio of the current. After the breaker opens an overload or short circuit, it may be reclosed at once provided that the current has returned to normal. No resetting is necessary, since the handle moves one way to on and the other way to off.

The Hufford Machine Works at Redondo Beach, Cal., as the result of a continual research and development program dating from 1943, has expanded the process of stretch-warp forming from the production of small parts from extrusions, to making a wide variety of parts of all sizes and shapes from both extrusions and sheet stock, and from such materials as high strength aluminum alloys, stainless steel and high temperature resisting alloys.

Hufford Models A5, A10 and A15 have been progressively developed primarily for forming stringers, narrow sheet metal parts and extrusions of constantly increasing size. With the completion of the Model 50, sheet stock up to 42" x 144" was successfully formed for skin contours, fillets, scoops, wing tips, cowling rings, and other parts.

Early in 1948 designs were started for a 150-ton machine, known as Model 46, capable of stretch-wrap forming both sheets and extrusions. Completed and delivered to Boeing in Wichita in June of 1949, both size and tonnage capacities were again enlarged over any previous model with several new and advantageous features.

Of primary importance was the incorporation of independent arm travel, enabling either arm to be operated singly from the central control pedestal. This feature not only made die setups even less critical and facilitated forming of non-symmetrical parts, but it opened up an entirely new vista of forming tapered section materials. Heretofore this possibility was limited by the tensile strength of the material at its thinnest point. Regardless of the system sufficient stretch could not be applied to form the thick end without fracturing the opposite and weaker end. Experimental work shows definite promise of successful stretch-wrap forming of tapered sections by first wrapping the thin end. With its completion, the necessary additional tension can be applied to form the thick end, possible because of the tendency of the material to work-harden across its surface as forming progresses (thus raising its tensile strength), plus the increased friction of the completed thinner half against the die surface which automatically increases grip and reduces breakage hazard at the jaw.

At present, two new machines (Models 44) are under construction for both Lockheed and Douglas. This model is similar to Model 46 but is of 200-ton capacity, and handles sheets measuring 24 feet by 72 inches. Extrusions within these work limits are also accommodated. Both Models 46 and 44 have a hydraulically-operated bolster plate which may be extended beyond the arms for ease of die loading. It is then retracted to forming position.

Employment of the stretch-wrap form process has proved a particularly adept solution for mass formation of many varied parts and in sheet gauges up to ¼" to date. Since there seems to be no impairment of functions, regardless of constantly increasing machine size, stretch-wrap forming definitely paves the way for all present and future predictable production requirements suitable for this method of manufacture.

Hydro-Aire, Inc., of Burbank, Cal., made extensive tests of the Hytrol unit, used as an anti-skid device, on various model transport aircraft. Hytrol is the trade name adopted by Hydro-Aire for the anti-skid wheel braking device developed by Boeing Airplane Co. for use on the B-47 *Stratojet* and since licensed for manufacture by Hydro-Aire. It also worked on several accessory units for jet engines including an oil boost pump, now in the final stages of development, for use on aircraft flying at high altitudes; a new vane type engine-driven fuel pump; an air turbine-driven fuel boost pump and several combinations of electrically driven fuel and oil booster pumps for jet aircraft use. During 1949 Hydro-Aire produced aircraft component equipment at a rate of $3 million per year and in November the company stated that this rate would probably be upped to $6 million during the following six months. Hydro-Aire produces more than 200 pieces of equipment for aircraft, primarily in the fields of fuel, hydraulic and pneumatic valves.

The Kollsman Instrument Division of the Square D Company, which this year celebrated its twenty-first birthday anniversary, marked it with a number of new instruments and a 1949 17-chapter catalogue listing its standard products. Entire chapters were devoted to the wide variety of accelerometers, air speed indicators, altitude instruments, angle-of-attack indicators, compasses, direction indicators, machmeters, mach number limit switch, pitot and pitot static tubes, pressure gauges, pickups, sextants, tachometers, vertical speed indicators, aviation clocks, and scores of other products.

Beyond producing these, the division devoted a large amount of its time to secret research for the military. Also expanding during 1949 was the precision optics department of the division, and work devoted to special-purpose motors, which now accounts for about a fourth of the total Kollsman business.

New products introduced to the general public included a new a.c. servo motor, combining high torque, high speed, low inertia, small size and light weight. The motor is designed to reverse fully in two-tenths of a second from 11,200 rpm. It delivers 2½ ounce inches stall torque which varies directly with the control winding voltage. The new motor is only 1¾ inches in diameter by 1¾ inches in length and weighs 6.1 ounces. It is especially adaptable to the high performance servo systems used in military and aircraft computers, radar direction equipment, automatic pilots, searchlight directors, fire control computers and various laboratory equipment.

The frame of the motor is fully enclosed. Moreover, the unit is so constructed and lubricated as to insure accurate performance at the extreme temperatures required for military aircraft application.

Another new development was the Kollsman 160 altimeter, a new sensitive altimeter with an altitude-counter on the dial. The two-digit counter in the new instrument both speeds up and simplifies the reading of altitude. Marking the first radical change in this basic flight instrument, the new altimeter is designed to substantially relieve the pilot of the hazards of error and confusion in reading the correct flight altitude, particularly at times of stress. It was developed following a study by Dr. Walter F. Grether of the U. S. Air Force Aero Medical Laboratory, showing the types of error likely to occur in reading the multiple-pointer altimeter. The instrument with the new type of indication was developed at the suggestion of the U. S. Air Force.

Instead of 3 pointers, the Kollsman 160 Altimeter has on its dial a single pointer and a two-digit counter similar to the automobile mileage-counter. The dial is graduated at 50 ft. intervals and its single pointer makes one revolution per thousand feet. Each revolution is then registered on the counter which gives altitude in thousands of feet. For example, at 16,080 ft. altitude, the pilot would, at a glance, see the number 16 registered on the counter and simply add 80 indicated by the pointer. Dials graduated at 20 ft. intervals are available for commercial use.

Wide acceptance was recorded for the Kollsman periscopic sextant by the major airlines, some of whom adopted it as a standard instrument in their long-range aircraft during 1949.

The sextant, which eliminates need for the plastic astradome, makes possible more rapid sights, increased flight speed or less power for a given speed, and fuel saving.

Pan American and American Overseas were among the first to install the sextant as standard equipment on Boeing 377's and Lockheed *Constellations*. Trans-Canada is using the new instrument as standard on its trans-Atlantic Douglas DC-4M *Northstars*. Other lines are following suit.

As compared with the old hand-held sextant, the new one is more easily and more rapidly operated and its timing device and averager are far superior. It removes the need for the astra-compass, since the azimuth ring on the mount provides an indication of the aircraft heading.

A new synchrotel, whose electrical output is increased five hundred per cent, and weight and volume are decreased to one-third of the former Kollsman unit, was put in production during the year.

The synchrotel functions as an inductive electrical pickoff wherever driving torque is so small that a conventional synchro cannot be used. Its lightweight rotor, ¾ gram, makes it useful where very high accelerations and rapid oscillations are to be measured. It is readily adaptable to flight and engine instruments and may be incorporated within the case of a regular dial and pointer instrument or in a blind transmitting instrument to be remotely located.

Other varied typical applications of the synchrotel are in air speed and altitude controls for autopilots, flight test recorder inputs, air traffic laminar controls, bomb and gun sight computer inputs, and telemetering. It can be used in most conventional synchro systems.

New transducers were also introduced in an attempt to answer the present quest for a highly accurate and precise electrical signal device for the telemetering system, which has become all-important in connection with flight testing and control application in pilotless aircraft.

Unusually small in size and light in weight, the Kollsman transducer achieves the proper static balance imperative for reducing the acceleration error to a minimum. No changes are noted when the transducer is subjected to vibrations having frequencies between 8-30 cycles per second with amplitude of .0625", and between 100-130 cycles per second with amplitude of .005".

Two major developments featured activities of Lear, Incorporated, with national headquarters in Grand Rapids, Mich.

One was the formation of a missile controls design group at the company's Los Angeles plant. As a nucleus for the group, Lear moved some of its top engineers and physicists from Grand Rapids.

Second was progress of Lear's Romec Division at Elyria, O., where aircraft products developed for military and civil aircraft during 1949 included dr-air pumps, improved water-injection pumps, power-driven fuel pumps, and dual pressure scavenger pumps.

Lear-Romec RD-8500 water-injection pumps of the fully submerged type were modified and improved. (The first successful fuel pump adopted for military flying after World War I was the Romec Type F-4.)

Romec division sales for the first nine months of 1949 were approximately 100 percent greater than for the same period of 1948, with profits consistently 10 percent of gross.

Great technical progress was made all along the line in the company. Automatic pilots for the Air Force still played an important production role, and work continued on special versions for new military aircraft. Delivery was also made on complete automatic control systems for guided missiles, as well as some remote reading attitude gyros. Considerable progress was made on a number of other gyro instrument projects, and further refinements went forward on the new type of automatic flight boost control, developed from the auto-pilot servo system. High temperature sensing elements for jet engines were further developed, and a project continued for radio remote controlled test flying of military aircraft.

Production went forward on electronic automatic temperature controls, both for engine cylinder temperatures and carburetor pre-heat control. The company began a production run on a new VHF transmitter, as well as a simplified omni-range station direction indicating system.

Over-all operations of Lear, Incorporated, showed steady increases and a marked improvement over last year. At the 1949 halfway mark, net operating profits were $222,000, as contrasted with an operating loss of

$702,000 for the full year 1948. The company had an unfilled order backlog of $4.9 million, plus additional contracts on the horizon of $2.5 million, indicating a healthy year-end backlog with which to begin 1950.

During the past year, Linear, Inc., manufacturers of mechanical packings, expanded its laboratory and production facilities to meet the ever-increasing demands brought about by jet propulsion development. Top on the Linear agenda was testing and finally moulding the latest polymers such as Kel-F and Silicone for special applications. Kel-F under certain conditions is suitable for a seal over a temperature range of minus 320° F. to plus 350° F. against concentrated sulfuric, hydrofluoric, hydrochloric, and other vigorous oxidizing materials.

A number of precision moulded synthetic rubber products were also major production items for Linear during the year.

Linear was an active participant in the 1949 Joint Industry Conference on Hydraulic Standards for Industrial Equipment which worked to establish new hydraulic packing standards.

A new electronic fuel gauge was the most significant 1949 equipment developed by the aeronautical division of the Minneapolis-Honeywell Regulator Company of Minneapolis, Minn. The gauge is 30 percent lighter and more adaptable than its predecessor. It is being used principally in Air Force and Navy planes built by such companies as Boeing, Consolidated, Grumman, Fairchild, Northrop, Martin, North American, Douglas, and in a number of small jet fighters. It also has an important research role in developing new automatic flight controls.

Production has increased sharply on Honeywell E-6 autopilots, developed since the war for use in bombers such as the B-36 and B-50. Current experiments in this field include a number of accessories for synchronizing autopilot and radar tracking equipment.

Most of the company's production in 1949 was for military aircraft. But Honeywell turbosupercharger controls and the new fuel gauge are in Boeing's new civilian airline *Stratocruiser*. A new factory, devoted almost exclusively to aeronautical devices, was completed in November and went into full operation before the end of the year. A wing was also completed to the Philadelphia plant during the year, and a new factory began operations near Glasgow, Scotland. Sales moved sharply higher during the year, and over 1,500 employees were added to the over-all company payrolls.

The company now operates plants in Wabash, Ind., Chicago, Philadelphia, and Toronto, five major factories in Minneapolis, six smaller shops and warehouses, and has seven subsidiary companies abroad.

The New York Air Brake Co. continued supplying its aircraft type hydraulic pump, Stratopower, to commercial and military users in the industry during the past year. The Stratopower, with a pressure rating of 3000 psi maximum, is produced with both constant and variable deliveries.

The constant delivery capacity is 0.25 gpm at 1500 rpm, rated speed to 3750; while the variable capacity is 2.0 to 10.0 gpm at 1500 rpm, rated speed to 3750 rpm.

The Parker Appliance Company, Cleveland and Los Angeles, manufacturer of components for fuel hydraulic systems, introduced several new products during 1949, most notable of which were:

(1) Fuel-Resistance O-rings made of special rubber compounds to withstand service in various aviation fuels under most extreme military operations.

(2) Level Control Valve—an internally tank mounted valve for control of liquid levels, particularly applicable in single point and underside fueling, fuel transfer systems, and pressurized drop tanks. The valve was used during the year on Republic F-84 *Thunder Jets* and McDonnell F-2H *Banshees.*

(3) A 75 PSI Gate Valve, for shutoff in fuel systems, which eliminates sticking and simplifies maintenance. This valve, resulting from 4 years' development work, has a fully guided square gate which cannot bind or jam.

(4) Special tank nozzles and related units for single point and underside fueling service.

In addition, the company was busy during the year manufacturing jet engine parts such as duplex injection nozzles, injection manifold dump valves, stop cocks, 600 PSI fuel check valves, hot air shutoff valves, high pressure fuel shutoff valves, special fittings, fuel filters and elements.

In 1949 the company instituted a plan of standardization. This led to a considerable removal from inventories of many slow-moving items.

Meanwhile, Parker continued to offer its standard products—manual and motor-driven fuel selector and shutoff valves; check, relief, restrictor, shuttle, and other hydraulic valves; swing check and other air and vacuum valves, engine primers, aircraft fittings, and hydraulic O-rings.

The Pawling Rubber Corporation of Pawling, N. Y., one of the first processors of synthetic rubber for high altitude aircraft, devoted most of its efforts in 1949 to supplying special synthetic rubbers for the Naval aircraft program and the Air Force. Newest developments are special silicone rubber parts for high-temperature applications in jet aircraft. The company pioneered similar installations in early high altitude bombers such as the B-17, B-24, B-29, and the B-32.

Under military contract, a new type all-metal rotor blade was fabricated and successfully whirl tested by the Prewitt Aircraft Co. of Wallingford, Pa. These blades, designed and fabricated for mass production, include a wrapped stainless steel cover from trailing edge to trailing edge. They possess, for the first time in rotor craft blades, an absence of stress risers, affording maximum structural strength and a life expectancy of that of the present day helicopter. The single sheet of stainless steel permits maximum aerodynamic efficiency through the smooth external surface, free from indentation, oil cans, etc. The use of these blades on operational helicopters will enable all-weather operations under conditions of darkness, rain, hail, ice, etc. Another program consisted of development of a rotary wing parachute.

Under another military contract, a project was begun to compile reference data on all types of rotary wing aircraft—historical and modern—to provide the following data: all rotary wing patents of the U. S. and foreign countries; handbooks on the important phases of rotary wing engineering such as aerodynamics, performance, vibration, stability and control, etc.; a survey of historical and modern rotary wing aircraft; and a summary of rotary wing manufacturing and operations.

Raybestos-Manhattan, Inc., of Passaic, N. J., was able to maintain its niche as one of the largest manufacturers of asbestos and rubber products during 1949, one of the prime factors being its plant expansion program and installation of new and better machinery.

Research was also stepped up during the year. Notable among past achievements of the company's skilled technicians was the first oil-proof synthetic rubber hose for airplane hydraulic controls and the development of brake lining.

Besides supplying civil and military aircraft groups, Raybestos-Manhattan products were widely used at airports for maintenance and repair work.

Saval, Inc., of Los Angeles, which specializes in the design and manufacture of all types of fluid controls for aircraft, continued during 1949 good sales of their main products—solenoid, motor, pressure and manually operated shutoff and 3 and 4 way selector valves for 1500 and 3000 psi hydraulic, pneumatic and special fluid service. They also manufactured a line of high pressure solenoid motor and manually operated fuel valves as well as a series of motor-operated gate valves for fuel and air service. Business was widely distributed among major airframe and engine manufacturers, as well as the major airlines throughout the United States.

The firm, a pioneer in the development of 3000 psi solenoid and manually operated valves for hydraulic and pneumatic service, has consistently manufactured the great majority of this type of equipment. A more recent development is a line of motor-operated gate-type fuel shutoff valves, on which Saval was the first firm to receive unqualified Yellow-Dot approval. The company has also developed a new three-position, solenoid-pilot-operated line of four-way selector valves.

Scott Aviation Corporation of Lancaster, N. Y., continued development and improvement of portable airline oxygen breathing equipment, supplying it to the majority of domestic and foreign airlines, including "smoke mask" equipment for use by crew and passengers during flight emergencies. Improvement of this equipment in 1949 enabled it to be used for both emergency work or to give oxygen to passengers requiring it in flight.

Scott also introduced an eight-inch tail wheel assembly for four-place aircraft, providing greater ground maneuverability, better vision over the nose and improved taxiing characteristics. To the company's line of emergency breathing equipment for fire fighting, especially fires resulting from crashes, were added several models of the Scott Air-Pak, self-contained breathing equipment providing its wearer with complete respiratory protection.

Scott Aviation Corporation in the first half of 1949 had its highest sales volume since 1946, with modestly profitable operation, and the year had the highest volume since V-J day.

The Scintilla Magneto Division of Bendix Aviation Corporation has maintained its production of fine aircraft ignition in both the high and low tension systems, and has brought out jet ignition designs of outstanding performance which are being used by such jet engine manufacturers as Westinghouse, Allison, Pratt & Whitney, and others. This division in 1949 met the ever-increasing demands for its electrical connectors for aircraft, radio, electronic and ordnance vehicle requirements. Improvements and additions to the existing line of connectors make it available for nearly every application.

Spencer Thermostat Division of the Metals and Controls Corporation of Attleboro, Mass., and manufacturers of a line of aircraft accessories under the trade name Klixon, reports a normal post-war year. Many old products were redesigned to incorporate new materials and techniques for better performance, better operation at high altitudes and higher temperatures, and other improvements. The trend toward completely sealed devices has been anticipated and development is going forward on circuit breakers and thermal devices which are self-sealing and can be hooked into a completely sealed circuit. Work is also going forward on a low-rate breaker to satisfy the demand for very small units which would be rated below the present two amperes, and on a new remote relay sensing unit suitable for the three-phase aircraft system. These major projects are being combined with thousands of small improvement projects already underway.

With the marked increase in industry and government interest in all-weather flying, Sperry Gyroscope Company celebrated 1949 by introducing to the general public a new gyroscopic flight instrument, the Zero Reader.

Sparked by a late-1948 article in *The Saturday Evening Post* authored by Hy Sheridan and entitled "Aviation's Incredible Dingus," airline, trade, press and military personnel in great numbers flew the device early in 1949 and unanimously confirmed that it was an outstanding development in instrumentation.

The Zero Reader was developed by Sperry engineers since the war with the cooperation and encouragement of the USAF's All-Weather Flying Division and the Air Transport Association. It is a gyroscopic flight instrument for aircraft which takes the type of information usually supplied by the gyro horizon, directional gyro, magnetic compass, sensitive altimeter, and cross-pointer meter and presents this information to the pilot on a simple two-element indicator in a form which tells him directly how to move the controls.

It will go into operational use on the airlines early in 1950, and is expected to help commercial carriers obtain lower operating minimums on the CAA's ILS system, because it provides a manual means of making precise low-weather approaches on ILS or GCA.

The year also saw increased use of the A-12 Gyropilot by domestic and foreign airlines. They employ it for more passenger comfort through stabilization in rough air, more precise navigation, and lower operating minimums through use of the automatic approach control component in making automatic approaches on ILS. The E-4 Gyropilot (Air Force version of the A-12) was installed in all USAF's B-45 jet bombers, and was further evaluated by the Air Force and Navy as an all-weather flying aid and stabilized bombing platform for bombers.

In the field of air navigation and traffic control, Sperry continued developments under Air Force contracts for a 5000-megacycle instrument landing system, a precision omni-directional range and distance measuring equipment. At year's end, details of these developments remained classified. Security classifications likewise apply to a sizable volume of Sperry contracts for armament, radio, radar, and guided missile developments.

Following two years of flight testing, a Sperry engine analyzer entered regular service on Pan American Airways in January, 1949, followed by its use on all of their *Stratocruisers* and *Constellations* as standard equipment.

The Analyzer was developed since 1945 because of the increasing complexity of aircraft and their power plants. It was first introduced in 1947. The first year of trial and evaluation produced several "saves," and led to an accelerated development program. Quantity production began late in 1948.

Introduction of the engine analyzer marks a new era in aircraft engine maintenance. With it, flight crews can detect, locate and identify engine malfunctions during flight. Knowing the nature and location of ignition or vibration troubles before an aircraft lands at its base eliminates much valuable trouble shooting time.

During the year a portable version of the airborne analyzer was introduced for ground maintenance and trouble shooting and to accommodate smaller aircraft. By autumn, twenty-one portables were in use by airline and other aircraft operators.

In military aviation, the analyzer is currently installed for evaluation tests on USAF B-50 and B-36 bombers. It is expected that employment as an engine monitor will provide improved cruise control and resultant longer bomber ranges. It will also solve many of the maintenance problems associated with high-altitude performance of military aircraft.

The Sperry Gyrosyn Compass, used extensively in airline and military aircraft, shared equipment honors on two record-breaking flights during the year. In Bill Odom's *Bonanza* flight from Honolulu to New York, he used the Gyrosyn for dead-reckoning navigation, as he had on his two world circuits. In the Bendix Trophy transcontinental dash, winner Joe De Bona used the Gyrosyn exclusively to dead-reckon the 2100 miles from California to Cleveland.

During the year Sperry chalked up a sizable volume of business on such aeronautical instruments as the Attitude Gyro, Gyrosyn Compass, Directional Gyro and Gyro-Horizon. Through September, contracts from the Air Force, Navy, commercial and private customers called for 10,800 of these instruments, the majority of them Attitude Gyros and Gyrosyn compasses.

Early in the year Sperry introduced the H-5 electric-driven Gyro-Horizon which claimed a number of advantages over all previous models. It can be made ready for use in 25 to 40 seconds from the time the main switch is turned on. Because the horizon bar, banking indices, and miniature airplane are closer to the bezel glass, its angle of vision is increased approximately 40 percent. Like the H-3 model, it is non-tumbling, even during a complete loop.

Vickers, Incorporated, a subsidiary of the Sperry Corporation at Detroit, Mich., devoted most of the year to manufacturing oil hydraulic pumps, motors, valves and accessories for aircraft. Probably best known of its products are the engine-driven constant displacement 3000-pound-per-square inch hydraulic pump, which is standard among the airlines on Convair 240, Douglas DC-4 and DC-6 and Martin 2-0-2 airplanes, and its variable displacement pumps on various models of the Lockheed *Constellation*. In addition, Vickers' variable speed transmission, consisting of hydraulic pumps and motors, have been used extensively for speed control and main power transmission on cabin compressor and air conditioning drives.

Considerable engineering and field service time was devoted to the development of improved equipment, working towards increasing operational time between scheduled overhauls.

Noteworthy among Vickers' wartime developments was the design and volume production of infinitely variable and reversible transmissions for driving aircraft gun turrets in train and elevation. This type of work has been continued since the war and expanded into all fields of servomechanisms, resulting in some startling improvements in the accuracy of power-driven turrets. Best known among these is the Vickers drive in the Emerson Electric Manufacturing Company's tail turret installed on the Lockheed P2V Navy patrol airplane.

Another wartime development, first undertaken in cooperation with the U. S. Coast Guard, is the hydraulically driven rescue winch for helicopters. This has proven to be a most worthwhile accessory to the helicopter, and has been adopted as standard equipment for Air Force, Navy, Coast Guard and Marine rescue services.

Standard Oil Company of California reported two outstanding developments during the year. One was the manufacture and marketing of new Chevron Aviation Gasoline 80/87, the first fuel of its kind to be offered the aviation industry. With a controlled take-off antiknock rating of over 87 octane, it virtually eliminates the twin dangers of detonation and pre-ignition. Pratt and Whitney has already approved 80/87 fuel for use in its Wasp Junior engines for which a 91 octane fuel was formerly specified. Results: lower fuel costs and lower maintenance costs, since the new 80/87 contains only one-eighth as much lead as regular 91 octane fuel.

The second item of interest was development of RPM Non-Inflammable Hydraulic Fluid, which will not ignite even when subjected to a 5000-degree flame. This fluid will eliminate the fire hazard, especially in bigger planes which use very high pressure hydraulic systems in operation of landing gear mechanisms, flight control surfaces and cabin superchargers. Because use of the fluid involves a change of seals in these hydraulic systems, marketing must await development of sealant material, now underway.

Swedlow Plastics Company of Los Angeles, Cal., one of the oldest and largest producers of fabricated acrylic parts to the aviation industry, produced fuel cell backing for Glenn L. Martin, Republic, Canadair Ltd., Boeing, Lockheed, Douglas, North American, Northrop and others.

A new development in 1949 was improved laminated acrylic resins for production of B-29 and B-36 sighting blisters. This improved material was developed in a cooperative program in conjunction with Boeing, Consolidated Vultee, and the Air Materiel Command at Dayton, O.

Swedlow has also developed during the past year a new and superior reinforcing and attachment media for acrylic enclosures for aircraft. Known as Pylon S-6, this acrylic bonded fiberglas laminate provides a means for making an attachment, the strength of which approaches that of the acrylic sheet itself. This product is used on the North American AJ-1 patrol bomber which utilizes a canopy approximately 60 square feet in area—one of the largest canopies yet to be produced as a one-piece unit on a production basis.

W. Harris Thurston, Inc., of New York, continued production of Airwing fabric and tapes used in the manufacture and repair of aircraft. Airwing was used prior to the first World War and has been a CAA-approved Army and Navy specification fabric ever since. Thurston also manufactures other fabrics which are coated and used in the aircraft industry.

The AW-12-25 and AW-12-36 aircraft batteries were the principal items produced by Willard Storage Battery Co. of Cleveland, O., during the year. Both batteries are designed primarily for use in personal planes and feature the Willard "Manifold-Vent" which collects all battery gases and charging spray and vents them completely outside the aircraft through an accessory vent exhaust tube. Because of this vent construction, the batteries have been CAA-approved for installation without battery boxes. A Willard adjustable aircraft battery hold down cradle is used with the batteries.

High-power plates were also produced by Willard for use with the manifold-vent batteries to increase starting performance better than 40% at zero temperatures in comparison with conventional plates of the same size.

Other Willard batteries designed specifically for aircraft are: SYW-7-3, SYW-7-6, TPWS-13-6, and KWS-13-6.

The Wyman-Gordon Co. of Worcester, Mass., continued during 1949 as one of the leading manufacturers of aluminum, magnesium, and steel forgings. In aircraft, most forgings were procured for use in the airframe, the engine, and the landing gear assemblies.

During the last few years important research work has been done by the company on the forging of aluminum and magnesium alloys. One of the by-products of Wyman-Gordon's pioneering activity was the Aircraft Forgings Conference, requested by the Air Services this spring, and held in Worcester, May 3 and 4. Representatives of the Army, Navy, and practically every major aircraft manufacturer, from all parts of the country, attended. This conference was the first of its kind ever held, and already has resulted in improvements in the design of several proposed aircraft.

The great science of heat treating, now so widely known and so important in the manufacture of all highly stressed material, was pioneered by Wyman-Gordon—the first to commercially heat treat steel forgings. Many of the fundamentals of modern, closely-controlled heat-treating processes were developed during this early period. In addition, the company designed and built its own heat-treating furnaces, there being none in existence at the time, and many of the principles of these early furnaces are still in use today.

In the testing of steel prior to forging, Wyman-Gordon has also led the way and many of the now standard acceptance procedures were developed in the Worcester and Harvey laboratories. Every heat of steel is not only checked chemically but is also tested for hardenability and in the case of aircraft material for magnaflux quality as well. The fracture test, long used by Wyman-Gordon as a laboratory check, has recently been developed as a production test for forging quality. It is now a standard Wyman-Gordon test on important aircraft forgings.

Zenith Plastics Company of Gardena, Cal., manufacturers of low-pressure reinforced fiberglas products for almost every aircraft company in the country, had an exceptionally good year in 1949. Specialties were loop antenna housings, such as a section of the nose, antenna housings, stabilizer tips, rudder tips, aileron and flap trailing edges, antenna masts, pitot masts, radomes, window frames, etc. One specific example which carries almost every part listed is the Lockheed PO1W.

Other low-pressure lamination parts produced in 1949 by Zenith are the laminated fiberglas window frames for the DC-6 and Convair 240, and the fin tips for the Lockheed F-90, T-33, P2V3W, P2V4, and F-90; Bell XS-2; Republic F-84, McDonnell F-85, F-88 and *Banshee;* Consolidated P5Y-1.

### Other New Products

Electro-Aire, Inc., of North Hollywood, Calif., produced a 1/100 hp DC motor Model 1305 that can be used for any type of application requiring linear or rotary motion. The motor weighs 15 ounces and measures 2.875 inches by 1.75 inches.

Guardian Electric Mfg. Co., Chicago, Ill., developed a small, compact switch operable in four directions, weighing only 15.3 grams and designed to control 3 amps, 28 volts, d-c.

General Electric Co. made available new circuit breakers for both 28 and 120 volt d-c systems with continuous current ratings as high as 600 amps for the 28 volt breakers and 250 amps for the 120 volt units.

Aero Castings, Inc., Canaan, Conn., announced its new "Bacco" process, a metal casting process which simultaneously molds, casts, forges and coins a product to the finished state, eliminating 60 to 70% of the machining operations normally required, while achieving a 10 to 40% improvement in tensile and yield strength.

An electrically-driven stick shaking device for stall warning was developed by Safe Flight Instrument Corp., White Plains, N. Y. The device weighs 20 ounces and is actuated by the SFI pre-stall sensing vane on the leading edge of the wing.

Robinson Aviation, Inc., of Teterboro, N. J., introduced an all-metal shock mount to protect instruments, electronic control panels and similar installations from vibration. The unit is made of stainless steel wire woven into compact supports.

An auxiliary power plant supplying 400 cycle a-c power for testing instruments and controls was developed by Jack and Heintz Precision Industries, Inc., Cleveland, O. The power plant is rated at 62.5 KVA at .8 power factor. 400 cycle, 208/120 volt, 3-phase a-c output is supplied from 60 cycle, 440- or 220-volt, 3-phase a-c input.

Stratos Corp. Division of Fairchild Engine & Airplane Corp. developed a new lightweight air conditioning unit for use in cooling transports, photographic aircraft and hospital planes while on the ground. The unit will use air as the working medium and a 100 hp aircooled gasoline engine for power. Its size is 3' x 3' x 7½' and weight, under 1,000 lb. Cooling capacity per day is equal to 28,000 lb. of ice.

A new aircraft fire detector with positive hermetic sealing, by means of an outer can and glass terminal seal, was developed by Control Products, Inc., of Harrison, N. J. Severe engine vibration, reciprocating, jet and rotary wing frequencies have no effect on the detectors.

Under a Navy contract, the University of Chicago developed an instrument which could accurately measure humidity and temperature at 99,000 ft. (twice the previous record for such work).

Aircraft Radio Corp. produced a new Type F-11 Isolation Amplifier for aircraft use designed (1) to make it possible for the pilot and co-pilot to select any combination of 10 receivers, sidetone, interphones, etc., with complete independence of the other's choice, and (2) provide loud-speaker operation to both pilot and co-pilot. Weight of the unit is 8.3 lb.

Globe Industries, Inc., developed a new stall warning indicator which automatically shakes the pilot's stick as his plane approaches a stall. A small motor in the device drives an unbalanced weight which is located at the base of the stick. As the stall position approaches, the motor is actuated by an attitude sensing device, setting up the stick vibration.

Johns-Manville put into production a new Thermoflex insulation blanket to protect jet engine tail pipes, exhaust cones, valves, pumps, guided missile structure and fuel storage tanks, etc., from fire hazard. Composed of an asbestos fiber pad sealed within metal foil, the blanket is custom-made in thicknesses of ½ in. and up.

Hoover Electric Co., Los Angeles, Cal., designed an electrical actuator to regulate internal pressure by bleeding off excess air. The actuator weighs 7½ lb. and consists of a 208-volt motor with a 1/6 hp output.

# 1949 DAY BY DAY CHRONOLOGY

(NOTE: The following chronology is condensed principally from *American Aviation Daily*, only daily in the aviation field; published by American Aviation Publications, Inc., Wayne W. Parrish, Editor.)

## JANUARY

### Jan. 3

70-Group Air Force Bill introduced by Rep. Carl Vinson (D., Ga.), new chairman of Armed Services Committee, as 81st Congress opens. Bill provides for procuring 5,200 aircraft or 42,500 tons in fiscal 1950, almost double fiscal 1949 quota.

$10 million B-47 subcontracts awarded by Boeing Airplane Co. to Bell Aircraft Corp. ($7,575,072), Curtiss-Wright ($1,353,424), Glenn L. Martin Co. ($1,081,569).

Joseph J. O'Connell, Jr. and Oswald Ryan reappointed chairman and vice chairman of Civil Aeronautics Board by President Truman.

Cleeman Withers elected secretary of Curtiss-Wright Corp. and its subsidiaries.

### Jan. 4

Hearings on route consolidations open on Transcontinental & Western Air, Eastern Airlines and American Airlines before Civil Aeronautics Board.

Air Transport Association shows 1948 safety record for domestic scheduled airlines was 1.41 passenger fatalities per 100 million passenger miles, ahead of 1947 record of 3.2 and one of the best all-around safety records in history.

Oliver P. Echols, president of Aircraft Industries Association, announces he will resign to become chairman of the board of Northrop Aircraft, Inc. Leland D. Webb, vice president of AIA's western office at Los Angeles, becomes acting general manager of the Association, with headquarters in Washington.

### Jan. 5

Sen. Edwin C. Johnson (D., Colo.), new chairman of Senate Interstate and Foreign Commerce Committee, introduces bill favoring "Merchant Marine of the Air" through government-subsidized construction of cargo aircraft. Matching bill introduced in House by Rep. John Kennedy (D., Mass.). Bills would place job of building fleet on Air Force, and call for initial cost of from $100 to $500 million.

Civil Aeronautics Board begins probe of Lehman Brothers interest in aviation.

Colin H. McIntosh named director of operations, All American Airways.

### Jan. 6

Boeing Airplane Co. leads airframe builders for the Air Force in fiscal 1949 (11,224,600 lb. of airframes, approximately $532 million), with North American Aviation, Inc., second (5,846,200 lb., $241 million), Lockheed Aircraft Corp., third (4,587,200 lb., $132 million). Grand total of Air Force purchases estimated at 2,632 planes, $1,567 billion.

Debenture interest for 1947, 1948 and first quarter of 1949 to be paid by Capital Airlines following company's improved financial position, J. H. Carmichael, president, announces.

Kenneth McKellar (D., Tenn.) officially named chairman of Senate Appropriations Committee, Millard Tydings (D., Md.) of Armed Services Committee, Olin D. Johnson (D., S. C.) of Post Office and Civil Service Committee.

### Jan. 7

Civil Aeronautics Board denies motion of National Airlines to dismiss its dismemberment case.

Air Force announces a new unofficial climbing speed record set by the Bell X-1 at Muroc Air Force Base with Capt. Charles E. Yeager at the controls, climbing more than 13,000 ft. per min., compared with 8-10,000 fpm for jet planes.

Air National Guard doubled its manpower in 1948 with strength of 34,981 officers and men, announces Gen. Kenneth F. Cramer, chief of the National Guard Bureau. Air Guard authorized to increase its manpower to 41,000 by June 30, 1949.

T. P. Wright, former Civil Aeronautics Administrator and now president of Cornell Research Foundation and a vice president of the University, elected to the board of directors of Robinson Airlines, New York.

### Jan. 10

Air Force officially confirms report that North American Aviation, Inc., has received a contract cutback of approximately $117,300,000 for 51 B-45 jet bombers.

President Truman submits to Congress fiscal 1950 budget for the National Military Establishment. Under the budget, the Air Force would be able to buy 1,669 planes in 1950, about 1,000 less than originally planned for fiscal 1949. The Navy would be able to purchase an estimated 1,100 — 123 less than planned for 1949. It would necessitate an Air Force reduction to 48 combat groups, instead of the generally accepted 70. The Civil Aeronautics Administration would receive in fiscal 1950 a $10,385,301 increase, or 11% over 1949 estimates; Civil Aeronautics Board would receive a net increase of $530,000; and the National Advisory Committee for Aeronautics an increase of $15,795,000. Also proposed is an appropriation of $41,753,000 for domestic airmail and $45,308,000 for foreign airmail.

William A. M. Burden, former Assistant Secretary of Commerce for Air, elected president of the Institute of Aeronautical Sciences.

### Jan. 11

Production plans for 30 Northrop RB-49's, 118 North American F-93's, 30 Northrop C-125's, and 10 Kellett H-10 helicopters cancelled by Air Force.

Eight major airlines serving New York City serve notice of a motion for a temporary injunction restraining the Port of New York Authority from preventing the operation into Idlewild Airport of the first 70-ton Boeing Stratocruisers slated for delivery.

Richard H. Rush named director of Aircraft Division of the Office of Production and Office of Transport and Storage, both under National Security Resources Board.

As a result of non-scheduled air carrier crash in Seattle, Jan. 2, claiming lives of 11 Yale students, Rep. John A. McGuire (D., Conn.) introduces resolution calling on the House Interstate and Foreign Commerce Committee to investigate Federal safety regulations for charter and contract flights.

Sen. Pat McCarran (D., Nev.), Interstate and Foreign Commerce Committee, introduces bill providing for all-American flag line.

## AVIATION FORECAST

"In January, 1950. . . . The 75-ton ship of mid-wing design, carrying 100 passengers, rides high and smoothly at better than 300 mph above an Arizona mountain storm. . . . The plane will have either four or six engines, in-line and liquid-cooled, built into the wing and accessible to flight mechanics. . . ."—Hall L. Hibbard, Chief Engineer, Lockheed Aircraft Corp., *Popular Aviation,* Dec., 1939.

### Jan. 12

W. E. (Dusty) Rhoades, former director of air navigation traffic control for Air Transport Association, elected to the board of directors of Transocean Air Lines.

Air America, Inc., non-certificated $99 transcontinental carrier, suspends operations for two months to meet Civil Aeronautics Board's ruling that there should be protracted breaks in the service of an irregular carrier.

Airline pilots can fly efficiently until they are 55, states Dr. Ross A. McFarland of the Harvard School of Public Health. He adds that of 7,250 pilots licensed by the Civil Aeronautics Administration, well over 100 are over 50 years of age and a few are close to 60.

Cessna Aircraft Co. unveils its 1949 Cessna Model 170 at the annual distributors' meeting.

Production schedules for the Hiller 360 helicopter call for a ship a day beginning in May, announces Stanley Hiller, Jr., president of United Helicopters, Inc.

### Jan. 13

Two military new-plane purchase requests totalling approximately $189 million out of fiscal 1950 aircraft funds okayed by President Truman. Air Force to buy 110 Lockheed F-94 all-weather fighters, 48 Northrop F-89 all-weather fighters and 100 Fairchild T-31 trainers; Navy order indeterminate.

Twenty-nine bills relating to various phases of civil and military aviation introduced by Sen. Owen Brewster (R., Me.) and Sen. Edwin C. Johnson (D., Colo.).

Civil Aeronautics Board converts All American Airways from the nation's only air mail pick-up operation to a conventional feederline.

First of 38 Sperry engine analyzers installed in Pan American Airways Constellation.

### Jan. 14

Capt. William Odom, flying a specially modified Beechcraft Bonanza, sets a new lightplane distance record, crossing from Honolulu to Oakland, Cal.

Clarence F. Lea, former Congressman, appointed director of governmental relations for the Transportation Association of America.

Transportation Association of America reports over $30 million spent on transportation in 1948. (Operating revenues of all certificated airlines in 1948 were only about $643 million, or 2.4% of the total, according to ATA's estimate.)

*American Aviation* magazine reports that the 10% fare increase by most domestic airlines last September was greatly diluted by fare concessions.

Agnew E. Larsen, manager of the Rotawings Div. of the Glenn L. Martin Co., elected chairman of the Helicopter Council of the Aircraft Industries Association.

Ryan Aeronautical Co. receives additional $1,500,000 in subcontract orders from Boeing Airplane Co. for C-97 Stratofreighter assemblies, plus Air Force order for five more L-17B Navions (bringing total on order to 163).

### Jan. 17

Air Force will spend approximately $200 million on development and production of a new, ten-engine long-range bomber evolved from the basic design of the Convair B-36, reports *American Aviation Daily*. This will include modernization of B-36's.

Airlines offer 5% discount bid for fiscal 1950 military travel to National Military Establishment, along with a railroad bid offering 10% discount on an "exclusive" basis.

Six non-certificated airlines associations announce formation of National Independent Air Carriers; executive committee composed of Amos Peacock, president of Air Transport Associates, Stanley Weiss, president of Standard Airlines, R. R. Hart, president of Viking Airlines, and Fred Miller, president of Air America.

### Jan. 18

Civil Aeronautics Board receives favorable decision prohibiting Modern Air Transport, Inc., irregular carrier, from operating more frequently than CAB regulations permit.

### Jan. 19

Ralph S. Damon, president of American Airlines, Inc., and vice president of American Overseas Airlines, Inc., announces resignation from both companies.

C. R. Smith, former chairman of the board, elected president of American Airlines.

McDonnell Aircraft Corp. receives military contract for $1 million for engineering design, construction of models and wind tunnel testing of an advanced type fighter plane.

Air America, Inc., announces suspension of operations will be indefinite pending final action by Civil Aeronautics Board.

**Jan. 20**

Bulk of Navy's approved second purchase request of approximately $80 million will be used to purchase 120 Chance Voughts F4U-5 shipboard fighters ($30,669,000). Other purchases include 16 Lockheed (Air Force TF-80) two-seat jet trainers ($4,015,000); nine Bell HTL-3 two-seat helicopters; modification of Bell Model 47 ($654,000) and one Goodyear ZPN 324-ft. blimp ($3,388,000).

**Jan. 21**

Navy Squadron VR-8 of MATS announces new squadron efficiency record in Berlin air lift of 8,538 tons of cargo during December.

Douglas Aircraft delivers third of nine DC-3's, specially modified for short-haul operations, to All American Airways, Washington.

Civil Aeronautics Board begins investigation of Southwest Airways' proposed sliding-scale tariff. (Proposed tariff based on theory: "the longer the haul, the lower the per mile fare.")

**Jan. 24**

First details of Douglas Aircraft's program to modernize the DC-3 announced by Donald W. Douglas. The modified transport will have a 27,300 lb. gross take-off weight, seating capacity of 24-26-28 passengers, cruising speed of 234 mph and block-to-block speed of 199 mph.

House Appropriations Committee, headed by Rep. George H. Mahon (D., Tex.) announces Armed Services subcommittee members: Harry R. Sheppard (D., Cal.), Robert L. F. Sikes (D., Fla.), Albert J. Engel (R., Mich.), Charles A. Plumley (R., Vt.).

J. H. Kindelberger, chairman of the board of North American Aviation, and Lee Atwood, president, state basic outlook of the company is unchanged despite cutbacks.

**Jan. 25**

Sen. Pat McCarran (D., Nev.) introduces bill for non-certificated and contract air carrier licensing system and asks Civil Aeronautics Board to defer any further action along this line until Congress has had an opportunity to act.

Lockheed Aircraft Service, Inc., awarded $1,220,000 contract to overhaul 19 Douglas R5D (Air Force C-54) transports and 2,280 flight instruments.

Texas Engineering and Manufacturing Co.'s new military trainer, TE-1A, completes initial test flights.

**Jan. 26**

Ralph S. Damon elected president and a director of Transcontinental & Western Air, Inc.

Consolidated Vultee Convair XC-99 military transport completes first test flight at 211,500 lb. take-off weight.

New slate blue uniform for Air Force approved by President Truman and Defense Secretary Forrestal.

American Airlines puts public address system in its fleet of DC-6's (cost, $25,000).

The Flying Tiger Line reports that it topped all previous operating records in 1948. Last half of year was first consistent money-making period in company history.

**Jan. 27**

Wright Aeronautical Corp. delivers first two models of its new Cyclone 9HE engine to Douglas Aircraft Co. for improved Douglas Super DC-3.

The Air Force Air Materiel Command plans small manufacturers "pilot plant," government-equipped, for manufacturers without facilities.

Hearings on the 70-group Air Force bill begin before House Armed Services Committee.

H. Danforth Starr, secretary and treasurer of American Overseas Airlines, resigns.

United Air Lines reports its on-time arrivals in 1948 40% greater than in 1947, scheduled mileage up 2.5%.

December report of Personal Aircraft Council, Aircraft Industries Association, brings 1948 total personal aircraft shipments to 6,969, valued at $27,906,000.

**Jan. 31**

Rep. Carl Vinson (D., Ga.) proposes transferring $800 million originally earmarked for universal military training to the Air Force. W. Stuart Symington, Secretary of the Air Force, and Gen. Hoyt S. Vandenberg, Chief of Staff, report to House Armed Services Committee that they would use $435 million of the UMT money, if it is made available, for aircraft, bringing total in 1950 to $1,915 million—2,370 planes instead of 1,668 in President's budget.

Air Force Secretary Symington claims criticism of B-36 unjustified.

Air Force terminates Packard Motor Car Co.'s J-49 jet engine development contract, closing $10 million Packard plant at Toledo, O.

Martin AM-1 Mauler, Navy carrier-based attack bomber, takes off with payload of 9,000 lb. and gross weight of more than 25,000 lb., believed to be the heaviest ever flown by a single-engine plane.

American Helicopter Co.'s XA-5 *Top Sergeant*, designed to use buzz-bomb type pulsejet engines, undergoes test flights at Manhattan Beach, Cal.

## FEBRUARY

**Feb. 1**

Curtiss-Wright retires directors William D. Kennedy and Burdette Wright; elects four new directors: John A. McCone, president of California Shipbuilding Corp., Henry S. Sturgis, vice president of the First National Bank of

### QUOTES THAT FAILED

"There is very little doubt that the airship is an accomplished fact . . . but has anyone considered the new dangers that will follow in the wake of the new machines? . . . The age of comparative safety is at an end. Look to your lives, fellow mortals, and if you would be perfectly safe, voyage perpetually in mail-ships. They will be manned by experts and they will have the right of way."—Charles Battell Loomis, *Century*, July, 1907.

the City of New York; T. Roland Berner, a New York attorney, and J. V. McCarthy, vice president and treasurer of Curtiss-Wright, formerly with United Aircraft Corp.

Maj. Gen. Milton A. Reckord, legislative chairman of the National Guard Association, denounces 70-group Air Force bill as "dangerous," because it would put Air National Guard under Air Force control.

Pan American Airways receives from Boeing Airplane Co. the first of twenty Stratocruisers.

1948 exports of personal planes down to 994 as compared with 1947 exports of 1,669.

Feb. 2

Civil Aeronautics Board Member Harold A. Jones advocates greater Reconstruction Finance Corp. aid for airlines. He suggests a two-part "interim program" for financing and refinancing airlines until equity capital again becomes available.

James Fischgrund, of the Executive Committee of the National Independent Air Carriers, says independent carriers are threatened with immediate extinction because Civil Aeronautics Board wants to cancel all letters of registration. He reports that at least four of the independent carriers have started negotiations to dispose of their air fleets, some to foreign countries.

N. A. (Dick) Brown appointed executive assistant to editor and publisher of *Aero Digest*.

Feb. 3

Secretary of the Navy John L. Sullivan announces Navy cut-back of both surface and air forces, reducing its active aircraft inventory from the present 8,183 planes to 7,765, and closing nine naval air stations.

House Republican Leader Joseph W. Martin (R., Mass.) introduces bill proposing cut on present transportation tax on persons from 15% to 5%.

J. H. Kindelberger, president of North American Aviation, Inc., appointed to committee to recommend which Federal plants in the National Industrial Reserve should be retained or disposed of for commercial use.

Department of Commerce announces appointment of Selig Altschul to conduct study on air transport mobilization.

Feb. 4

Air Force will buy 2,437 aircraft out of fiscal 1949 funds after all procurement revisions, testifies Air Secretary Symington before the House Armed Services Committee.

Sen. Edwin C. Johnson (D., Col.) introduces bill calling for airlines probe.

Beech Aircraft Corp. reports number of A-35 type Bonanzas involved in accidents to be 1.4% of total in use.

Piper Aircraft Corp. exhibits ten different models at Lock Haven, Pa., ranging in price from $1,995 (65-hp *Vagabond*) to $6,484 (165-hp Stinson *Flying Station Wagon*).

Feb. 7

Two new subcontracts awarded by Boeing Airplane Co. in production of six-jet B-47 Air Force bomber to Bendix Aviation Corp. ($1,962,693) and Pneumatic Tool Co. ($483,604).

Reconstruction Finance Corp. denies $600,000 loan to Parks Air Lines.

Civil Aeronautics Administration announces plans to set up an Office of International Operations.

Eastern Air Lines reports new transcontinental speed record for transport aircraft set Feb. 5 by new-type Lockheed Constellation on delivery flight from Los Angeles to La Guardia Field in 6 hr., 17 min., 39-2/5 sec.

Pan-American Grace Airways win Inter-American Saftey Council aviation award for fifth consecutive year.

Navy Bureau of Aeronautics officially releases first photos of Fairchild XSAM N-2 *Lark* guided missile.

Navy's Lockheed Constitution completes first round trip, Moffett Field to Washington and return, 81 passengers and 19 crew members aboard; flight time, 18 hr., 14 min.

Feb. 8

Chairman Carl Vinson (D., Ga.) gets House Armed Services Committee okay for recommendation to the House Appropriatitons Committee that the 1950 Air Force budget be increased to $800 million from money for universal military training.

Boeing XB-47 jet bomber sets cross-country speed record to Andrews Field, Washington, D. C., from Moses Lake, Wash., in 3 hr. 46 min.

Feb. 9

Gen. Hoyt S. Vandenberg, Chief of Staff of the U. S. Air Force, states that the Convair B-36, flying at 40,000 ft., has not yet been successfully intercepted by American jet fighters of current design.

An *American Magazine* survey shows that 55% of the men and 53% of the women among its readers prefer air travel for transcontinental or trans-Atlantic trips.

Feb. 10

Chairman Edwin C. Johnson (D., Colo.), Senate Interstate and Foreign Commerce Committee, says his committee will study new regulations for large irregular air carriers before Civil Aeronautics Board puts them in effect.

House Armed Services Committee begins hearings on an Air Force $161 million radar defense network capable of picking up enemy aircraft at about 150 miles.

Feb. 11

Employees of American Overseas Airlines ask Civil Aeronautics Board to hold up action on the AOA-Pan American Airways merger until they can work up an alternative offer to purchase AOA.

Dan A. Kimball, vice president of the General Tire & Rubber Co. and managing director of Aerojet Engineering Corp. and Marquardt Aircraft Co., named by President Truman to succeed John Nicholas Brown as Assistant Secretary of Navy for Air.

Richard S. Hettenbaugh is elected new president of National Pilots Association.

Silvaire Sprayer, first production plane ever designed specifically for aerial crop-spraying, unveiled by Luscombe Airplane Corp.

Feb. 14

C. W. Smith, formerly with Pan American

Airways, joins staff of Eastern Air Lines as assistant to the vice president, traffic and sales.

Hearings begin before a subcommittee of the House Armed Services Committee for a $200 million guided missile test range.

Feb. 15

Wright Aeronautical Corp. delivers the first Cyclone 7 (R-1300) engine under a $7 million Air Force contract.

Civil Aeronautics Administration reports 97,025 United States civil aircraft.

Third annual CAA report on Federal Airport Act, lists $15,900,000 Federal expenditures for airport construction and development on Oct. 31, 1948.

Feb. 16

William B. McFarlane, Department of Justice, urges the Civil Aeronautics Board to encourage transport competition and make irregular air carriers regulations economically sound.

La Guardia Field and New York International Airport report net $436,312 operating loss in 1948.

Eastern Air Lines completes automatic teletype switching central office system.

Tennessee Senate exempts aviation gasoline from tax.

Air Force holds impressive "Air Progress Demonstration" for President Truman at Andews Field, Washington, D. C.

Lockheed Aircraft Corp. flight tests retractable rocket mounts which fold into the wing for use on Air Force jet fighters.

Feb. 17

Air Force plans to equip its Convair B-36's with provisions for four jet engines in addition to its six normal Pratt & Whitney R-4360 reciprocating engines.

Separation of air mail pay from subsidies is recommended by Hoover Commission.

House Armed Services Committee approves Undersecretary of Defense post.

A. H. Rude, named executive vice president of Aerojet Engineering Corp., replacing Dan A. Kimball, recently appointed as Assistant Secretary of the Navy for Air.

Feb. 18

President Truman reports to Congress that aviation is biggest Lend-Lease supplier. From March 11, 1941, through March 31, 1948, shipments to 38 allies cost the U. S. $50,205,229,-788. Of this amount, $8,763,827,000 was for aircraft and aeronautical supplies.

Sperry Corp. elects Thomas A. Morgan, chairman of the board, as president, in addition to his other duties. Thomas B. Doe resigns as president but continues as a director and consultant. Harry F. Vickers is elected senior vice president.

Allison Division of General Motors today delivers its 5,000th jet engine to the Air Force, just a little less than four years after delivery of its first J-33.

Feb. 21

W. A. Patterson, president of United Airlines, predicts that United will be flying jet transports in scheduled operation within ten years.

Bureau of Reclamation reports that its weed-elimination crews find helicopters better adapted to weed spraying than conventional aircraft. (As of June 1948, aircraft in the United States used for spraying, dusting and seeding totaled 1,219.)

Feb. 22

Indiana legislature excludes airlines from public utilities tax.

Los Angeles Airways flew 281,861 helicopter miles in 1948 and carried a total of 2,573,607 gross lb. of mail, reports Clarence Belinn, president.

Feb. 23

Rep. John Kennedy (D., Mass.) introduces bill proposing separation of subsidies and air mail pay.

Civil Aeronautics Board okays Pan American Airways to serve New York through International Airport (Idlewild) in addition to La Guardia Airport on or about March 1.

James M. Verner named to Civil Aeronautics Board's Bureau of Hearing Examiners.

Feb. 24

Republic XF-91 jet-rocket interceptor fighter unveiled by Air Force at Republic's Farmingdale, L. I., plant.

Ralph S. Damon, president of Transcontinental and Western Air, Inc., elected director of Goodyear Tire and Rubber Co., subject to Civil Aeronautics Board okay.

Kaman Aircraft Corp. plans additional financing of about $1 million to expand its helicopter production program.

Feb. 25

Civil Aeronautics Board policy statement for 1949 favors dismemberment for Northeast Airlines and Western Air Lines, higher mail pay for seven lines, coach fare and route pattern study.

Rep. Carl Vinson (D., Ga.) asks President Truman to request $800 million more for the Air Force fiscal 1950.

Thomas G. Lamphier, editor of the Boise, Idaho, *Statesman*, named Assistant Secretary of

## QUOTES THAT FAILED

"In the opinion of competent experts, it is idle to look for a commercial future for the flying machine. There is and always will be a limit to its carrying capacity which will prohibit its employment for passenger or freight purposes. There are some, of course, who will argue that because a machine will carry two people, another may be constructed that will carry a dozen, but those who make this contention do not understand the theory of weight sustentation in the air . . . there is a limit to these . . . beyond which the aviator cannot go." —W. J. Jackman and Thomas H. Russell, *Flying Machines*, 1910.

the Air Force for civilian components, replacing Cornelius V. Whitney, who will become Undersecretary of Commerce.

Post Office announces that air parcel post to France will start March 1.

January exports of 27 personal aircraft, four-place and under, reported by Aircraft Industries Association. Companies reporting exports include: Aeronca, Beech, Bellanca, Cessna, Engineering and Research, Fairchild, Luscombe, Piper, Ryan, and Taylorcraft.

Feb. 28

Sen. Edwin C. Johnson (D., Colo.) introduces a bill providing for segregation of mail pay from subsidy grants. (Similar to bill introduced by Rep. John Kennedy, Feb. 23.)

William T. Arthur named assistant to S. A. Stewart, president of Chicago and Southern Airlines.

The Martin JRM-2 Mars, Navy's largest flying boat, sets record for largest number of passengers, carrying a total of 206 persons from Alameda NAS, near San Francisco, to San Diego, Cal.

## MARCH

Mar. 1

American Airlines appoints Glenn E. Markt to the new position of assistant vice president, properties and facilities.

Rep. Lindley Beckworth (D., Tex.) named chairman of House Interstate and Foreign Commerce subcommittee on transportation.

Air Force announces that its Northrop XF-89 all-weather fighter is capable of speeds in the 600 mph class and can operate at altitudes above 40,000 ft.

House Armed Services Committee reports bill for a radar air warning and control system at an initial cost of $85,500,000; and another for a joint long-range proving ground for guided missiles, with an initial appropriation of $75 million.

Mar. 2

Air Force completes the first non-stop, round-the-world flight in history, as a Boeing B-50 bomber, *Lucky Lady II*, lands at Carswell AFB, Fort Worth, Tex., at 9:30 CST, after a 94-hr. trip around the globe. The B-50, piloted by Capt. James Gallagher, assisted by a crew of 13, took off Feb. 26 and flew a total of 23,452 miles at an average speed of 249 mph. Four refueling contacts were made with B-29 tankers.

### AVIATION WONDERS

"Through the efforts of Comdr. John Barry Ryan of the United States Aeronautical Reserves, the U. S. will probably have one of the largest aerial emergency navies in the world within the next twelve months. . . . This will give the U. S. a fleet of fifty military planes. . . ."—*New York American*, Jan. 3, 1911.

Convair B-36's have made two missions in which they stayed above 40,000 ft. for 12 hr. or more, Air Force officials state.

General Electric opens plant at Lockland, O., to assemble J-45 jet engines.

George E. Stoll and Lawrence A. Hyland elected vice presidents of Bendix Aviation Corp.

Mar. 3

House passes Treasury and Post Office Department bill, fiscal 1950, for $45,308,000 foreign air mail payments and $41,753,000 domestic payments to the airlines for the year beginning July 1.

Mar. 4

American Airlines completes three full years without a passenger fatality, with 4,154,637,050 passenger miles for the period.

North American Aviation awarded contract for research and development of nuclear reactor technology with particular emphasis on the investigation of materials and components suitable for the practical application of atomic power, announes A. Cammaro, Chicago operations manager of the Atomic Energy Commission.

Berlin Air Lift passes million-ton mark, with U. S. aircraft carrying 780,963 tons of the total. Cost to the USAF now estimated at $119,702,600.

President Truman announces effective April 1, resignation of James V. Forrestal as Secretary of Defense and the appointment of Louis A. Johnson.

R. C. Sebold, chief engineer of the Fort Worth division, appointed director of engineering, Consolidated Vultee.

Navy says its Piasecki XHJP-1 helicopter is "the world's fastest and highest performing."

Personal Aircraft Council, Aircraft Industries Association, announces shipment of 152 personal aircraft by 10 companies during January.

Mar. 7

During first day of National Airlines Dismemberment Case, NAL announces sale of 174,000 shares of common stock to Pan American-Grace Airways (W. R. Grace & Co.); offers additional sale of 172,000 shares to Panaga and 346,000 to Pan American Airways, upon the approval of the Civil Aeronautics Board of an interchange agreement.

Aviation Maintenance Corp. appoints Stan Wilson as general sales manager.

Hoover Commission recommends new Bureau of Civil Aviation.

President Truman asks Congress to set up National Military Establishment as a single department, with the three services de-emphasized and increased power and responsibility for the Secretary of Defense.

Mar. 8

New world distance record for light planes set by Capt. William Odom in a Beechcraft *Bonanza*, flying 5,273 miles from Honolulu to Teterboro, N. J., in 36 hr. 2 min.

Mar. 9

Civil Aeronautics Board promotes Frank H. Crozier to Special Adviser to the Board, Edward A. Bolster to Assistant Director-International of the Bureau of Economic Regulation, and Joseph C. Watson to Chief of the Operations Division, Bureau of Economic Regulation.

J. Clawson Roop resigns as vice president and treasurer of Pan American Airways to become director of Facilities and Services, Munitions Board.

The Airlines Lease Committee of the Air Transport Association votes against any regulation denying airlines freedom of action in buying gasoline at airports.

Mar. 11

Rep. Carl Vinson (D., Ga.), chairman of the House Armed Services Committee, introduces bill for an Air Engineering and Development Center at an initial cost of $311 million.

Air Force announces that low-octane gasoline will replace kerosene (JP-1) as jet fuel. A higher percentage of the new fuel can be distilled from a barrel of crude oil than by producing JP-1, it was stated.

William Frye, former Associated Press war correspondent, is named Director of Public Information for the National Military Establishment, replacing Harold Hinton, who has returned to his post at the *New York Times.*

Mar. 14

Pan American Airway's option to buy National Airlines stock expires without action.

Gyrodyne Co. of America, Inc., rotary wing aircraft manufacturers, open business offices in New York City and engineering offices at Hicksville, L. I.

Fairchild Engine and Airplane Corp. discontinues its Personal Planes Division at Strother Field, Winfield, Kan.

Mar. 15

It was announced today that Convair B-36B landed at Carswell Air Force Base, Fort Worth, Tex., on March 12, completing a flight of 9,600 miles, the longest ever flown by a B-36. The entire flight took 43 hr., 37 min.

Sen. Edwin C. Johnson (D., Colo.) reports that internationally during the first nine months of 1948, irregular carriers operated without a passenger fatality, while the certificated carriers experienced 1.8 deaths per 100 million miles of flying. Domestically, irregulars averaged 25.4 passenger fatalities per 100 million miles compared with a rate of 1.8 deaths per 100 million miles for scheduled airlines.

Mar. 16

Rep. Carl Vinson (D., Ga.) again asks Congress for $800 million more than the President's budget so that the 70-air group program can be continued.

George D. Childress, chief of the Industrial Operations Section, Civil Aeronautics Administration, states that CAA considers state agriculture departments best qualified to control crop dusting operations.

Bendix Aviation Corp. announces that George E. Stoll and Lawrence A. Hyland have been elected vice presidents of the corporation.

Mar. 17

John R. Alison, Assistant Secretary of Commerce for Air, resigns to become president of the Transit Van Corp. of Redwood City, Cal.

## AVIATION FORECAST

"What prospect is there that the aeroplane will have any considerable commercial value? . . . My own answer to these questions is that the aeroplane is capable of such development that it will carry passengers, mail, and express freight with great speed (100 to 150 miles per hour) and comparative safety greater than that of train and steamer over long distances (the Atlantic Ocean)." — James V. Martin, *Air Scout*, April, 1911.

Sen. Pat McCarran (D., Nev.) introduces eight bills to improve the Federal Airport Act.

Senate Armed Services Committee Chairman Millard Tydings (D., Md.) introduces a bill to provide $150 million for the initial construction of a $3 billion Air Engineering Development Center.

Fairchild Aircraft Division delivers the first production model track-type landing gear to the 314th Troop Carrier Wing, Smyrna AFB, Tenn. The gear was installed on a C-82 Packet troop-carrying transport.

Dr. Clark B. Millikan, professor of aeronautics at California Institute of Technology, is appointed director of the Daniel Guggenheim Laboratory of Aeronautics and chairman of the jet propulsion board.

Mar. 18

Civil Aeronautics Board issues mail rate orders which will give four Alaskan certificated airlines an estimated $602,089.

United Aircraft Products, Inc., appoints Edward Ladd sales manager in the aviation division.

Defense Secretary Forrestal orders armed forces' public relations merger.

Aircraft Industries Association reports export of 41 personal planes during February.

Mar. 21

Senate Rules Committee approves $50,000 for airlines probe.

Hearings on the 70-group Air Force bill open before the Senate Armed Services Committee.

New Navy HTL-3 two-place helicopter (Bell Aircraft Corp.) reaches altitude of 18,550 ft. in test flights.

Second Assistant Postmaster General Paul Aiken discourages New York helicopter service at a Civil Aeronautics Board's prehearing conference.

Mar. 22

House passes 70-group Air Force bill with a roll call vote of 395-3.

Lockheed Aircraft Service, Inc., signs an agreement with Boeing Airplane Co., naming LAS an authorized Stratocruiser maintenance and service facility.

Mar. 23

Oswald Ryan, Civil Aeronautics Board vice chairman, asks Congress for CAB regulatory power over airline financing.

Pan American Grace Airways receives a special safety award from the Inter-American Safety Council (in addition to its 1948 award) for a perfect safety record during the past five years.

North American Aviation's stockholders approve new five-year contracts for J. H. Kindelberger, chairman of the board, and J. L. Atwood, president, at annual meeting in Los Angeles.

Edward C. Sweeney, editor of the *Journal of Air Law and Commerce* and a professor of law at Northwestern University, Evanston, Ill., is named legal consultant to the Senate Interstate and Foreign Commerce Committee.

Mar. 25

Bell Aircraft Corp. announces that its XH-12 helicopter has flown a test flight over a measured course at Niagara Falls Airport at a speed of 133.9 mph. (Official world helicopter speed record—124.315 mph.)

Fairchild Engine and Airplane Corp. wins Air Force's competition for the T-31 primary-basic trainer and will soon receive orders totaling over $8 million for an initial order of 100 planes.

Piper Aircraft Corp. begins deliveries on its 1949 Family Cruiser (PA-14) $3,995 f.a.f., fully equipped.

The Civil Aeronautics Board announces that the combined domestic and international United States scheduled air carriers flew more passenger miles with greater safety in 1948 than ever before in the history of air transportation.

Lockheed Aircraft Service, Inc., is awarded a contract by the Navy Bureau of Aeronautics totaling almost $2 million for the heavy maintenance and reconditioning of about 50 additional Douglas R5D (Air Force C-54) transports.

All privately-owned and fixed-base operation airplanes in Washington (state) will be taken off local property tax lists this year, under a new law passed by the state legislature.

Mar. 28

First ten-engine B-36D completes successful 3 hr., 15 min. flight at Fort Worth, Tex. (The ten-engine version consists of the normal B-36, powered by six Pratt and Whitney R-4360 Wasp Major engines, plus four Allison J-35 jets located in underwing "pods," outboard of the No. 1 and No. 6 piston engines.)

Curtiss-Wright Corp. moves its New York executive and Export Division offices to Woodridge, N. J.

Piper Aircraft Corp. elects August C. Esenwein, former vice president and general manager of Aviation Maintenance Corp., executive vice president and general manager.

Aeronca Aircraft Corp. announces two new 1949 models: Aeronca Sedan, Aeronca Champion.

Monocoupe Aircraft and Engine Corp. announces its 1949 line of two-place aircraft, including a 115-hp Standard, 115-hp DeLuxe and a 185-hp Clipped Wing Model 110.

Mar. 29

Sen. Edwin C. Johnson (D., Colo.) introduces bill which would separate air mail pay from subsidy.

President Truman asks Congress for a fiscal 1949 deficiency appropriation of $43 million for the Berlin air lift.

Texas Engineering and Manufacturing Co. receives a subcontract from Boeing Airplane Co. to build 43 components of the B-54 Air Force bomber.

Joe de Bona, flying a North American F-51 single-engine fighter from Burbank, Cal., to La Guardia Field, N. Y., in 4 hr. 59 min. 50 sec., sets a new solo cross-country record for piston engine aircraft. (Best cross-country time for any type plane is still 4 hr. 13 min., set by Col. William Councill in a Lockheed F-80 jet in Jan., 1946.)

Mar. 30

Rep. Carl Vinson (D., Ga.) asks Congress for an additional Navy appropriation of $645 million, most of which would be spent for aircraft.

Mar. 31

The Aircraft Industries Association elects Admiral DeWitt C. Ramsey president.

## APRIL

Apr. 1

The Senate Post Office and Civil Service Committee pigeon-holes bill to carry all first class mail by air.

Brig. Gen. William D. Eckert, procurement assistant to the Secretary of the Air Force, is named Comptroller of Air Materiel Command, replacing Brig. Gen. John C. Gordon, retired.

Personal Aircraft Council, Aircraft Industries Association, announces shipment of 226 personal aircraft by 10 companies during Feb.

Output of complete aircraft during January as measured by airframe weight declined 42% from December (2,225,000 pounds as compared to 3,865,400 pounds), according to a report issued jointly by the Bureau of Census and the Civil Aeronautics Administration.

Globe Industries, Inc., Dayton, O., develops a new type stall warning device which automatically shakes the pilot's stick as his plane approaches a stall.

Apr. 4

The Civil Aeronautics Board proposes adjustments in feederline and route pattern; would drop Trans-Texas Airways, extend Pioneer Air Lines and Southwest Airways.

Pan American Airways' first Stratocruiser seven-hour trans-Atlantic flight completed as Chief Pilot Robert D. Fordyce lands 10 minutes ahead of schedule at Shannon, Ireland.

The Council of the International Civil Aviation Organization adopts uniform rules to cut red tape on crossing international boundaries by air.

Arthur E. Smith, former assistant chief engineer, appointed chief engineer of Pratt and Whitney Aircraft Division of United Aircraft Corp., replacing the late Andrew V. D. Willgoos.

Apr. 5

Air Force cancels plans to buy 42 Boeing

B-54 medium bombers and will purchase instead 36 additional Convair B-36 heavy bombers and five additional Boeing B-47 six-jet bombers.

House Appropriations Committee reports out a bill cutting the Civil Aeronautics Administration $11,934,895 under the Budget estimates of $151,008,500 for direct appropriations. However, the committee allows CAA additional contractual authority in the amount of $58,-800,000. It allows the Civil Aeronautics Board $3,620,500, $359,500 under budget estimates.

Western Air Lines elects I. W. Burnham, II, New York, and L. Welch Pogue, Washington, as directors.

Fairchild Engine and Airplane Corp. Aircraft Division completes the first two models of the C-119 troop-carrying transport. (The Air Force has thus far ordered 136 C-119's.)

### Apr. 6

A Sikorsky helicopter completes a 3,750-mile flight from Elizabeth City, N. C., to Port Angeles, Wash., in 57.6 hr. through 10½ days, believed to be the longest unescorted helicopter ferry flight on record.

Four Lockheed F-80's at Williams Air Force Base, Chandler, Ariz., have logged more than 1,000 hours of flying time, first time on record that jet airplanes have attained this service mark.

Piper Aircraft Corp. offers two agricultural versions of its Cub; Aeronca Aircraft Corp. announces the *Aeronca Spray Champ*.

### Apr. 7

Budget Bureau approves $300 million for an Air Force purchase of 39 new B-36's bringing the total on order to 170.

Curtiss-Wright Corp. announces that it is building the XLR-CW-1 rocket engine to power the Bell X-2, third in a series of Air Force special research aircraft.

The War Assets Administration states that 135 leased surplus aircraft, now on air lines, will be sold or transferred to the National Military Establishment when the leases expire. (Most of the leases were entered into early in 1945 for a five-year period.)

### Apr. 8

*American Aviation Daily* survey reveals that of the contracts let or planned by the Air Force during the fiscal year 1949, from the standpoint of airframe weight, Boeing Airplane Co. is still the leading contractor, despite recently announced cancellation plans for the B-54 bomber. In second place is Consolidated Vultee Aircraft Corp.

Martin AM-1 Mauler, Navy attack bomber, lifts 10,689 lb. of destructive payload, a new unofficial record for single-engine aircraft.

Boeing Airplane Co. awards subcontracts for components of the six-jet B-47 bomber to 15 additional companies, bringing the total number of companies participating to 47. Bell Aircraft Corp. is the leading major subcontractor.

Cornell University announces Cornell Aeronautical Laboratory Research Associates, to promote an education and research program. Already participating are Republic Aviation Corp., Fairchild Engine and Airplane Corp., Grumman Aircraft Engineering Corp., Curtiss-Wright Corp., Bell Aircraft Corp., United Aircraft Corp., and AVCO Mfg. Corp.

> **QUOTES THAT FAILED**
>
> "The machines will eventually be fast, they will be used in sport, but they are not to be thought of as commercial carriers. To say nothing of the danger, the sizes must remain small and the passengers few . . . the power required will always be great . . . hence fuel cannot be carried for long single journeys. The north pole and the interior of Sahara may preserve their secrets a while longer."—Octave Chanute, *Popular Science*, March, 1904.

### Apr. 11

House Appropriations Committee's recommendations for the defense budget for fiscal 1950 would let the Air Force buy 2,550 planes, the Navy, 843.

The Senate airlines inquiry begins with Civil Aeronautics Board Chairman Joseph J. O'Connell, Jr., reading a policy statement.

Charles Hart Miller, former executive vice-president and general manager of Republic Aviation Corp. and more recently vice-president in charge of sales with the Glenn L. Martin Co., is elected vice-president and general manager of Piasecki Helicopter Corp., Morton, Pa.

### Apr. 13

The Douglas C-124 is selected by the Air Force to equip its heavy troop carrier units.

Brig. Gen. A. A. Kessler, Air Force Director of Procurement and Industrial Planning, reports that the Air Force plans to spend $3,430,672 during fiscal 1950 on production planning for high-volume aircraft engine. The money will be spent in contracts to General Electric Co., Allison Division of General Motors, Pratt and Whitney Aircraft Division and others.

The Senate unanimously approves the nomination of Stephen T. Early as Under Secretary of Defense.

Curtis Barkas is elected new United Airlines vice president.

Aircraft Industries Association survey shows that 92% of the current backlog of the seven major airframe manufacturers on the West Coast, represents military orders from the Air Force and Navy. Sales for the seven companies in 1948 included 79% to the armed services and 21% to commercial business.

American Airlines topped all previous records in air freight volume when it passed the 3 million-ton-mile mark in March.

### Apr. 14

House defeats plan to give the Navy an additional $300 million for aircraft.

*American Aviation Magazine* reports that, at the peak this summer, there will be at least 136 trans-Atlantic roundtrip flights weekly, with three U.S. lines (TWA, Pan American, American Overseas) flying 72.8% of the trips and foreign carriers flying 27.2%. This compares with about 120 trips last year.

Apr. 15

It was announced today that on May 1 the Civil Aeronautics Administration will establish an Office of Aviation Development. The office will have three divisions: aviation extension, aviation education, and flight information.

A Navy Lockheed P2V patrol bomber takes off from a carrier on the East Coast with the equivalent of a 10,000-lb. bomb load, flies to the West Coast and cruises up and down the coast, for a total of more than 4,600 miles non-stop and 23 hr., 15 min. flying time under operational conditions before landing at Moffett Field, Cal.

Civil Aeronautics Administration revises Federal Aid Airport program to build or improve 4,977 airports at a cost of $1,115,300,000—$510,600,000 in Federal funds, $604,700,000 state and local contributions.

Bill passes Senate giving Veterans Administration $595,890,000 in emergency funds for veterans unemployment compensation and educational benefits, including flight schools.

Apr. 18

The Supreme Court rules that the Civil Aeronautics Board has no power to adjust mail rates retroactively for periods in which a final rate has been in effect and unchallenged by the carrier.

Colonial Airlines sets an airline safety record in concluding its 19th consecutive year of scheduled operation without a fatality or serious injury to passenger or crew member. It has flown about 20 million plane miles and more than 250 million passenger miles.

Apr. 19

Lockheed Aircraft Corp. agrees to underwrite the costs of a research study on the transportation of horticultural products by air.

Apr. 20

Guy W. Vaughan, chairman of the board of Curtiss-Wright Corp., announces his retirement.

Bellanca Aircraft Corp. announces that a new four-place personal plane, *Cruisemaster*, powered by a 190-hp Lycoming engine, is now undergoing Civil Aeronautics Administration certification tests.

The Kaman Aircraft Corp. K-190 utility helicopter is certificated by the Civil Aeronautics Administration.

Apr. 22

The Institute of Life Insurance reveals that of 100 life insurance companies surveyed, 93 now grant life insurance to applicants who are pilots and crew members on scheduled airlines in the United States, and 80 grant insurance to pilots and crews on non-scheduled domestic commercial flights.

Two automobile manufacturers, Ford Motor Co. and Packard Motor Car Co., are working on military jet or rocket engines.

Fairchild Engine and Airplane Corp. starts a plant-purchase program, allocating $2,500,000 out of 1949 expenditures for down payments on two plants. The company now operates from government-owned plants.

Apr. 25

Assistant director J. Weldon Jones announces before the Senate Committee studying airline finances that the Budget Bureau approves continued government support for the airlines but urges separation of mail pay from subsidies.

E. S. Hensley is appointed director of Civil Aeronautics Administration's Office of Aviation Safety.

Apr. 26

Paul V. Shields is elected to the newly-created office of chairman of Curtiss-Wright Corp. William C. Jordan, who assumed the presidency when Guy W. Vaughan vacated that office, resigned as president of both Curtiss-Wright Corp. and Wright Aeronautical Corp.

Bell Aircraft Corp. receives a subcontract from Consolidated Vultee Aircraft Corp., to produce jet engine "pods" for the B-36 bomber at a contract value of about $4,000,000.

Personal Aircraft Council, Aircraft Industries Association, announces shipment of 376 personal aircraft by 10 companies during March. The shipments include 261 four-place planes and 115 two-place aircraft.

Bill Barris and Dick Riedel land at Fullerton, Cal., Airport after setting a new world flight endurance record of 1,008 hr., 1 min., 50 sec. in a four-place Aeronca *Sedan* powered by a 145-hp Continental engine.

Apr. 27

Air Force cancels Boeing Airplane Co. contract for XB-55.

Piper Aircraft Corp. board of directors approve a Stinson Division to handle Piper-Stinson aircraft sales.

Apr. 28

United Helicopter Corp. demonstrates its Hiller 360 commercial helicopter, price $19,995, the lowest on the rotary wing aircraft market today.

Apr. 29

Pan American Airways claims a new non-stop trans-Atlantic speed of 9 hr., 46 min. in a Stratocruiser between New York and London.

Vice Admiral John Dale Price, former Deputy Chief of Naval Operations for Air, is named Vice Chief of Naval Operations, replacing Vice Admiral Arthur W. Radford, now in command of the Pacific Fleet.

## MAY

May 2

Army offers aid to light plane development and manufacturers in improving airframes, power plants and accessories at sixth annual I.A.S. Personal Aircraft Meeting.

Lockheed Aircraft Corp. receives Civil Aeronautics Administration approval of a maximum take-off weight of 107,000 lb. for the L-749A Constellation—an increase of 20,750 lb. in certified weight since the initial Constellation approval.

May 3

The Civil Aeronautics Board approves an agreement for interchange of equipment between Capital Airlines and National Airlines.

The Martin *Viking*, 45-ft. research rocket, is fired successfully at White Sands Proving Ground, Las Cruces, N. M., reaching an altitude of 51½ miles and a speed of 2,250 mph. The *Viking*, designed under the technical direction of the Naval Research Laboratory, Washington, D. C., is described as "the most powerful and efficient liquid rocket yet developed."

May 4

Ryan Aeronautical Co. raises the price of its four-place Navion to $11,005 (an increase of $1,020), due to increased costs.

Congress approves a compromise bill to start work on a $200 million test center for guided missiles, with a proviso that Congressional approval be obtained before purchasing property for the center.

May 5

Civil Aeronautics Board Vice Chairman Oswald Ryan is sworn in for his third term as a member of the Board. Ryan is the only remaining member of the original (1938) Board.

A new $175,000 building of the Institute of Aeronautical Sciences in San Diego is dedicated at a dinner meeting with the presidents of five San Diego companies at the speaker's table. They included: LaMotte T. Cohu of Consolidated Vultee; Fred Rohr of Rohr Aircraft; E. T. Price of Solar Aircraft; T. Claude Ryan of Ryan Aeronautical; and Henry L. Mandolf of Langley Corp.

Bernard M. Doolin, San Francisco, is elected president of the Airport Operators Council.

May 6

Arthur E. Raymond, vice president-engineering of Douglas Aircraft Co., is elected national chairman of the Aircraft Technical Committee of Aircraft Industries Association.

Robert L. Earle is appointed acting general manager of Wright Aeronautical Corp.

The combined British-American air lift forces will have flown approximately 1,575,000 tons of cargo into Berlin when the need for the lift ends at midnight, May 11. The Military Air Transport Service's contribution to this total will be about 1,210,000 tons. Cost of the air lift to the United States Air Force only, as of May 3, totaled $173,498,600.

May 9

Civil Aeronautics Administration okays new airport regulations to permit federally-aided airport owners to grant exclusive franchises to gasoline and oil concessionaires.

Lockheed Aircraft Corp. receives orders for 16 L-749A Constellations from four foreign airlines, bringing total Constellation sales in the last 11 months to 23 planes.

The Air Force's Republic XF-91, jet-rocket interceptor fighter, successfully completes its first test flight at Muroc Air Force Base, Cal., remaining aloft for 40 min. Carl Bellinger handled the contols.

May 10

The Civil Air Patrol, auxiliary of the United States Air Force, plans to enroll approximately 100,000 cadets between 15 and 17 in its preflight training program in many secondary schools throughout the nation this fall.

May 11

Wiley Wright named head of the Civil Aeronautics Administration's new Office of Aviation Development.

It is announced that a Sikorsky S-52-1 helicopter set a new international speed record of 122.75 mph for the 100-kilometer closed circuit course on May 6. The pilot was Harold E. Thompson. Thompson also set a new three-kilometer record of 129.616 mph at Cleveland, O., on Apr. 27 in the same plane. The two records give the United States a clean sweep of all international helicopter records.

Chase Aircraft Co., West Trenton, N. J., files application with the Civil Aeronautics Administration for an approved type certificate for its Model MS-7B two-engine, 32,000-lb. transport and cargo plane.

May 12

Delta Airlines promotes T. P. Delafield to newly-created position of general manager.

Aeronca Aircraft Corp. receives CAA approval of its *Load Master* spray unit for the Aeronca *Sedan*.

Lee Douglas, former chief engineer and general manager of Kellett Aircraft Corp. is appointed chief engineer of Piasecki Helicopter Corp.

## AVIATION FORECASTS

"Behind the spectacular and the unique in the international air races which ended here tonight is the demonstration of the commercial possibilities of the airplane, possibilities which flyers say America is not realizing while other nations forge ahead." —Oliver Sherwood, *Dayton News*, Oct. 5, 1924.

May 13

A newly-designed light aircraft that will take off over a five-story building in 100 yards, fly at speeds as low as 27 miles per hour and land in an area no larger than a tennis court, will be announced on May 15 by the Helio Corp., Boston Metropolitan Airport, Norwood, Mass. The aircraft was designed by Otto C. Koppen.

The Senate Armed Services Committee by a vote of 12 to 1 approves a bill to strengthen unification.

Boeing Airplane Co. cancels or cuts back subcontracts with the Glenn L. Martin Co., Curtiss-Wright Corp.'s Airplane Division and Bell Aircraft Corp., due to cancelled Air Force B-54 contract.

Sen. Edwin C. Johnson (D., Colo.) introduces bill to give states a voice in air policing.

Civil Aeronautics Board denies Trans-Texas Airways motion to rescind show-cause order proposing to terminate the company's certificate on May 13, 1950.

May 16

Air Force schedules aircraft manufacturer meeting for May 20 to plan new fighter and radar defenses.

Hearings begin on the proposed transfer of American Overseas Airlines to Pan American Airways.

The Douglas D-558-2 *Skyrocket*, jet-rocket special research plane, flies under dual rocket power. After exhausting its rocket fuel, the plane continued on a routine research flight under its jet power.

First (hour and a half) flight of the Navy's AJ-1 production model multi-engine attack plane is made at North American Aviation's field, Downey, Cal.

Bell Aircraft Corp. announces the Bell Aircraft Supply Corp., a wholly-owned subsidiary incorporated in California.

May 18

The House Armed Services Committee orders the Defense Department to conduct "impartial tests" of the Air Force's B-36 bomber against the Navy's best jet fighters.

Metropolitan Aviation Corp. holds ceremonies officially opening New York City's first helioport at Pier 41, East River.

Dr. Alexander Klemin is installed as new president of the American Helicopter Society.

Boeing C-97A *Stratofreighters* are approved for operation at a new gross weight of 148,000 lb.

May 19

Cessna Aircraft Co. announces a new Model 140 two-place personal aircraft, all-metal construction, featuring a top speed of 125 mph and a cruising speed of 110 mph.

The U. S. delegation to the talks that open next Monday with Canada on a bilateral civil aviation agreement will include Russell B. Adams, chairman, (Civil Aeronautics Board); Livingston Satterthwaite, (State Department); Sydney Smith, (CAB); Louis W. Goodkind, (CAB); Joe Wolf (State Department); George Roper, (U. S. civil air attache in Ottawa); and Stuart Tipton, (Air Transport Association).

May 20

Chairman Edwin C. Johnson of the Senate Interstate and Foreign Commerce Committee criticizes the Civil Aeronautics Board for failure to certificate Willis Air Service, Inc., as a freight air carrier.

John B. Walker named vice-president of Braniff Airways.

General Electric Co. receives orders from both the Air Force and Navy for lamps to be used in the "slope line" airport approach lighting system, which has now been adopted by both services.

The United States is now in a position to mass produce supersonic aircraft in the event of an emergency, reports John Stack, National Advisory Committee for Aeronautics.

During the eleven weeks from March 1 to May 15, Civil Aeronautics Administration made 100 Federal Aid Airport grant offers with slightly over $8 million in Federal funds.

The Senate unanimously confirms Francis P. Matthews as Secretary of the Navy; Dan A. Kimball as Undersecretary of the Navy, and Gordon Gray as Undersecretary of the Army.

## AVIATION FORECAST

"Within 15 years, non-stop transatlantic flights will be a thing of reality, declared Lt. Com. Richard E. Byrd, following his arrival in Dayton Friday morning."—*Dayton Herald,* Nov. 19, 1926.

May 23

The National Safety Council names 27 domestic and overseas air carriers as winners of its 1948 aviation safety awards. American Airlines set a new all-time record by ending 1948 with a total of 2,933,272,000 passenger miles since its last fatal accident, Dec. 28, 1946.

Los Angeles Airways applies to the Civil Aeronautics Board for a permanent certificate to authorize scheduled transportation of passengers by helicopter as well as mail and property.

May 24

The Senate Armed Services Committee asks Defense Secretary Louis Johnson to appear before the committee with complete information regarding aircraft procurement contracts.

Personal Aircraft Council, Aircraft Industries Association, announces shipment of 436 personal aircraft by ten companies during April. April shipments bring the 1949 totals to date to 1,190 aircraft valued at $5,468,000.

May 25

Rep. James E. Van Zandt (R., Pa.) asks Congress to investigate military aircraft procurement, in particular Air Force purchases of the Convair B-36.

Capt. E. V. Rickenbacker, president of Eastern Air Lines, in a letter to Sen. Edwin C. Johnson (D., Colo.), offers to operate the routes of five competitors of Eastern without subsidy.

May 27

Fred C. Crawford, president, Thompson Products, Inc., is elected industry chairman of the Munitions Board Aircraft Industry Advisory Committee.

First attempt to test the Los Angeles Airport's FIDO system under actual fog conditions hits a snag when it fails to produce sufficient visibility for a landing.

May 31

Rep. Carl Vinson (D., Ga.) gets $50,000 for House Armed Services Committee investigation of the Convair B-36.

Court of Appeals sets aside National Labor Relations Board order which found Boeing Airplane Co. guilty of unfair labor practices. The court rules 3-0 that the union violated a no-strike clause in its contract.

## JUNE

June 1

The Senate Appropriations Committee reports out the Second Deficiency bill without including $16,100,000 to cover air mail payments due the domestic airlines for services during part of fiscal 1949.

The House Armed Services Committee abandons plans for a test of the Convair B-36 against the Navy's best jet fighters "for security reasons."

C. R. Smith, president of American Air Lines, is appointed vice commander of Military Air Transport Service as an emergency mobilization assignment.

June 2

The Aircraft Owners and Pilots Association reports that nine classes of personal planes participated in the annual Spring Regatta of the Philadelphia Aviation Country Club at Wings Field, Ambler, Pa., with 71 planes and 142 pilots and navigators flying the 271-mile course.

The Senate Armed Services Committee unanimously approves a bill to authorize a $311 million wind tunnel program.

Rear Admiral John P. Whitney, vice commander of the Military Air Transport Service, announces that the Berlin air lift will continue indefinitely at the current rate of about 8,000 tons daily.

June 3

Trans World Airline signs an agreement with Lockheed Aircraft Corp. for purchase of 20 additional Model 749 Constellations, with deliveries to start in April, 1950.

A new Deputy Administrator (Donald W. Nyrop), a new director of the Office of Federal Airways (Charles F. Horne), and a new international region (headed by A. S. Koch) is announced by Civil Aeronautics Administrator Del Rentzel.

Ryan Aeronautical Co. reports it has received $1 million in new business for its metal products division in the last 30 days.

June 6

It is announced that a bilateral air transport agreement between the United States and Canada was signed Saturday afternoon in Ottawa. Canada came out of the negotiations with a direct Montreal-New York route, paralleling Colonial Airlines. Probably of most importance to the U. S. was continuation of fifth freedom rights for its trans-Atlantic carriers at Gander, Newfoundland.

C. S. Robinson resigns as chairman of the Robinson Airlines' board of directors.

June 7

Ansel E. Talbert, aviation editor of the New York *Herald Tribune*, is elected president of the Aviation Writers Association.

The Air Force's Lockheed XF-90 jet penetration fighter successfully completes its first test flight at Muroc Air Force Base, Cal., remaining aloft for 37 min. Piloted by Tony LeVier, it was taken to an altitude of 15,000 ft.

June 8

Senate defeats bill to increase Federal Airport program from $36,500,000 to $60 million; passes an increase of $9 million for the Civil Aeronautics Administration air navigation program, and $159,500 increase for the Civil Aeronautics Board for additional personnel.

June 9

A Sikorsky S-52-1, piloted by Capt. Hubert D. Gassis, sets a new world helicopter record of 21,220 ft.

June 10

Jamieson Aircraft Co. announces a new lightplane, *Jupiter*, which will sell for $2,500. Designed by C. M. Jamieson, it is a three-place, all-metal airplane, powered by a Lycoming 115-hp engine, with a cruising speed of 150 mph.

Shipments of aircraft propellers and parts during 1948 totaled $51,002,000 according to a report issued jointly by the Bureau of Census and the Civil Aeronautics Administration. Of this amount, 80% represented shipments to the armed forces.

Helicopter Air Service, Inc., files a registration statement with the Securities Exchange Commission proposing an offering at $4 per share of 80,000 shares of Convertible Class A 6% Stock, $4 par value.

## AVIATION FORECAST

"Air Trains coming? Visions of giant 'air trains' crossing continents, and unloading passengers and express at local stations by the simple method of detaching a glider, were awakened by the success of the Russian pilot, Fediosev, in a flight of 930 miles from Moscow to Koktebel, Crimea, with three gliders attached to his plane."—*Literary Digest*, June 9, 1934.

June 13

Sherman M. Fairchild's stockholders committee releases names of those who will stand for election as directors of the corporation at the annual meeting on July 6. The list includes Richard S. Boutelle, Sherman M. Fairchild, J. A. Allis, Arthur F. Flood, Grover Loening, L. M. W. Bolton, William D. McIntyre, Frank R. Nichols, and Charles H. Colvin.

Dr. Clark B. Millikan is named chairman of the Committee on Guided Missiles of the Research and Development Board.

June 14

Domestic airlines inform the National Military Establishment that they will increase discount on military business from 5% to 10% if certain of the restrictive features of the railroad agreement are modified.

Airline chief pilots begin three-day meeting in Washington to discuss technical problems.

June 15

Military services prepare final program to transfer the overhaul of all transport type aircraft to commercial overhaul agencies in an attempt to increase industrial capacity in the field of aircraft overhaul.

Oral argument in the three-year-old Air Freight Case ends. Civil Aeronautics Board Chairman Joseph J. O'Connell, Jr., promises review of the Board's decision of May 12 in which it awarded certificates to four new air freight carriers.

A 10% reduction in the net price of Douglas-manufactured spare parts for DC-3, DC-4 and DC-6 transports is announced.

President Truman submits to Congress supplemental aviation estimates of $19,571,000 which includes the sum of $16,100,000 in back air mail pay.

June 16

Sen. Edwin C. Johnson (D., Colo.) said today that hearings of the Senate Airline Investigating Committee would end June 30 and, as a result of the evidence, the following three bills would be reported out: one to recreate the Independent Air Safety Board; another to authorize appropriation of $300,000 to permit CAB to make a study of separation of air mail from subsidy; and a third to create an air merchant marine.

Spin recovery is eliminated from instruction of student pilots by a change in Civil Air Regulation Part 43.

J. M. Harper, adjutant general of the Air Transport Command during the war, is named secretary of the Air Coordinating Committee's industrial division.

### June 17

Flight Refueling, Inc., sets up facilities at Danbury, Conn., airport, and expects to offer a commercial mid-air refueling system across the North Atlantic this year.

Aeronca Aircraft Corp. announces a new "no-bounce" landing gear, available immediately for two Aeronca models.

Lockheed Aircraft Corp.'s PO-1W, a modified Constellation built for the Navy, successfully completes its first test flight at Burbank, Cal.

Air Materiel Command signs a $843,000 contract with Pacific Overseas Airlines for complete reconditioning of 74 Beech T-7 (C-45) trainers to be used in the reserve training program.

### June 20

Civil Aeronautics Administration reveals details of its three-year air navigation and traffic control program, showing amount of equipment to be installed and the type and number of airports involved.

Northrop Aircraft completes arrangement with Reconstruction Finance Corp. for a $5 million line of credit.

### June 21

Maj. Gen. Edward M. Powers, retired Air Force officer, is appointed vice president and director of engineering for Curtiss-Wright Corp.

United States Employment Service survey shows that aircraft employment is leveling off.

Aircraft Industries Association reports that 57 personal aircraft, four-place and under, were exported during May.

Domestic airlines will give a 10% discount on official military travel during fiscal 1950.

The War Assets Administration offers 130 leased planes for sale to U. S. airlines.

Senate passes seven aviation bills, five of them as amendments to the Federal Airport Act.

### June 23

C. C. Pearson announces his resignation as vice president of Curtiss-Wright Corp., effective May 30 but not announced until today.

### June 24

Douglas Super DC-3 successfully completes first test flight, piloted by John F. Martin.

American Overseas Airlines-Pan American Airways merger case hearing ends with many major problems yet unsettled.

Air Transport Association appoints S. P. Saint, American Airlines captain, as director of the Air Navigation and Traffic Control Unit of the operations division.

### June 27

Twenty-seventh annual National Aeronautic Association convention opens in Akron, Ohio.

Fairchild Engine and Airplane Corp. receives a license from Helio Corp. to use the "Helioplane" principles in designing military and commercial aircraft.

### June 28

Sperry Gyroscope Co. announces the appointment of Carl G. Holschuh as vice president in charge of manufacturing.

Robert L. Earle is elected senior vice president of Curtiss-Wright Corp. and made executive director of the corporation's three aircraft manufacturing divisions.

Pan American Airways marks the tenth anniversary of regular trans-Atlantic passenger service, having carried 413,148 persons since its first flight.

The Civil Aeronautics Administration Non-Scheduled Flying Advisory Committee recommends that CAA test all existing models of lightplanes to explore the possibility of reducing spin characteristics by restricting control travel.

### June 29

Combat radius of the Republic F-84E, latest production model of the *Thunderjet*, is rated at 850 miles, an increase of 250 miles over previous models. Service ceiling listed as "above 45,000 ft.," compared to 40,000 ft. for previous models.

Pan American Airways and Eastern Airlines test RCA Victor slow-playing (45-rpm) phonographs as an entertainment medium for passengers.

National Flying Farmers Association forms a research foundation for agricultural aviation.

### June 30

Senate subcommittee on Banking and Currency investigates Reconstruction Finance Corp. lending policies on airlines, and Civil Aeronautics Board's procedures and policies on such loan applications.

William T. Arthur is appointed vice president-operations of Chicago & Southern Air Lines.

### AVIATION FORECAST

"What of the next thirty years? . . . There are some things within the realms of certainty during the next thirty years. Speeds of 1,000 miles an hour, for example, speeds such that time will be overtaken."—Capt. J. L. Pritchard, *London News Chronicle*, Dec. 12, 1933.

## JULY

### July 1

Civil Aeronautics Board proposes regulation providing for cockpit standardization in transport aircraft.

B-50 Super-fortress (Boeing Airplane Co.) successfully takes off and lands equipped with tractor tread landing gear, being the heaviest plane thus far to operate with the tread gear. The main gear trucks and belts were built by Goodyear Tire and Rubber Co., while the nose wheel gear was built by Firestone Tire and Rubber Co.

Lockheed Aircraft Corp. Air Force all-weather fighter, the F-94, completes test flights at Burbank, Cal.

Lanier Aircraft Corp. announces new *Paraplane* that acts as its own parachute in case of engine failure.

July 5

Curtiss-Wright Corp. names Theodore B. Focke vice president-general manager and H. Fletcher Brown general manager of the Airplane Division.

United Air Lines flew an estimated 1 million passengers and 627 million revenue passenger miles in the first six months of 1949, increases of 17% and 16%, respectively, over last year.

424 lightplanes were shipped during June, according to unofficial figures by the Personal Aircraft Council, Aircraft Industries Association. Included were: Aeronca, 21; Beech, 35; Bellanca, 1; Cessna, 96; Ercoupe, 9; Luscombe, 25; Mooney, 10; Piper, 190; Ryan, 17; TEMCO, 10. (No report available from Taylorcraft.)

North American Aviation designs "console" type instrument panel that enables pilots to observe 60 instruments and 16 indicator lights with ease while flying over 550 mph.

July 7

House Armed Services Committee appoints Joseph B. Keenan director of the Congressional investigation of military procurement and strategy.

Rep. Carl Hinshaw (R., Cal.) introduces bill which would delegate civil air regulations enforcement to state aviation agencies.

President Truman abolishes the Office of Defense Transportation.

July 8

Harold J. Roig retires as president of Pan American-Grace Airways and is succeeded by Andrew B. Shea, a director and senior vice president of W. R. Grace & Co.

Battle for control of Fairchild Engine and Airplane Corp. ends as stockholders committee takes over the company's management. Richard S. Boutelle replaces J. Carlton Ward, Jr., as president of the corporation.

Odom Aviation Corp., headed by Bill Odom, opens at Teterboro Airport, New Jersey.

Senate Appropriations Committee approves bill liberalizing eligibility requirements for flight training under the G. I. Bill of Rights.

July 11

Rep. Robert Crosser (D., Ohio) introduces bill to recreate Air Safety Board.

President Truman recommends repeal of 3% tax on freight.

Marine Aircraft Corp., headed by L. C. McCarty, is formed to carry out specialized aircraft projects for military services and transport industry.

July 12

Civil Aeronautics Board orders September 30th expiration date on coach and promotion-type tariffs.

House Armed Services Committee sidetracks bill giving more power to Defense Secretary Johnson pending completion of its B-36 investigation.

July 13

Beech Aircraft Corp. announces a new twin-engine, five-passenger *Bonanza* which will sell for about $30,000.

Civil Aeronautics Board proposes more stringent safety rules for intrastate carriers.

Senate Interstate and Foreign Commerce Committee approves bill to transfer airport funds to Civil Aeronautics Administrator.

Fairchild Engine and Airplane Corp. names J. A. Allis chairman of the board.

July 14

To date, 21 states have exempted airlines from fuel taxes.

American Airlines breaks all-time monthly record by flying 156,009,534 revenue passenger miles in June.

President Truman asks $5,300,421 supplemental funds for aviation activities.

Aircraft Industries Association reports cost trend of new military planes has been held far below the general price rise.

July 15

Glenn L. Martin becomes chairman of the board of Glenn L. Martin Company; C. C. Pearson succeeds Martin as president and general manager; Harry T. Rowland and Morgan R. Schermerhorn, Jr., resign.

Sen. Edwin C. Johnson (D., Colo.) recommends major airline changes including consolidation of services and facilities, interchange agreements, coach service, natural mergers, and Civil Aeronautics Board control over airline securities.

Munitions Board creates Military Procurement Information Center to eliminate "five percenters" in military contract awards.

July 18

Rex B. Beisel resigns as vice president of United Aircraft Corp.; Frederick Detweiler is named acting general manager.

Parkman Sayward resigns as general sales manager of Slick Airways.

Senate Appropriations subcommittee begins hearings on House - passed bill providing $19,569,807 for airmail and airport repairs.

July 19

Northrop Aircraft discloses extensive research program on boundary layer control.

Airlines protest proposed Civil Aeronautics Administration landing fees at CAA airports in the Pacific.

Backlogs of aircraft companies' orders total $2,991 million on March 31; total new net orders amounted to $269 million (75% military) as compared to $303 million during previous quarter; net sales amounted to $384 million as compared to $433 million.

July 20

Consolidated Vultee Aircraft Corp. names V. C. Schorlemmer secretary and treasurer.

Boeing Airplane Co. designs and tests new anti-skid device.

July 21

American Overseas Airlines' flight radio officers strike for higher pay and changed work rules.

## AVIATION WONDERS

On July 17, 1908, the first city aircraft ordinance was passed at Kissimmee, Florida, limiting altitude to ten feet over any street or alley, speed to eight miles an hour.

Civil Aeronautics Administration appoints a 12-man airport advisory committee.

House Armed Services Committee tentatively approves $246,509,481 Air Force construction program bill.

July 22

Reports to the Civil Aeronautics Board disclose that April and May found the airline industry operating with a net income in excess of total mail payments.

Harold Luskin, Douglas Aircraft Co. engineer, predicts speeds of 1,500 mph at 80,000 feet by 1960.

Civil Aeronautics Administration announces fiscal 1950 Federal-Aid Airport Program, involving more than $67 million for 314 projects.

Grumman Aircraft Engineering Corp. awards sub-contracts totalling more than $6 million to the Glenn L. Martin Co. for manufacture of parts and assemblies for Navy F9F fighters.

Rear Admiral Gorden McLintock is named president of the Institute of Navigation, with Paul Rosenberg as technical adviser.

July 25

Rep. Carl Hinshaw (R., Cal.) urges House to retain 58-group Air Force bill for fiscal 1950.

Cloyce J. (Tip) Tippett heads International Civil Aviation Organization's South American office at Lima, Peru, effective August 1.

Securities and Exchange Commission report discloses a 51% increase in aircraft sales for the first quarter of 1949 over the same period last year —$335,175,000 in 1949 as compared to $226,097,000 in 1948.

Texas Engineering and Maunfacturing Co. tests commercial version of its 145 hp military trainer.

July 26

Sen. Edwin C. Johnson (D., Colo.) reports it unlikely that airline finance hearings will inspire new laws during current Congressional session.

Aircraft unions urge $1.15 minimum wage in industry as compared to existing rate of 40c to 50c an hour.

President Truman signs bill allowing 10% increases for Class IV and larger airports.

The Sikorsky H-5H, world's first amphibious helicopter, is announced by the National Military Establishment.

Experimental western division of the Military Air Transport Service is established in Los Angeles with Lt. Gen. Harold L. George as commander.

July 27

Aircraft manufacturers oppose wage rate increase in industry.

July 28

Two bills governing shipment of explosives by air become law.

Civil Aeronautics Board survey shows that sky-coach operations brought five domestic airlines $1,500,000 during April and May, 1949.

July 29

Berlin airlift to begin gradual demobilization August 1.

Senate version of the Military Establishment Appropriation bill for 1950 would cut airframe weight by 14,840,000 pounds.

Exports of personal aircraft during first six months of 1949 total 277 units as compared to 542 for the same period last year.

## AUGUST

Aug. 1

Following a mid-air crash on July 30 between a scheduled transport and a Navy F-6-F Grumman Hellcat, at Fort Dix, N. J., Sen. Edwin C. Johnson calls for greater disciplining of military fighters.

Senate adopts $4,900,000 increase for National Advisory Committee for Aeronautics.

Northrop Aircraft test-flies its tri-motored C-125 Raider at Hawthorne, Cal.

National Safety Council reports 1948 travel safest in last decade with air rate being 1.3 deaths per 100 million passenger miles.

Arthur M. Young, New York City aviation engineer, receives Edward Longstreth Medal for helicopter developments.

Aug. 2

Civil Aeronautics Board reaffirms its freight case decision by issuing five-year certificates to Flying Tiger Line Inc., Slick Airways Inc., U. S. Airlines Inc., and Airnews Inc.; carriers may not handle Railway Express Agency shipments.

H. C. Dobbs resigns as vice president, traffic, National Airlines.

Civil Aeronautics Board finds carbon dioxide in cockpit caused United Air Lines DC-6 accident on June 17.

Forty-nine Senators sign letter to President Truman protesting United States-Canada air transport agreement announced in June.

Aug. 3

National Pilots Association seeks to replace pilot seniority promotion system with new one permitting older pilots to receive seniority pay without flying larger, heavier and faster aircraft.

Aug. 4

Veterans Administration reports a 33% reduction in G. I. enrollment for flight training courses during first six months of '49.

Douglas Aircraft Co. appoints L. E. Tollefson as secretary.

Aug. 5

Gov. Thomas E. Dewey of New York announces agreement reached between the Port of New York Authority and major airlines over use of New York International (Idlewild) Airport after a two-year deadlock; airlines involved to pay a flat fee for every flight.

Alaska Airlines' non-scheduled operation certificate suspended by Civil Aeronautics Board.

Boeing Airplane Company receives Air Force contract for 16 new-type mobile bomb lifts.

Aug. 8

Curtiss-Wright Corp. elects Roy T. Hurley as president and director.

Texas Engineering and Manufacturing Co. names H. G. Erickson to head activities in design work on the TE-1A military trainer.

John H. Fite named vice president of Piper Aircraft Corp.

Douglas Aircraft Co. and Monsanto Chemical Co. develop non-inflammable hydraulic fluid for use in Douglas Super DC-3.

Second Lockheed F-90 twin-jet penetration fighter goes to Muroc Air Force Base for flight tests.

Revenue pounds hauled in and out of San

Francisco airport have increased 978% in past decade.

Aug. 9

B-36 hearings begin; Maj. Gen. Frederick H. Smith, Jr. (Operations, United States Air Force) first witness.

Rep. Carl Vinson (D., Ga.) plans fight to restore $8 million trimmed from Air Force budget by Senate.

National Airlines names Walter Sternberg as vice president, sales.

W. E. (Dusty) Rhoades, United Air Lines test pilot, receives Air Transportation Association trophy for air navigation work.

Aug. 11

President Truman signs unification bill.

Sen. Walter George (D., Ga.) promises action on excise tax repeal (which includes 15% transportation tax).

Ryan XQ-2 jet-propelled pilotless target plane undergoes preliminary inspection by Air Force, Navy and Army Field Force technicians at Ryan Aeronautical Co. plant.

Aug. 12

Air Force Chief of Staff Gen. Hoyt S. Vandenberg denies influence charges at B-36 hearings.

Aug. 15

B-36 investigation recessed until August 22 to permit probe of west coast manufacturers and former Air Force Commanding General H. H. Arnold.

$311 million wind tunnel and aircraft development equipment bill passed by Senate.

Lt. Gen. Harold L. George, war-time chief of Air Transport Command and now vice president and general manager of Hughes Aircraft Co., receives Air Force Association award for his contribution to American air power.

Ryan Aeronautical Co. cuts price on Navion by $1,000.

Aug. 16

Sen. Edwin C. Johnson proposes federal regulation of intrastate lines on competitive routes; also introduces legislation which would give the Civil Aeronautics Board control over domestic and foreign contract air carriers.

Secretary of Commerce Charles Sawyer supports separation of mail pay from subsidy.

Aug. 17

Chase Aircraft Corp. holds a production contract for its YC-122 Air Force assault transport.

Aug. 18

Eugene E. Wilson resigns as chairman of Aircraft Industries Association's board of governors.

Solar Aircraft Company elects Edmund T. Price as president and general manager.

Boeing Airplane Co. develops device to eliminate "Dutch roll," the tendency of high speed aircraft to lose wing lifting ability because of tail yaw caused by side gusts.

Aug. 19

Rep. Melvin Price (D., Ill.) reports B-36 conspiracy charges "completely exploded" as result of west coast investigation.

Northrop Aircraft announces long-range jet engine currently being developed.

Aug. 24

Defense Secretary Louis Johnson advocates economy program which would close numerous Air Force and Naval bases. Military cutback is part of a large-scale program to save between $1 billion and $3 billion a year.

Aug. 25

House Armed Services Committee votes clean bill of health on B-36 procurement and recesses investigation until October 8.

National Airlines tells Civil Aeronautics Board that "reductions in fares are essential to placing its operations on a sound economic basis."

## AVIATION WONDERS

"To travel by air now costs on the average three times as much as by rail (without sleeping car). Some comparisons:

| | Rail | Air |
|---|---|---|
| Chicago-N. Y. | $32.70 | $100.00 |
| Wash.-N. Y. | 8.14 | 30.00 |
| Seattle-L. A. | 47.46 | 125.00 |
| San Francisco-L. A. | 17.04 | 50.00 |
| Boston-N. Y. | 8.26 | 25.00 |
| Cleveland-N. Y. | 20.55 | 85.00 |

—*Time*, Dec. 3, 1928.

Aug. 26

Senate slashes $577 million from Air Force funds, reducing aircraft procurement funds to $1,415 million contained in President's original budget which will mean cutting back to 48 groups rather than 58 provided under House-approved version of the bill.

$29,192,000 contract awarded to Pratt & Whitney by Navy for R-4360-53 Wasp Major engines.

Air Force awards Sikorsky Aircraft a $1 million contract for five H-19A helicopters.

Luscombe Airplane Corp. declared bankrupt.

Aug. 29

Sixteen domestic trunk airlines end first six months of 1949 $20 million over same period last year.

Ryan Aeronautical Co. receives a $1 million Air Force Contract for additional XQ-2 target planes.

Senate okays 70-group Air Force.

Senate passes bill authorizing "grants for minor projects at major airports, and for other purposes."

Aug. 30

Senate passes airport bill allowing grants up to $50,000 for development of Class 4 or larger airports without Congressional authorization; also okays inclusion of Logan International Airport, Boston, in 1950 airport program.

Sen. Edwin C. Johnson (D., Colo.) introduces bill permitting technical training for certain Civil Aeronautics Board personnel.

Alvin P. Adams and Associates, New York aviation consultants, report that air travel during May exceeded first class rail for the first time.

Westinghouse J-34 engine passes Air Force-Navy qualification test.

President Truman signs air star route bill.

## AVIATION FORECAST

"At first flying will be a sport, but its commercial value will come later. In warfare, in science, its utility is already assured. I believe it may solve the North Pole problem."—Allen R. Hawley, *Boston Sunday Post,* Aug. 30, 1908.

## SEPTEMBER

### Sept. 1

Christopher de Groot, general traffic manager, and Nicholas C. Craig, sales manager, resign from Pan American-Grace Airways, Inc.

Boeing Airplane Co. elects Cliff Barron a vice-president.

Douglas Aircraft Co. reports "the commercial outlook for the company today is better than at any time in the last two years."

Capt. E. V. Rickenbacker completes 13,700-mile Latin-American good will tour in new type Constellation.

### Sept. 2

Edward G. Bern is named sales manager of Pan American-Grace Airways, Inc.

The Internal Revenue Bureau rules that tickets bought abroad for use in the United States are subject to 15% Federal tax.

Glenn L. Martin Co. announces first flight of its P4M-1 Mercator on Aug. 31 near Baltimore.

Neil Silsbee, managing editor of *Aero Digest,* resigns to become executive secretary of the Corporation Aircraft Owners Association.

Aircraft Industries Association reports shipment of 295 personal aircraft by ten companies during July, with Piper and Cessna heading the list. This represents a 65% drop under July shipments last year, with shipments for first seven months of 1949 being 50% below 1948 figure for same period.

### Sept. 5

Bill Odom is killed in Thompson Trophy Race at Cleveland National Air Races.

### Sept. 6

House Commerce Committee group leaves for study tour of European jet transport, synthetic fuels and health problems.

Aircraft spark plug and ignition conference opens in Toledo, Ohio.

### Sept. 7

Civil Aeronautics Board approves promotional-type fare programs until June 30, 1950.

Navy Board of Inquiry begins investigation of B-36 document prepared by Cedric R. Worth.

Secretary of Defense Johnson announces that official trips may be made aboard military aircraft, thereby reversing his earlier stand.

### Sept. 8

Warren Smith becomes public relations director and assistant to the president of Fairchild Engine and Airplane Corporation.

### Sept. 9

President Truman orders survey of government transportation policies.

### Sept. 12

Civil Aeronautics Administration's Airport Advisory Committee begins three-day session.

Mark Nevils resigns as public relations director for Curtiss-Wright Corporation.

Skysailing Corp. formed to encourage soaring with the use of power.

### Sept. 13

William Goulding and Raymond Young resign as vice presidents of Curtiss-Wright Corporation.

Federation Aeronautique Internationale re-elects William R. Enyart, president.

### Sept. 14

Capital Airlines buys first three Douglas Super DC-3's.

Air Force cancels production of Fairchild T-31 Trainer.

### Sept. 15

Fairchild Engine and Airplane Corporation announces assignment of Willard L. Landers as assistant general manager; Floyd S. Bennett as division comptroller; and George A. Hatcher as director of customer relations.

Thomas W. S. Davis is named Assistant Secretary of Commerce.

Airports Advisory Committee of the Civil Aeronautics Administration adjourns session and promises to submit a score of recommendations to Administrator Rentzel.

### Sept. 16

Warren Lee Pierson, chairman of the board of Transcontinental and Western Airlines, is elected president of International Air Transport Association.

Piasecki Helicopter Corp. receives letter of intent for seven HUP-1 helicopters for Navy.

The Martin XB-51, first Air Force three-jet airplane, undergoes final check-out.

Capt. William Virginius Davis, Jr., USN, and Capt. Vincent Mazza, USAF, receive National Air Council's annual awards.

### Sept. 19

Pratt and Whitney announces development of new series of compound engines, offering ratings in the neighborhood of 5,500 horsepower and "rather spectacular" range.

Gen. Joseph T. McNarney, defense "unity expediter," orders cutback in military transportation costs.

### Sept. 21

International Air Transport Association ends 1949 assembly recommending, among other things, fare differentials and aircraft interchange.

National Advisory Committee for Aeronautics officials cite development of easily producible jet engine as a top NACA project.

### Sept. 22

International Civil Aviation Organization effects rule to reduce red tape involved in crossing international boundaries by air.

### Sept. 26

Pratt and Whitney receives $7,007,851 Navy contracts for R-2800 series piston engine.

U. S. Airlines, Inc., names Ralph W. Starkey executive vice president.

### Sept. 27

Top defense officials, including Johnson and Symington, view Navy aircraft carrier operations.

Civil Aeronautics Administration reports installation of one low frequency omni-range at Nantucket, with others to be ready soon.

Rep. Clarence Cannon (D., Mo.) promises House fight for restoration of $8 million Air Force funds.

Department of Commerce reports airframe shipment totals at 36,670,500 pounds for year ended July 31, and employment in aircraft and engine plants up 17% over July, 1948, totals.

### Sept. 28

Dr. J. H. Dellinger re-elected president of Radio Technical Commission for Aeronautics.

Dr. Edward P. Warner, president of the Council of the International Civil Aviation Organization, to receive Daniel Guggenheim medal and certificate for 1950.

### Sept. 29

Douglas Aircraft Company's DC-6A *Liftmaster*, cargo version of the DC-6, completes first test flight at Santa Monica.

Total shipments for August by nine lighplane companies were 260, with Piper Aircraft Corporation leading the field.

## OCTOBER

### Oct. 3

Navy jet-rocket special research plane, the Douglas D-558-II Skyrocket, reaches a top speed of slightly over 700 mph at an altitude of 25,000 ft. in test flight at Muroc, Cal.

"The Civil Aeronautics Board will continue its feederline experiment but won't government-finance transition of feeders into trunklines," states Paul W. Cherington, CAB executive assistant.

President Truman signs bill permitting the Civil Aeronautics Administrator to transfer surplus properties on airports for non-aviation uses.

Northwest Airlines begins $1.5 million expansion project to handle its Stratocruiser operations.

Northrop Aircraft observes its tenth anniversary.

### Oct. 4

As a result of the Navy blast against Unification, the House Armed Services group opens a full-scale investigation.

Senate Agricultural Committee passes resolution to develop a special agricultural airplane.

Robert Ramspeck, Air Transport Association executive vice president, asks greater use of airlines by government employees.

Field artillery battery is dropped from Fairchild C-82 packets by parachute for first time, in demonstration at Fort Bragg, N. C.

Kellett XH-10 experimental Air Force transport helicopter crashes during test flight at Moorestown, N. J., killing pilot Dave Driskill.

### Oct. 5

House Armed Services Committee closes its B-36 procurement hearings, reaffirming a clean bill of health for both Air Force and Convair officials, but will continue other phases of the investigation.

Civil Aeronautics Administration reports 92,658 civil aircraft on record as of July 1, representing a drop of 5,087 from 1948. The four leading producers are: Piper, Aeronca, Consolidated Vultee and Cessna.

### Oct. 6

Veterans Administration rescinds "complete justification" rule for flight training.

Two committees are named to work out improved training program for airline mechanics.

### Oct. 7

Admiral Arthur W. Radford, commander-in-chief of the Pacific fleet, launches new attack on the B-36, terming it a "billion dollar blunder."

Air Force officials report immediate availability of A-bombs if their use is ordered.

Maj. Gen. Laurence S. Kuter, Military Air Transport Service commander, seeks to cut down plane types used by MATS from present 20 models to single model in each category.

Curtiss-Wright Corp. receives $1,200,000 Air Force contract for C-46 spare parts.

Senate Interstate and Foreign Commerce Committee signs contract for mail pay-subsidy separation study by Ernst and Ernst, auditing firm.

Capital Airlines appoints Russell L. Wageneck as manager of maintenance.

### Oct. 11

Civil Aeronautics Board proposes tighter safety requirements for intrastate carriers.

Naval experts claim that Air Force strategic bombing theory is militarily unsound.

Airports Advisory Committee files first report with Civil Aeronautics Administration, recommending continued construction of multiple-directional runways.

Harold C. Stuart is nominated assistant Air Force secretary by the President.

Air Force acknowledges test flights of Lockheed F-90, a 26,000-pound swept wing penetration fighter with a 55 ft. length, 40 ft. span, and 35 degrees sweepback.

New endurance record of 1,124 hr., 14 min., 5 sec. is set by pilots Bob Woodhouse and Woody Jongeward in a 4-place Aeronca at Yuma, Ariz.

George C. Van Nostrand is elected vice president and general manager of American Airlines de Mexico.

Glenn L. Martin Co. names William B. Bergen chief engineer.

### Oct. 12

President signs Third Deficiency Bill releasing $16 million in air mail pay.

Capital Airlines leases three 049 Constellations from Lockheed with an option to buy after 18 months, being the first such deal between an airline and a manufacturer.

Fleet Adm. William F. Halsey asks House Armed Services Committee for restoration of super aircraft carrier, *United States*, and recommends that Defense Secretary Johnson not be permitted to order cuts in Navy spending.

New Civil Aeronautics Administration policy backs federal aid for single-strip Class I airports.

House passes Senate-approved bill for a unitary plan for construction of transonic and supersonic wind tunnels and an air engineering development center.

Oct. 14

Capt. E. V. Rickenbacker, Eastern Air Lines president, urges $100 million government aid for jet transport development, in address before the Aviation Writers Association in New York.

Chase Aircraft Co.'s XC-123, Air Force assault transport, completes first test flight at West Trenton, N. J., taking off in 12 seconds (about 500 ft.) and coming to a complete stop six seconds after landing.

Frederick C. Crawford, president of Thompson Products Co., is named head of the Munitions Board Advisory Committee on Military-Contractor Relationship.

Oct. 17

Nineteen-week old Bell Aircraft Corp. strike is settled.

National Military Establishment and domestic airlines sign agreement on use of air transport for official travel; is expected to benefit airlines.

Richard C. Coleman is named employment manager for Eastern Air Lines.

AiResearch Manufacturing Co. observes its tenth anniversary.

Boeing Airplane Co. delivers first C-97A (new model of the Stratofreighter) to Military Air Transport Service.

Oct. 18

House-Senate conference group approves 58-group air force; bill passed to President.

Post Office begins reorganization project to closer coordinate air and surface mail.

Congress acts on twelve aviation bills to free airport and mail funds, construct development centers, etc.

Oct. 19

Senate investigation of airline subsidies is postponed until January 1, possibly longer.

Senate passes conference-approved bill for 58-group air force; measure goes to President.

Senate also sends to President resolution for $252 million transonic and supersonic wind-tunnel and air engineering development center.

Immigration report shows 20 percent more international travel by air than ship during fiscal 1949.

Oct. 20

American Airlines announces plans to start transcontinental air coach service in December with fares 25 percent lower than present rates.

Edward E. Wilox is named special assistant to Undersecretary of the Navy Dan A. Kimball, replacing Cedric R. Worth, author of the B-36 "anonymous document."

Robert T. Kenney is named director of public relations for the Airplane Division of Fairchild Engine and Airplane Corp.

Oct. 21

Sen. Edwin Johnson (D., Colo.) introduces legislation to give Civil Aeronautics Board control over intrastate lines competing with certificated carriers.

Aircraft Industries Association reports export of 58 personal planes during September, as compared with 48 during August.

Oct. 24

Beech Aircraft Corp. receives $3 million Navy contract for modification and overhaul of 100 twin-engine Beechcrafts.

Ronald S. Gall is named public relations manager of Curtiss-Wright Corp.'s Propeller Division.

Oct. 25

*American Aviation Daily* reports that the Navy will concentrate on two shipboard jet fighters in its 1950 procurement program: the Grumman F9F Panther and the McDonnell F2H Banshee. There will also be an increased order for Chance Vought's F7U Cutlass.

Douglas Aircraft Co. unveils its DC-6A Liftmaster cargo plane and announces existence of the DC-6B, passenger version of the cargo plane. Douglas officials state that the DC-6B will offer 7% greater payload capacity and 14% greater passenger capacity with no increase in operating costs.

Oct. 26

Second hearing begins in Pan American Airways-American Overseas Merger Case.

President signs bill for $1,900,000 guided missile laboratory, and another to redistribute unobligated federal airport funds.

Aerojet Corp. develops Junior Jato unit weighing 30 lb. for lightplane use.

Continental and American Airlines begin using VHF omnirange navigation system in regular operations.

Oct. 27

Brookings Institution study urges a Federal Department of Transportation and a new independent Transport Regulatory Commission.

Braniff Airways appoints A. S. Aldridge as West Coast manager.

Oct. 28

Glenn L. Martin Co.'s XB-51, latest Air Force jet bomber, completes first test flight at Baltimore, Md., piloted by Martin's director of flight, O. E. (Pat) Tibbs. The XB-51 is powered by three General Electric J-47 jet engines of over 5,200 pounds thrust each.

Harvard Business School study cites multiple competition as "major flaw" in expansion of domestic airlines.

Boeing B-50 bomber successfully completes cold-weather test flights at —83 degrees Fahrenheit for a two-hour period and —40 degrees for prolonged periods.

Oct. 31

North American Aviation, Inc., develops F-86D, all-weather version of F-86, powered by General Electric J-47.

National Aeronautic Association recommends ban on closed-course jet racing.

President Truman signs military appropriations bill but freezes $615 million for 58-group Air Force.

## NOVEMBER

### Nov. 1

Bell Aircraft Corp. announces its 12-passenger helicopter with all-metal fuselage, engineered to use either a 600 or 800 hp engine to cruise at more than 100 mph.

*American Aviation* reports commercial transport aircraft backlog at $96,259,000.

Douglas C-124, Air Force heavy transport, goes on pre-flight line. The plane weighs 175,000 pounds and features a built-in ramp and clamshell doors.

An Eastern Air Lines DC-4 and military P-38 crash at Washington National Airport, killing 55 persons.

Bendix Aviation Corp. appoints R. C. Fuller as general manager of Pacific Division.

### Nov. 2

United Aircraft Corp.'s Sikorsky Division announces a single-engine 10-passenger helicopter to be test-flown soon.

James D. Ramsey is elected president of the National Association of State Aviation officials.

### Nov. 3

*American Aviation Daily* reports Air Force fiscal 1950 cargo aircraft procurement to be concentrated in three plane types: Douglas C-124, Boeing C-97 and Fairchild C-119, Bomber purchases will be Boeing B-47's and Convair B-36's while two fighters will be North American F-86's and Lockheed F-94's.

### Nov. 4

Civil Aeronautics Board reports the airline financial improvement during first six months of 1949—a $10,649,000 operating profit as compared to a $3,966,000 loss in 1948—resulted from increased non-mail revenues.

Consolidated Vultee receives $5 million Air Force contract for 12 T-29 trainers.

### Nov. 7

Navy announces Rear Adm. Lynde D. McCormick to replace Vice Adm. John D. Price as Vice Chief of Naval Operations.

Civil Aeronautics Administration certifies first two air star routes to Post Office.

Personal Aircraft Council, Aircraft Industries Association, reports 268 personal plane shipments during Sept. Total 1949 shipments for first nine months were less than half of 1948 totals.

Fred N. Dickerman is named chief engineer for Chance Vought Aircraft Div., United Aircraft Corp.

Kollsman Instrument Div., Square D Co., develops altitude controller weighing 25 ounces.

### Nov. 9

President certifies $10.5 million Air Force funds for five projects, the major one being over $7.5 million for modification of 700 North American T-6 trainers.

Air Force announces site of its Air Engineering Development Center to be Camp Forrest, Tullahoma, Tenn.

### Nov. 10

McDonnell Aircraft Corp. announces demonstration last week of its XHJD-1 Whirlaway twin-engine twin-rotor helicopter to the Air Force's Arctic Rescue Helicopter Evaluation Board at St. Louis.

### Nov. 14

G. B. Van Dusen is elected president of the Aviation Distributors and Manufacturers Association.

Boeing Airplane Co. begins delivery to Air Force of B-50D's, equipped with droppable fuel tanks.

### Nov. 15

Pratt and Whitney receives $10 million Air Force contract for development of its R-4360 Wasp Major engine.

Curtiss-Wright receives $2 million contract for B-36 propellers.

Ryan Aeronautical Co. releases details of the first air-to-air missile, the Ryan XAAM-A-1 "Firebird," a ten-foot, target-seeking, rocket-powered air-to-air missile.

### Nov. 16

*American Aviation Daily* reports Air Force fiscal 1950 procurement plans to include: Republic F-84E's, Lockheed T-33's and F-94's; Boeing B-47's and C-97's, Convair B-36's and T-29's; North American F-86's, Douglas C-124's and Fairchild C-119's.

Douglas DC-6A prototype sets commercial San Francisco-Los Angeles record of 58 min., 13 sec. with an average speed of 350 mph.

### Nov. 17

Pratt and Whitney plans to put its new J-48P6 jet engine into full production under a $10 million Navy contract.

Northrop F-89 is included in Air Force procurement schedule.

Beech Aircraft Corp. announces its two-engine Beechcraft Twin-Bonanza, an all-metal, five or six place plane with a cruising speed over 180 mph and a range of about 1,000 miles.

Civil Aeronautics Board bars all military-type aircraft from operation into Washington National Airport.

Robert J. Smith, president of Pioneer Air Lines, is elected National Air Council president.

### Nov. 18

Navy awards $560,310 contract to Grumman Aircraft Engineering Corp., $535,968 to AiResearch Manufacturing Co., and $209,478 to Bendix Aviation Corp.'s Eclipse-Pioneer Div.

Charles Parker is named executive director of the National Aviation Trades Association.

### Nov. 21

Ben Odell Howard is appointed general manager of Fairchild Aircraft Div., Fairchild Engine and Airplane Corp.

### Nov. 22

*American Aviation Daily* survey of 1949 Air Force purchase reveals 2,324 planes were bought, totalling 31,746,000 pounds, with Boeing Airplane Co. and Consolidated Vultee Aircraft Corp. leading the contractors.

Aircraft Industries Association reports October lightplane exports only 62% of 1948 average.

**Nov. 23**

Ryan Aeronautical Co. announces new 260 hp Lycoming-powered "super" Navion with 170 mph cruising speed which it plans to sell for under $14,000.

**Nov. 29**

American Airlines DC-6 crashes at Love Field, Dallas, Tex.

**Nov. 30**

C. R. Smith, American Airlines president, asks government support for jet transport development.

Aeronca Aircraft Corp. announces its 1950 Champion, the all-electrical 90-hp Model 7EC, with a complete 12-volt electrical system, soundproofing, full-width rear seat, no-bounce gear and other improvements. Delivery to begin Dec. 1.

Military renegogiation representatives visit west coast manufacturers.

## DECEMBER

**Dec. 1**

$2.6 million Naval supersonic wind tunnel is dedicated at Massachusetts Institute of Technology.

American Rocket Society outlines specifications for transcontinental rocket airship, capable of 3,000-mile flight in less than 60 min.

Douglas Aircraft Co. develops automatic analyzer to cut 80% of time and cost in interpreting data radioed from research rockets.

Personal Aircraft Council, Aircraft Industries Association, reports 208 personal aircraft shipments during October, being less than half of Oct. 1948 totals.

**Dec. 2**

Civil Aeronautics Board approves transcontinential coach service by American Airlines with DC-6 equipment.

North American Aviation delivers YF-86D prototype, a swept-back jet fighter, to Muroc Air Force Base.

Navy reveals details on Allison Division's XT-40 turbo-prop engine, which will power the Navy Convair XP5Y-1 flying Boat. The XT-40 has a rating of 5,500 hp without increase in fuel consumption rate.

Civil Aeronautics Administration survey reports that airport abandonments during first six months of 1949 nearly equalled openings.

**Dec. 5**

Fairchild Aircraft Division announces $20 million in new orders.

Sen. Edwin C. Johnson (D., Colo.) asks Civil Aeronautics Board to review last summer's U.S.-Canadian air agreement.

Douglas D-558-2 Skyrocket exceeds speed of sound in test flight at Muroc Air Force Base.

**Dec. 6**

Sikorsky Aircraft Div. totals more than 20 hours flight time on its 12-place H-19 Air Force helicopter.

Air Force to divert $50 million of 1950 fiscal funds to build U.S.-Alaska radar defense system.

**Dec. 7**

Civil Aeronautics Administrator D. W. Rentzel reports a "modest net gain" for civil aviation in 1949.

Air Traffic Conference seeks close working relations with charter operators; Hugh W. Coburn is elected president of the Conference.

Thomas G. Lamphier sets round-the-world commercial transport record, flying from LaGuardia Field eastward and return in 119 hr. 47 min.—3 min. less than the scheduled time.

John F. Floberg takes oath as Assistant Secretary of the Navy for Air.

**Dec. 8**

Air Transport Association reports 16 domestic trunk airlines had a total net operating income of $24,342,851 for the 1st nine mos. of this year, over $8,214,062 loss during the same period in 1948.

J. Malcolm Smith is named assistant to W. A. Patterson, president of United Air Lines.

Air Force reports improvement in aircraft accident rate since 1946.

**Dec. 9**

Aviation securities committee of the Investment Bankers Association proposes airline financing of jet transport development from mail pay, and endorses major revision of present route structure through voluntary mergers.

Aircraft Industries Association elects Walter H. Beech to head Personal Aircraft Council.

American Mercury Insurance Co., headed by G. C. Whalen, is incorporated in D. C. to specialize in lightplane and fixed-base needs.

**Dec. 12**

Aircraft Industries Association asks government action on prototype construction to protect U. S. lead in commercial aircraft field.

Capitol Airlines DC-3 passenger transport rashes near National Airport, killing 4.

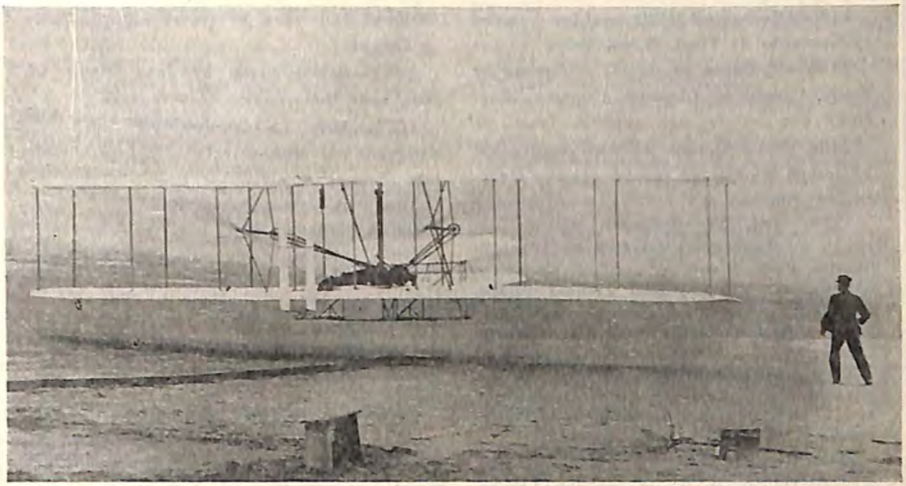
**Dec. 13**

Prototype of North American SX-93, Air Force jet penetration fighter, arrives at Edwards (formerly Muroc) Air Force Base for tests. The XF-93 is a new version of the basic F-86 Sabre design, with a 38 ft. wing span and 44 ft. length, powered by a Pratt and Whitney J-42 engine.

**Dec. 14**

AIRCRAFT YEAR BOOK GOES TO PRESS.

# A CHRONOLOGY of U. S. AVIATION



**Orville Wright at controls of *Kitty Hawk* during first flight—1903**

This chronology would be incomplete without one more date—

**1882, Aug. 14—Ernest L. Jones born in Haverstraw, N. Y.**

—a date which we would have put in its proper sequence except for the fact that we owe it special mention. The man in question, now a retired Air Force lieutenant colonel and the editor of this section, is also one of the outstanding authorities on U. S. aeronautic history.

He also made a lot of it. He was a pioneer in glider flying, assistant secretary of the Aero Club of America (grandfather of NAA) in 1906, and publisher and editor of the magazine *Aeronautics* from 1907 to 1915. In World War I Ernest Jones rose to the rank of major and was the air historian of that conflict. He was the first employee in what today is the CAA. He co-founded the Early Birds and returned to active duty and intelligence and historical work in August, 1941. Today, he is a civilian historian with the air Historical Office, U. S. Air Force.

We are deeply indebted—as is aeronautics in the United States—to Colonel Jones for his thorough knowledge of aeronautics in this country and the generosity with which he shares it.

In all fairness to him, it should be added that the following pages represent only brief excerpts from his vast store of air data. Space has forced this chronology to deal only with the highlights.

THE EDITORS

## Foreign Chronology, Pre-Wright

**150 B.C.—Principle of jet propulsion discovered by Hero with his Aeolipile, Alexandria, Egypt.**

**1496—Mechanical flying machine designed by Leonardo da Vinci, Milan, Italy.**

**1766—Hydrogen properties discovered by Henry Cavendish, Clapham Common, England.**

**1782, Nov.—Hot-air balloon constructed by Joseph Michel and Etienne Jacques Montgolfier, France.**

**1783, Aug. 27—Hydrogen balloon ascends, no passengers; released by J. A. C. Charles, Paris, France.**

**1783, Oct. 15-19—Jean Jacques Pilatre de Rozier makes first ascent by man in a Montgolfier hot-air captive balloon, Paris, France.**

**1783, Nov. 21—Pilatre de Rozier and the Marquis d'Arlandes make first free ascent by man in Montgolfier hot-air balloon, Paris, France.**

**1783, Dec. 1—First free hydrogen balloon ascent by J. A. C. Charles, French physicist, also credited with invention of first barometer, valve, and ballast.**

**1784, June 4—First woman aeronaut, Mme. Thible, ascends in a Montgolfier free balloon, Lyons, France.**

**1793—Balloon parachute descent by Jean Pierre Blanchard, Basle, Switzerland.**

**1852, Sept. 24—Steam-powered airship designed and flown by Henri Giffard, Paris to Trappe.**

**1855—Glider flight by Jean Marie Le Bris, near Douarnenez, France.**

**1872, Dec. 13-14—Gas-engined airship designed and demonstrated by Paul Haenlein, Brunn, Austria.**

**1883, Oct. 8—Electric-powered airship flight by Albert and Gaston Tissandier, Auteuil, France.**

**1884, Aug. 9—Electric-powered airship round-trip flight by Renard and Krebs, Meudon-Paris.**

**1891—Possibility of soaring on rigid arched wings demonstrated by Otto Lilienthal.**

**1896, Aug. 28-29 — Gasoline-powered airship exhibited by Hans Wolfert, Berlin.**

**1897, Nov. 3—All-metal airship built by David Schwartz, Tempelhof Field, Berlin.**

**1898, Sept. 20—Santos-Dumont airship flown, Bagatelle, France.**

**1900, July 2—First Zeppelin ascent, Lake Constance, Germany.**

## United States Chronology

**1784, July 17—First U. S. balloon flight in Peter Carnes' captive balloon, Baltimore, Md.**

**1793, Jan. 9—Balloon flight by Jean Pierre Blanchard from Philadelphia, Pa., to Woodbury, N. J. (Letter from George Washington carried on this flight.)**

**1859, Aug. 16—Airmail carried by John Wise in balloon flight from Lafayette to Crawfordsville, Ind.**

**1860, Oct. 13—Successful aerial photos taken by William Black from a balloon, Boston, Mass.**

**1861, June 10—Military flight by James Allen, First Rhode Island State Militia, in balloon over Washington, D. C.**

**1861, June 18—Balloon telegraph demonstrated by T. S. C. Lowe. (Message to Abraham Lincoln.)**

**1861, June 22-24—Military reconnaissance by T. S. C. Lowe and Army officers from balloon using telegraph, over Arlington and Falls Church, Va.**

**1873, Oct. 7—Unsuccessful trans-Atlantic flight by W. H. Donaldson, Alfred Ford and George A. Lunt in balloon, *Graphic*, from Brooklyn, N. Y., to New Canaan, Conn.**

**1883, Mar. 17—First of a series of glider flights by John Joseph Montgomery, Otay, Cal.**

**1892—Air Group formed by U. S. Army with attachment of balloon section to Signal Corps telegraph units.**

**1896, May 6—Steam-powered airplane model flown by Samuel Langley, Washington, D. C.**

**1903, Mar. 23—Orville and Wilbur Wright apply for patent on their flying machine. (Patent issued May 22, 1906.)**

**1903, Dec. 8—Samuel Langley's flying machine, piloted by Charles Manly, plunges in the Potomac and is wrecked on its second test, Washington, D. C.**

**1903, Dec. 17—First sustained flight of powered heavier-than-air machine by Orville and Wilbur Wright, Kitty Hawk, N. C.**

**1904, Aug. 3—Circuit flight in airship (Curtiss motor) by Capt. Thomas S. Baldwin at Oakland, Cal.**

**1905—Lt. Frank P. Lahm becomes first Army balloon pilot.**

1906, Jan. 13-20—First indoor aero exposition, New York.

1907, June 8—Building devoted exclusively to aeronautics dedicated at Jamestown (Va.) Exposition.

1907, Aug. 1—Aeronautical Division established, Army Office of Chief Signal Officer.

1907, Dec. 6—Seven-minute towed flight from motor boat tug in Dr. Bell's kite, flown by Lt. T. E. Selfridge.

1908, Feb. 10—First Army plane contract signed by Signal Corps with Wright Brothers. (Other contracts signed with A. M. Herring and J. F. Scott.)

1908, May 14—Plane flights with passenger; piloted by Wilbur and Orville Wright with Charles W. Furnas, passenger.

1908, May 31—G. H. Curtiss Manufacturing Company announces planes for sale.

1908, July 4—Scientific American Trophy awarded Glenn H. Curtiss for first public flight of one kilometer circuit in his biplane, *June Bug*, Hammondsport, N. Y.

1908, Sept. 17—First plane fatality, killing Signal Corps Lt. Thomas E. Selfridge and severely injuring Orville Wright, in delivery of first Army airplane, Fort Myer, Va.

1909, Jan. 22—Commercial airplane, built by Glenn Curtiss, sold to Aeronautic Society of New York.

1909, Sept. 7—Army Aerodrome established, College Park, Md.

1909, Oct. 8—Nov. 5—First Army aviators taught to fly by Wilbur Wright, College Park, Md.: Lt. Frank P. Lahm, Lt. Frederic E. Humphreys, Lt. B. D. Foulois.

1910, May 29—Record flight from Albany to New York by Glenn Curtiss, 142.50 mi. in 2 hr., 50 min.

1910—Night flights by Walter R. Brookins (Montgomery, Ala., Apr. 18) and Charles Hamilton (Camp Dickenson, Nashville, Tenn., June 21-26).

1910, Aug. 27—Air-land plane radio used by J. A. D. McCurdy, Sheepshead Bay, N. Y.

1911, Jan. 18—Landing on ship deck, *U.S.S. Pennsylvania*, by Eugene Ely, San Francisco Bay.

1911, Jan. 26—Successful flight of Curtiss seaplane, San Diego, Cal.

1911, July—First Navy planes, Curtiss A-1, A-2, and Wright B-1 delivered.

1911, July—Tailless airplane flown by Frank E. Boland, Mineola, L. I., N. Y.

1911, Aug. 20—World altitude record set at 11,642 ft. by Lincoln Beachy in Curtiss biplane.

1911, Sept. 23-30—Earle L. Ovington appointed Airmail Pilot No. 1, flying mail from Nassau Boulevard to Mineola, L. I., N. Y.

1911, Sept. 17—Nov. 5—Transcontinental flight by Calbraith P. Rodgers from New York to Pasadena, Cal.

1911, Oct. 10—Bombsighting and dropping device demonstrated by Riley Scott, College Park, Md.

1912, Jan. 10—Successful flight of Curtiss flying boat, San Diego, Cal.

1912, Oct. 9 ('11)—Feb. 12—Eastbound transcontinental flight in 116 days by Robert G. Fowler in Wright B plane, from Los Angeles to San Pablo Beach, Fla.

1912, Feb. 2—First pilot physical exam published by U. S. Army.

1912, Mar. 1—Attached type parachute jump by Bert Berry from Benoist pusher plane, St. Louis.

1912, Apr. 6—First U. S. licensed woman pilot, Harriet Quimby, flies English Channel. (Killed at Boston Aviation Meet, July 1.)

12 Pages
In Two Parts

Virginian-Pilot.

FLYING MACHINE SOARS 3 MILES IN TEETH OF HIGH WIND OVER SAND HILLS AND WAVES AT KITTY HAWK ON CAROLINA COAST

TALLY SHEETS WILL DECIDE CONTEST

U. S. LANDING PARTY FINDS STRONG CAMP OF COLOMBIAN TROOPS

TO DEEPEN THE HARBOR AT NORFOLK

Secretary of War to Report Plan to Congress For Making Ship Channel Here 35 Feet Deep to Float Big Warships

SENATOR MARTIN INTRODUCED MEASUER

"WANTS CANAL BUILT WITHOUT SUSPICION OF NATIONAL DISHONOR"

NO BALLOON ATTACHED TO AID IT

Three Years of Hard, Secret Work by Two Ohio Brothers Crowned With Success

ACCOMPLISHED WHAT LANGLEY FAILED AT

With Man as Passenger Huge Machine Flew Like Bird Under Perfect Control

BOX KITE PRINCIPLE WITH TWO PROPELLERS

*Virginian-Pilot*, Norfolk, Va., December 18, 1903

Fokker T-2 in transcontinental flight — 1923

1912, June 7-8—Machine gun fired from Wright biplane by Capt. Charles DeForest Chandler, College Park, Md.

1912, July 31—Plane launched from sea wall by catapult, Navy Lt. T. G. Ellyson in Curtiss AH-3.

1912, Aug. 12—First Army tractor plane, Burgess, received; flown by Lts. H. H. Arnold and Roy C. Kirtland from Marblehead, Mass.

1912, Oct. 8—First Navy physical exam for pilots published by Bureau of Medicine and Surgery.

1912, Oct. 12—Plane launched from ship's deck by catapult, Navy Lt. T. G. Ellyson.

1913, Feb. 13—Langley Field Aerodynamical Laboratory project inaugurated.

1913, Feb. 17—Sperry automatic pilot tested by Army, San Diego, Cal.

1913, June 20—First Naval aviator killed when Ensign W. D. Billingsley is thrown from seaplane.

1913, Nov. 27—First exhibition loop by Lincoln Beachy in Curtiss biplane, Coronado, Cal.

1913, Dec. 4—Tactical Air Unit, First Aero Squadron, set up as provisional organization, San Diego, Cal.

1913, Dec. 31—Orville Wright demonstrates automatic pilot; awarded Collier Trophy.

1914, Jan. 1—First scheduled airline begins operations with Benoist flying boat between St. Petersburg and Tampa, Fla.; Tony Jannus, pilot.

1914, July 18—Aviation Section of Signal Corps created by Congress, authorizing 60 officers and students and 260 enlisted men.

1914—Permanent Naval Aeronautical Center established at Pensacola, Fla.

1915, Mar. 3—National Advisory Committee for Aeronautics established by Congress.

1915, June 22—Wisconsin State Forester, E. M. Griffith, flown by Jack Vilas, in first air forest patrol.

1915, Dec. 1-16—Two-way plane-ground radio demonstrated by Lt. H. A. Dargue and Lt. J. O. Mauborgne, Manila, P. I.

1916, Feb. 12—Invitation for bids on airmail issued by Post Office in Massachusetts and Alaska.

1916, Mar. 15—First Aero Squadron, under command of Capt. B. D. Foulois, begins operations at Columbus, N. M., with Gen. Pershing's Punitive Expedition.

1916, June 18—U. S. aviator H. Clyde Balsley shot down. (Member of Lafayette Escadrille, flying for France.)

1917, Apr. 6—U. S. declares war on Germany.

1917, Aug. 21—Eight-cylinder Liberty engine plane flown. (L.W.F. Engineering Company's Model F.)

1917, Sept. 6—Lt. Col. T. C. Lyster made Chief Surgeon, Aviation Section, Signal Corps.

1917, Oct. 1—Aircraft Board created by Congress.

1917, Oct. 18—Aviation Medical Research Board established by Signal Corps.

1917—Gen. William Mitchell claimed as first U. S. officer to fly over enemy lines.

1918, Jan. 19—U. S. School of Aviation Medicine begins operations under Signal Corps Maj. William H. Wilmer, Hazelhurst Field, Mineola, L. I., N. Y.

1918, Mar. 8—Maj. Edward C. Schneider and Maj. James L. Whitney, in simulated altitude flight, reach artificial altitude of 34,000 ft. in 24 min. at Signal Corps, Mineola, N. Y. laboratory.

1918, Mar. 14—Two pilots of First Pursuit Group (95th Squadron) go on patrol.

1918, May 11—U. S.-built DH4-Liberty planes received by AEF.

1918, May 15—Regular airmail service flown by Army between New York and Washington, D. C.

1918, May 20—Army aeronautics severed from Signal Corps; two departments created: Bureau of Military Aeronautics and Bureau of Aircraft Production.

1918, Aug. 2—First DH-Liberty patrol by 135th Aero Squadron.

1918, Sept. 18—Altitude of 28,899 ft. reached by Maj. R. W. Shroeder.

1918, Nov. 11—Armistice signed.

1919, Mar. 3—U. S.-Canada airmail flown by Edward Hubbard in Boeing seaplane, Type C.

1919, Mar. 19—Aircraft Board abolished by President.

1919, Apr. 28—Free-type parachute jump by Leslie L. Irvin, McCook Field, Dayton, O.

1919, May 8-31—Trans-Atlantic crossing by Lt. Albert C. Read and crew from Rockaway Beach, N. Y., to Plymouth, England, in NC-4, 53 hr. 58 min.

1919, Aug. 14—Airmail from Aeromarine flying boat to White Star liner, *Adriatic*.

1919, Oct. 30—Reversible pitch propeller tested at McCook Field, Dayton, Ohio.

1920, June 4—Army Reorganization Bill approved, creating Air Service in Army.

1920, July 7—F-5-L Navy seaplane flown by radio compass from Hampton Roads, Va., to *U.S.S. Ohio*, at sea.

1920, July 15-Oct. 20—New York-Alaska flight; Capt. St. Clair Street, First Lt. Clifford Nutt, Second Lts. Ross C. Kirkpatrick, Eric H. Nelson and C. E. Crumrine, Sgts. James Long and Joseph E. English, Capt. Howard Douglas, advance officer; Mitchel Field, N. Y., to Nome and return.

1920, Sept. 8—Transcontinental mail route, combination plane-train, (New York-Chicago-San Francisco) completed.

1920, Nov. 1—U. S. international passenger service started by Aero-marine West Indies Airways between Key West, Fla., and Havana, Cuba.

**1921, Feb 22-23—Night airmail flown by Jack Knight from North Platte, Neb., to Chicago, Ill.**

**1921, July 18-21—Sinking of captured German cruiser, *Frankfort*, and battleship, *Ostfriesland*, by U. S. bombs proves vulnerability of naval craft to aerial attack.**

**1921, Aug. 10—Navy Bureau of Aeronautics formed with Rear Admiral W. A. Moffett as Chief.**

**1921, Sept. 28—New world altitude record of 34,508 ft. set by Lt. J. A. Macready.**

**1921, Dec. 1—Helium airship, Navy dirigible C-7, flown from Hampton Roads, Va. to Washington, D. C.**

**1922, Mar. 20—Airplane carrier, *U.S.S. Langley*, commissioned at Norfolk, Va.**

**1922, June 16—Helicopter demonstrated by Henry Berliner, Washington, D. C.**

**1922, Sept. 14-23—Transcontinental Army airship flight with Maj. H. A. Straus commanding crew of Capt. G. W. McEntire and others, from Langley Field, Va. to Arcadia, Cal.**

**1922, Oct. 18—World speed record of 222.97 mph set by Brig. Gen. William Mitchell in Curtiss racer.**

**1923, May 2-3—Cross-country non-stop flight by Lts. J. A. Macready and Oakley G. Kelly in Fokker T-2, from New York to San Diego, 2,520 miles in 26 hr., 50 min., 3 sec.**

**1923, Sept. 5—Smoke screen demonstrated by Thomas Buck Hine during naval bombing maneuvers, Cape Hatteras, N. C.**

**1924, Feb. 21—Alaskan airmail flown by Carl B. Eielson from Fairbanks to McGrath.**

**1924, Apr. 6—Sept 28—Round-the-world flight by Lts. Smith, Nelson, Arnold, and Harding, Seattle to Seattle, 26,345 miles, 175 days (363 hours flying time).**

**1924, June 23—"Dawn-to-dusk" cross-continent flight by Lt. R. L. Maughan from New York to San Francisco, Curtiss plane.**

**1924, July 1—Through transcontinental airmail service begun by U. S. Post Office.**

**1925, Feb. 2—Kelly Bill signed by President Coolidge authorizing private contract air transport of mail.**

**1925, July 15—Dr. A. Hamilton Rice Expedition, first to employ planes in exploration, returns from Amazon; Lt. Walter Hinton, pilot, in Curtiss Seagull.**

**1925, Sept. 3—Navy dirigible, *Shenandoah*, collapsed in storm over Ava, O., killing 14 of 43 on board.**

**1925, Sept. 12—Morrow Board appointed by President Coolidge. (Laid down U. S. air policy.)**

**1925, Dec. 17—Gen. William Mitchell found guilty of violating 96th Article of War; had risked insubordination by demanding unrestricted use of air power. Sentenced five years suspension of rank, pay and command. Resigned.**

**1926, Apr. 16—First cotton dusting plane purchased by Department of Agriculture.**

**1926, May 8-9—Flight over North Pole by Richard Byrd, navigator, and Floyd Bennett, pilot, in Fokker monoplane.**

**1926, May 20—Air Commerce Act (Bingham-Parker Bill) signed by President Coolidge; Aeronautics Branch, Department of Commerce, established.**

**1926, July 2—Army Air Service renamed Army Air Corps.**

**1926, Aug. 25—JN training plane dropped by parachute, San Diego Naval Air Station.**

**1926, Dec. 7—Airway beacon erected by Aeronautics Branch, Department of Commerce, on Chicago-Dallas route.**

**1926—Federal civilian medical group created in Aeronautics Branch, Department of Commerce; Dr. Louis Bauer, Director.**

**1926, Dec. 21—May 2 ('27)—Mass amphibian good will flight from San Antonio, Tex. through Mexico, Central and South America and West Indies.**

**1927, May 20-21—Non-stop trans-Atlantic solo flight by Charles A. Lindbergh, New York-Paris, 3,610 miles, 33 hr., 30 min.**

**1927, May 25—Outside loop demonstrated by Lt. James H. Doolittle.**

**1927, June 28-29—Longest overwater flight, non-stop from Oakland, Cal., to Honolulu, made by Lester J. Maitland and Albert F. Hegenberger in Fokker monoplane, 25 hr., 50 min.**

**1927, Sept 1—Air express operations begun by American Railway Express and major airlines.**

**1928, Mar. 1-9—Transcontinental amphibian flight by Army Lt. Burnie R. Dallas and civilian Beckwith Havens in Loening.**

**1928, June 17-18—First woman to fly Atlantic, Amelia Earhart with Wilmer Stultz, pilot, from Trepassey Bay, N.F., to Burryport, England, in trimotored Fokker, 2,140 miles, 20 hr., 40 min.**

**1928, Sept. 19—First Diesel engine to power heavier-than-aircraft; designed by L. M. Woolson, manufactured by Packard Motor Car Co.; flight-tested at Utica, Mich.**

**1928, Dec. 19—Autogiro flight by Harold F. Pitcairn, Pitcairn Field, Willow Grove, Mich.**

**1929, Jan. 1-7—Refueling endurance record set by Maj. Carl Spaatz and Capt. Ira C. Eaker, Lt. Elwood R. Quesada, Lt. Harry A. Halverson, S/Sgt. Roy W. Hooe in 150 hr., 40 min., 51 sec.**

**1929, Oct. 21—Air Ambulance Service organized by Colonial Flying Service and Scully Walton Ambulance Co., New York.**

**1930, Mar. 15—Glider, piloted by Capt. Frank Hawks, released from seaplane, Port Washington, N. Y.**

**1930, Apr. 6—Transcontinental glider in tow, piloted by Capt. Frank Hawks; San Diego to New York; 2,860 miles in 36 hr., 47 min.**

**1930, May 20—Dirigible-launched Vought observation plane, flown by Lt. Commdr. Charles A. Nicholson from *U.S.S. Los Angeles* to *U.S.S. Saratoga*, Lakehurst, N. J.**

**1930, June 4—New world altitude record of 38,560 ft. set by Navy Lt. Apollo Soucek, Anacostia, Md.**


***Winnie Mae* in round-the-world flight—1933**

1930, July 21-Aug. 17—Refueling endurance record raised to 647 hr., 28 min. by Forrest O'Brien and Dale Jackson in a Curtiss Robin, St. Louis, Mo.

1931, May 25-28—World endurance record, non-refueled, set by Walter E. Lees and F. A. Brossi, Bellanca, Packard Diesel 225 hp; 85 hr., 32 min., 38 sec., Jacksonville, Fla.

1931, May 14-28—Transcontinental autogiro flight by John M. Miller, from Philadelphia to San Diego.

1931, June 4—Rocket glider flown by William G. Swan; remained aloft for 30 min. with 10 rockets, Atlantic City, N. J.

1931, Oct. 3-5—Trans-Pacific non-stop airplane flight by Clyde Pangborn and Hugh Herndon, Samushiro Beach, Japan, to Wenatchee, Wash.

1931, Nov. 3—Dirigible, *Akron*, carried record number of 207 persons in flight over New York and Philadelphia.

1932, May 9—First solo blind flight, by Capt. Albert F. Hegenberger, Wright Field, Dayton, O.

1932, May 20-21—Amelia Earhart soloes across Atlantic, St. Johns, New Brunswick to Londonderry, Ireland, in Wasp-powered Lockheed Vega.

1932, Aug. 25—First woman to complete non-stop transcontinental flight, Amelia Earhart, Los Angeles to Newark.

1932, Dec. 1—Teletypewriter weather map service inaugurated by Department of Commerce.

1933, Apr. 4—Navy dirigible, *Akron*, crashes into sea, killing 73; Commdr. Herbert V. Wiley, commanding.

1933, July 15-22—Solo round-the-world flight by Wiley Post in Lockheed Vega monoplane, *Winnie Mae*, in 7 days, 18 hr., 49 min.

1933, Sept. 4—World speed record for land planes set at 304.98 mph by James R. Wedell in Wasp-powered Wedell-Williams racer.

1933, Nov. 20-21—World balloon altitude record set at 61,237 ft. by Lt. Commdr. T. G. W. Settle and Maj. C. L. Fordney over Akron, O.

1934, Jan. 10-11—Longest non-stop overwater mass flight completed by six P2Y-1 Navy flying boats under command of Lt. Commdr. Knefler McGinnis, San Francisco to Honolulu.

1935, Feb. 12—Navy dirigible, *Macon*, crashes into sea, killing 2.

1935, Aug. 15—Will Rogers and Wiley Post killed in take-off crash near Point Barrow, Alaska.

1935, Nov. 22-29—Trans-Pacific airmail flight by Capt. Edwin C. Musick, Pan American Airways, from San Francisco to Honolulu, Midway Island, Wake Island, Guam and Manila, in Martin *China Clipper*.

1936, June 7—All-instrument transcontinental flight by Maj. Ira C. Eaker, between New York and Los Angeles.

1936, Sept. — Trans-Atlantic round-trip flight by Henry (Dick) Merrill and Harry Richman, New York to London and return.

1937, May 6—German dirigible, *Hindenberg*, burned on mooring, killing 36, Lakehurst, N. J.

1937, May 20-July 3—Amelia Earhart Putnam and Frēd Noonan lost in Pacific in round-the-world attempt.

1937, June 25—Non-stop transcontinental amphibian flight by Richard Archbold in PBY-1, Catalina, from San Diego to New York.

1938, Feb. 26—Government acquires monopoly on helium by purchasing production facilities at Dexter, Kan.

1938, Apr. 22—Capt. E. V. Rickenbacker purchases Eastern Air Lines from North American Aviation, Inc., for $3,500,000.

1938, June 23—Civil Aeronautics Authority with five members, an administrator, and a three-man Safety Board, created under Civil Aeronautics Act signed by President. This supercedes Aeronautics Branch, Department of Commerce.

1938, July 10-14—Howard Hughes and crew of four fly short northern course around world in 3 days, 19 hr., 8 min.

1938, July 17-18—Douglas (Wrong-Way) Corrigan flies from New York to Ireland in nine-year-old Curtiss Robin.

1938, Aug. 22—Civil Aeronautics Act becomes effective.

1939, Mar. 5—Non-stop airmail system by pick-up demonstrated by Norman Rintoul and Victor Yesulantes in Stinson Reliant planes, Coatesville, Pa.

1939, Apr. 3—The National Defense Act, providing for aerial rearmament, signed by President Roosevelt.

1939, May 20—North Atlantic airmail service begun by PAA between Port Washington, L. I., the Azores, Portugal and Marseille, France.

1939, June 27—Bill authorizing Civilian Pilot Training Program signed by President.

1939, Sept. 1-3—Germany invades Poland. England and France declare war on Germany.

1940, Mar. 26—U. S. commercial airlines complete a full year of flying without a fatal accident or serious injury to a passenger or crew member.

1940, July 1—Air Safety Board abolished with its functions delegated to the Civil Aeronautics Board. Civil Aeronautics Administration transferred to Department of Commerce.

1941, Apr. 15—First officially-recorded rotor helicopter flight in western hemisphere, Vought-Sikorsky VS-300A, piloted by Igor I. Sikorsky; flight time, 1 hr., 5 min., 14.5 sec., Stratford, Conn.

1941, June 5—Ferry Command, for delivery of planes to Britain, organized by Army Air Corps.

1941, June 20—Army Air Force, comprising office of Chief of Air Corps and Air Force Combat Command, created.

1941, June—First woman to ferry bomber across Atlantic, Jacqueline Cochran, Canada to British Isles.

1941, Sept. 5—Mass trans-Pacific flight of heavy bombers completed by nine Army B-17 Flying Fortresses.

1941, Dec. 7—Pearl Harbor.

1942, Apr. 8—First flight of Ferry Command over Himalayan "Hump" made by Lt. Col. William D. Old, between Assam, India and Kunming, China.

1942, Apr. 18—First bombing attack on Japanese mainland by 16 B-25 Mitchell bombers from Navy carrier, *Hornet*; Lt. Col. James H. Doolittle commanding.

1942, May 4-9—Battle of Coral Sea.

1942, June 20—Ferry Command redesignated Air Transport Command under Maj. Gen. Harold L. George.

1942, June 3-7—Battle of Midway.

1942, June 17—AAF tow planes successfully pick up gliders in tests at Wright Field.

1942, Aug. 17—First official bombing raid of Eighth Air Force, 12 Flying Fortresses, Brig. Gen. Ira C. Eaker commanding, Rouen, France.

1942, Sept.—Fifty American Eagle squadron pilots, RAF, all Americans, transferred to Eighth Air Force. (Fourth Fighter Group.)

1942, Oct. 1—Jet plane built and flown by Robert M. Stanley; Bell Airacomet (XP-59A), Muroc Dry Lake, Cal.

1943, Mar. 1-4—Battle of Bismarck Sea.

1943, Mar. 19—Lt. Gen. Henry H. Arnold, commanding general of the AAF, advanced to full four-star general, the first in air history.

1943, June 24—World's longest parachute drop, 40,200 ft., made by Lt. Col. W. R. Lovelace at Ephrata, Wash.

1943, June 11—First ground victory by air power when Pantelleria, Italy, surrenders unconditionally to Lt. Gen. Carl Spaatz. First case in history of a well-fortified citadel being defeated without aid of ground forces.

1943, Oct.—World's longest freight line opened by Capt. J. L. Okenfus and crew of five in 28,000-mile round-trip flight, Ohio to India.

1944, June—Army Air Force reaches peak with 78,757 aircraft.

1944, Sept. 14—Successful flight into hurricane for scientific data by Col. Floyd B. Wood, Maj. Harry Wexler, and Lt. Frank Record in Douglas A-20 Havoc.

1944—U. S. Aircraft industry ranks first in world with an annual production value of $16,745,000,000.

1945, May 8—War in Europe ends.

1945, Aug. 6—Atomic bomb dropped on Hiroshima from B-29, *Enola Gay*, under command of Col. Paul W. Tibbets, Jr.

1945, Aug. 14—Japan's surrender ends World War II.

1945, Sept. 28-Oct. 4—Round-the-world air service begun by Air Transport Command, Douglas C-54E, Globester, 9 passengers, 23,147 miles in 149 hr., 49 min.

1946, Jan. 26—Jet-propelled P-80, flown by Col. William H. Councill, sets non-stop transcontinental record of 4 hr., 13 min., 26 sec., between Long Beach, Cal., and New York.

1946, Mar. 12—First commercial helicopter license granted by Civil Aeronautics Administration for Bell 2-place Model 47.

1946, Mar. 22—First American-built rocket to escape earth's atmosphere, reaches 50-mile height. Constructed by Douglas.

1946, May 13—Federal Aid Airport Bill signed by President Truman.

1946, June 22—Jet-powered airmail delivery in two Army P-80's from Schenectady, N. Y., to Washington and Chicago.

1946, July 21—The McDonnell XFH-1 Phantom is first U.S. jet to operate from carrier, *U.S.S. Franklin D. Roosevelt*.

1946, Aug. 6—Two B-17 radio-controlled bombers with stand-by crews, fly non-stop, Hilo, Hawaii, to Muroc Lake, Cal.

1946, Aug. 8—Preliminary test flight of Army's B-36, Consolidated Vultee, world's largest land based bomber.

1947, June 2—Helicopter route certificate issued to Los Angeles Airways by Civil Aeronautics Board.

1947, June 15—Special Board on Air Safety appointed by President.

1947, July 18—Air Policy Commission established by President.

1947, July 26—Army-Navy Merger Bill signed by President, making Department of Air Forces co-equal with Army and Navy, and creating Department of Defense.

1947, Oct. 17—First faster-than-sound flight by Capt. Charles E. Yeager in rocket-powered Air Force research plane, Bell XS-1, betters 760 mph. (Not announced officially until June 10, 1948.)

1948, Mar. 1—Congressional Aviation Policy Board recommends that U. S.'s air power be built up to major proportions as quickly as possible.

1948, June 18—Air parcel post system established by Congress; to begin Sept. 1.

1948, June 26—Berlin Airlift begins "Operation Vittles" with Douglas C-47's carrying 80 tons of supplies the first day. During first five months, Airlift tops cargo volume of all U.S. airlines by flying 93,000,000 ton-miles.

1948, July 1—Air Transport Command and Naval Air Transport Service consolidated as Military Air Transport Service (MATS) under command of Air Force Chief of Staff.

1948, Sept. 15—U. S. Air Force recaptures world speed record with North American F-86 jet fighter traveling 670.981 mph, flown by Maj. Richard L. Johnson.

1948—Permanent organization for women authorized for Air Force, (WAF—Women in the Air Force) with Col. Geraldine B. May as first director.

1948—Northrop's YB-49 Flying Wing, first eight-jet bomber in the U.S. Air Force, makes longest pet-propelled flight on record of approximately 3,400 miles at average speed of 382 mph.

# BIOGRAPHICAL BRIEFS

To include the names of all who are outstanding in current aviation activities in this section would expand it to a book. We have therefore been faced with the difficult problem of setting arbitrary limits, governed by space. If, as a result, we have omitted anyone who should have been included, we are extremely sorry—and hope that our readers will inform us of it for correction in future editions.

An asterisk (*) following a biographical sketch indicates that the information has not been verified by the individual concerned.

The Editors

ADAMS, Alvin P., aviation consultant born in New York, N. Y.; consultant, Alvin P. Adams & Associates. Address: 30 Rockefeller Plaza, New York, N. Y.

ADAMS, Charles L., aviation writer, *Aviation Week*. Address: 1174 Nat'l Press Bldg., Washington 4, D. C.*

ADAMS, Russell Baird, economist and administrator born in Wheeling, W. Va., Dec. 28, 1910; member, Civil Aeronautics Board. Address: 10,710 Old Bladensburg Road, Silver Spring, Md.

ADAMSON, Hans C., free lance aviation writer. Address: 510 Lexington Ave., New York, N. Y.*

ADDEMS, Walter J., aviation executive born in Loda, Ill., Jan. 10, 1899; general manager, flight operations, United Air Lines. Address: Denver, Colo.

ADEN, Everett L., pilot born in Rising City, Nebr., May 5, 1921; chief pilot, Monarch Air Lines. Address: Stapleton Airfield, Denver 7, Colo.

ADLER, Ernest Jr., engineer born in Hardin, Mont., June 6, 1915; president, All American Aircraft, Inc. Address: Long Beach, Cal.

AGEY, Hoite McKee, public relations executive born in Norfolk, Va., Jan. 8, 1912; director of publicity, National Airlines. Address: Aviation Bldg., 3240 N.W. 27th Ave., Miami 37, Fla.

AHNSTROM, Doris N., editor and writer born in Muskegon, Mich., Aug. 4, 1913; managing editor, *Skyways*. Address: 444 Madison Ave., New York, N. Y.

AHRENS, R. F., aviation executive; vice president, personnel, United Air Lines. Address: Clearing Station, 5959 S. Cicero Ave., Chicago 38, Ill.*

AKERS, Frank, Naval officer born in Nashville, Tenn., Mar. 28, 1901; Rear Admiral. Address: 3600 Porter St., N. W., Washington, D. C.*

ALEXANDER, Eben Roy, editor born in Omaha, Nebr., Feb. 15, 1899; executive editor, *Time*. Address: 9 Rockefeller Plaza, New York, N. Y.

ALEXANDER, John J., aeronautical service and maintenance executive born in Jersey City, N. J., Oct. 7, 1909; service manager, Curtiss-Wright Corp., Airplane Div. Address: 222 N. Cassingham Road, Bexley, O.

ALLEN, C. B., aviation writer; Washington Herald Tribune Bureau. Address: Nat'l Press Bldg., Washington, D. C.*

ALLEN, William M., airplane manufacturer born in Lo Lo, Mont., Sept. 1, 1900; president, Boeing Airplane Co. Address: P. O. Box 3107, Seattle 14, Wash.

ALLIS, James Ashton, banker born in St. Paul, Minn., 1881; vice-president, Grace National Bank; chairman of the board, Fairchild Engine & Airplane Corp. Address: 7 Hanover Sq., New York 5, N. Y.

ALTSCHUL, Selig, aviation consultant born in Chicago, Ill. Address: 25 Broad St., New York, N. Y.

AMOS, David H., Jr., airline executive born in Bowling Green, Ky., Apr. 12, 1916; personnel director, National Airlines. Address: 3240 N. W. 27th Ave., Miami 37, Fla.

ANDERSON, Ben M., aircraft engineer born in Oklahoma City, Okla., Mar 2, 1916; president, Anderson, Greenwood & Co. Address: Sam Houston Airport, Houston, Texas.

ANDERSON, F. C., aviation executive; president and treasurer, Iowa Airplane Co., Inc. Address: P. O. Box 59, Des Moines, Iowa.*

ANDERSON, G. V., aviation executive; personnel manager, Chance Vought Aircraft Div., United Aircraft Corp. Address: Stratford, Conn.*

ANDERSON, Leland D., pilot born in Ontario, Cal., Jan. 3, 1908; system chief pilot, Chicago & Southern Airlines. Address: Municipal Airport, Memphis, Tenn.

ANDERSON, M. H., aviation executive; vice-president, operations, Northeast Airlines. Address: Logan Intn'l Airport, 239 Prescott St., E. Boston 28, Mass.*

**ANDERSON, Orvil A.**, Air Force officer born in Springfield, Utah, May 2, 1895; Major General (permanent). Address: Maxwell Air Force Base, Alabama.

**ANDERSON, Samuel Egbert**, Air Force officer born in Greensboro, N. C., Jan. 6, 1906; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.*

**ANGOTTI, Samuel A.**, aviation executive born in Clarksburg, W. Va., Jnne 5, 1908; director of industrial relations, Aircraft Div., Fairchild Engine & Airplane Corp. Address: Hagerstown, Md.

**ANGSTADT, Ira F.**, technical writer and aviation ground instructor born in Mertztown, Pa., Dec. 22, 1908; technical editor, *Aero Digest*. Address: 6 Elmwood Ave., Elmsford, N. Y.

**ANKENBRANDT, Francis L.**, Air Force officer born in Ill., Jan. 27, 1905; Major General. Address: U. S. Air Force, Washington 25, D. C.

**ANSLEY, M. L.**, controller born in Bay St. Louis, Miss., Mar. 3, 1902; treasurer, Aeronautical Securities, Inc. Address: One Wall St., New York, N. Y.

**APPLEGATE, Ray**, aviation executive; president and general manager, Dart Aircraft Corp. Address: P. O. Box 263, Elkhart, Ind.*

**ARCHIBALD, Ann M.**, aviation executive born in Brookline, Mass., Feb. 14, 1904; assistant vice-president, Pan American Airways. Address: 3133 Connecticut Ave., Washington, D. C.

**ARMSTRONG, Sam B.**, aviation writer; assistant City Editor, *St. Louis Post-Dispatch*. Address: 12th & Olive Sts., St. Louis 1, Mo.*

**ARNOLD, H. H. (Hap)**, General of the U. S. Air Forces, retired. Address: Hamilton Air Force Base, San Raphael, Cal*

**ARNOLD, Milton Wylie**, Air Force officer born in Troup County, Ga., May 23, 1907; vice-president, operations and engineering, Air Transport Association of America. Address: 1107 Sixteenth St., N. W., Washington 25, D. C.

**ARTHUR, William T.**, aviation executive; vice-president, operations, Chicago & Southern Airlines. Address: Municipal Airport, Memphis 2, Tenn.*

**ASHENKAS, Irving**, engineer; chief of aerodynamics, Northrop Aircraft, Inc. Address: 1239 No. Sweetzer Ave., Los Angeles 46, Cal.

**ASHLEY, Tom**, aviation writer; managing editor, *Southern Flight*. Address: P. O. Box 750, Dallas 1, Tex.*

**ATKINSON, Joseph Hampton**, Air Force officer born in Dublin, Tex., Feb. 5, 1900; Major General (temporary). Address: War Dept., Washington 25, D. C.

**ATWOOD, John Leland**, aviation executive born in Walton, Ky., Oct. 26, 1904; president, North American Aviation, Inc. Address: Los Angeles Airport, Los Angeles 45, Cal.

**AUL, Harold E.**, aviation executive; president and director, Aeronautical Securities, Inc. Address: One Wall St., New York 5, N. Y.*

**AUSTIN, James W.**, aviation executive; vice-president, traffic and sales, Capital Airlines, Inc. Address: National Airport, Washington 1, D. C.*

**AVERY, John B.**, public relations counsel born in Fresno, Cal., May 3, 1906; assistant director of public relations, Consolidated Vultee Aircraft Corp. Address: 7033 Draper Ave., LaJolla, Cal.

**BABB, Charles H.**, aviation executive, Charles H. Babb Co. Address: Grand Central Air Terminal, Glendale 1, Cal.*

**BAILEY, F. R.**, chief pilot, American Airlines, Address: 100 E. 42nd St., New York, N. Y.*

**BAILEY, Joseph**, chief pilot, National Airlines. Address: 3240 N. W. 27th Ave., Miami 37, Fla.*

**BAKER, Carl F.**, engineer born in Quincy, Mass., Dec. 4, 1908; chief engineer, Hamilton Standard Div., United Aircraft Corp. Address: 362 Main St., E. Hartford, Conn.

**BAKER, G. T.**, aviation executive; president, National Airlines. Address: Aviation Bldg., 3240 N. W. 27th Ave., Miami 37, Fla.*

**BAKER, J.**, business executive; personnel director, Continental Motors Corp. Address: Market St., Muskegon 82, Mich.

**BAKER, Keith**, public relations executive born in Springfield, Mo., June 18, 1917; public relations manager, Chance Vought Div., United Aircraft Corp. Address: Box 5907, Dallas, Tex.

**BAKER, Paul S.**, aeronautical engineer born in Quincy, Mass., Oct. 2, 1907; engineering manager, Chance Vought Div., United Aircraft Corp. Address: Box 5907, Dallas, Tex.

**BAKER, Warren Lowe**, engineering business executive born in Washington, D. C., May 9, 1892; general manager, aviation department, Socony-Vacuum Oil Co., Inc. Address: 26 Broadway, New York 4, N. Y.

**BALFOUR, Maxwell W.**, aviation executive born in Traer, Iowa, June 22, 1895; vice-president, Spartan Aircraft Co., and president, Aeronautical Training Society. Address: Tulsa, Okla.

**BANGS, Scholar**, public relations executive born in Wamego, Kans., June 12, 1905; owner, Scholar Bangs Public Relations Consultant. Address: 123 N. Gladys Ave., Monterey Park, Cal.

**BARCUS, Glenn O.**, Air Force officer born in Genoa, Ill., July 25, 1903; Major General (temporary), Twelfth Air Force. Address: Department of the Air Force, Washington 25, D. C.

**BARDWELL, Eugene S.**, clergyman born in Falconer, N. Y., Nov. 19, 1895; director public and industrial relations, Schweizer Aircraft Corp. Address: 208 Overland St., Elmira, N. Y.

**BARKER, John DeForest**, Air Force officer born in St. Albans, Vt., Mar. 25, 1897; Major General. Address: Air Adjutant General's Office, Hq., U. S. Air Force, Washington 25, D. C.

**BARNES, Earl Walter**, Air Force officer born in Alliance, Nebr., Aug. 23, 1902; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.*

**BARRINGTON, William D.**, transportation analyst born in Syracuse, N. Y., 1914; rates and tariffs officer, International Air Transport Association. Address: 1756 Seminole Ave., New York 61, N. Y.

**BARRY, Philip**, aviation executive born in Winthrop, Mass.; director of personnel, Northeast Airlines. Address: E. Boston 28, Mass.

**BASSETT, Preston Rogers**, business executive born in Buffalo, N. Y., 1892; president, Sperry Gyroscope Company Div. of The Sperry Corp.; vice-president of The Sperry Corp. Address: Great Neck, L. I., N. Y.

**BAUMAN, Edgar H.**, aviation writer and consultant born in New York, N. Y., Jan. 4, 1899. Address: 271 Madison Ave., New York, N. Y.

**BAUMAN, George D.**, aviation writer; *Globe Democrat*. Address: St. Louis, Mo.*

**BAUMANN, J. B.**, aviation executive; president and chief engineer, Baumann Aircraft Corp. Address: P. O. Box 3336, Glendale, Cal.*

**BAYLIS, Joseph H.**, aviation executive born in Alameda, Cal., Sept. 6, 1912; director of industrial relations, Texas Engineering and Manufacturing Co., Inc. Address: Route 3, Box 38, Arlington, Texas.

**BAZLEY, H. R.**, aviation executive born in Whitman, Mass., May 7, 1896; vice-president, All-American Airways. Address: 4700 Baptist Rd., Pittsburgh, Pa.

**BEALL, Wellwood E.**, airplane designer and engineering executive born in Canon City, Colo., Oct. 28, 1906; vice-president, engineering and sales, Boeing Airplane Co. Address: Box 3107, Seattle 14, Wash.

**BEALS, H. W.**, engineer born in Pons, Ind., Mar. 18, 1897; director of aircraft procurement, American Airlines, Inc. Address: 231 1st St., Santa Monica, Cal.

**BEARD, Charles E.**, aviation executive; director, Air Cargo, Inc., and executive vice-president, Braniff Airways, Inc. Address: 910 17th St., N. W., Washington 6, D. C.*

**BEARDSLEE, John Murchison**, civil engineer born in Washington, D. C., Nov. 27, 1907; regional administrator, ninth region, Civil Aeronautics Administration. Address: Box 4009, Honolulu 12, T. H.

**BEAU, Lucas Victor**, Air Force officer born in New York City, Aug. 3, 1895; Major General (temporary). Address: Hq. & Hq. Sq., Civil Air Patrol—USAF, Bolling AFB, Washington 25, D. C.

**BEDINGER, Robert D.**, aviation official born in Walton, Ky., Apr. 20, 1895; regional administrator, seventh region, Civil Aeronautics Administration. Address: 3215 Dose Terrace, Seattle 44, Wash.

**BEEBE, David C.**, aviation insurance underwriter born in Syracuse, N. Y., Oct. 15, 1896; chairman of the board, United States Aviation Underwriters, Inc. Address: 80 John St., New York 7, N. Y.

**BEEBE, W. T.**, aviation executive; personnel manager, Chicago & Southern Air Lines. Address: Municipal Airport, Memphis 2, Tenn.*

**BEECH, Richard Keyes**, aviation executive born in Nashville, Tenn., Feb. 16, 1897; vice president in charge of purchasing, Beech Aircraft Corp. Address: 302 N. Pinecrest, Wichita, Kans.

**BEECH, Walter Hershel**, aircraft manufacturer born in Pulaski, Tenn., Jan. 30, 1891; president, director and chairman of the board, Beech Aircraft Corp. Address: E. Central Ave., Wichita 1, Kans.

**BEHNCKE, David L.**, aviation executive born in Beaver Dam, Wis., May 1, 1897; president, Air Line Pilots Association and president, International Federation Air Line Pilots Association. Address: 3145 W. 63rd St., Chicago 29, Ill.

**BELINN, Clarence M.**, airline executive born in Lanse, Pa., Oct. 24, 1903; president, Los Angeles Airways, Inc. Address: 12312 Viewcrest Rd., No. Hollywood, Cal.

**BELL, Lawrence Dale**, airplane manufacturer born in Mentone, Ind., Apr. 5, 1894; president and general manager, Bell Aircraft Corp. Address: P. O. Box 1, Buffalo 5, N. Y.

**BELLANCA, Giuseppe Mario**, airplane engineer born in Sciacca, Italy, Mar. 19, 1886; president, Bellanca Aircraft Corp. Address: New Castle, Del.

**BENDIO, Ruric H., Sr.**, aircraft maintenance executive born in Redlodge, Mont., Sept. 5, 1902; superintendent of maintenance, Empire Air Lines, Inc. Address: P. O. Box 521, Boise, Idaho.

**BENNETT, Floyd S., Jr.**, comptroller born in Durham, N. C., Aug. 8, 1916; comptroller, Aircraft Div., Fairchild Engine & Airplane Corp. Address: Hagerstown, Md.

**BENTZ, Al**, editor born in Kansas City, Kans., May 15, 1911; managing editor of *The Wichita Beacon*. Address: Wichita, Kans.

**BERGEN, William B.**, aeronautical engineer born in Floral Park, L. I., N. Y., Mar. 29, 1915; chief engineer, The Glenn L. Martin Co. Address: Dulaney Valley Rd., Glenarm, Md.

**BERLINER, Henry A.**, mechanical engineer born in Washington, D. C., Dec. 13, 1895; chairman of the board, Engineering and Research Corp. Address: 2841 Tilden St., N. W., Washington, D. C.

BEVANS, James Millikin, Air Force officer born in San Francisco, Cal., Oct. 12, 1899; Major General (temporary). Address: Hqs. Air Materiel Command, Wright-Patterson AF Base, Dayton, O.

BEZ, Nick, salmon packer born in Selca, Yugoslavia, Aug. 25, 1895; president and active chairman of the board, West Coast Airlines, Inc. Address: Foot of Stacy St., Seattle 4, Wash.

BISHOP, Clair W., aviation executive; personnel manager, Lycoming Div., AVCO Manufacturing Co. Address: Williamsport 38, Pa.*

BISSELL, Clayton Lawrence, Air Force officer born in Kane, Pa., July 29, 1896; Major General (temporary). Address: Hq. U.S.A.F.E., Wiesbaden, Germany.

BITTNER, S. P., chief pilot, American Airlines. Address: 100 E. 42nd St., New York 17, N. Y.*

BJERKNES, J., meteorology professor born in Stockholm, Sweden, Nov. 2, 1897. Address: 620 Adelaide Dr., Santa Monica, Cal.

BLACK, Don, public relations counsel born in Bowie, Tex., June 28, 1895; public relations manager, Douglas Aircraft Co. Address: 1022 Wellesley Ave., Los Angeles 49, Cal.

BLACK, Charles L., journalist born in Cape Girardeau, Mo., Aug. 2, 1922; managing editor, *Flying*. Address: 185 N. Wabash, Chicago, Ill.

BLACKMAN, Roy, aviation executive born in Salt Lake City, Utah, Nov. 23, 1914; general sales manager, Western Air Lines. Address: 3163 Coolidge Ave., Los Angeles, Cal.

BLACKMORE, Orra Heald, founder and honorary life president, Women's Nat'l Aeronautic Association of the U. S., Inc. Address: 3722 Melba Place, St. Louis, Mo.*

BLANCHARD, W. J., business executive; general manager, Aero-products Div., General Motors Corp. Address: P. O. Box 1047, Municipal Airport, Dayton 1, O.*

BLATT, Robert C., engineer and editor born in Washington, D. C., Mar. 26, 1903; airport editor, American Aviation Publications. Address: 9 Bishop Place, Larchmont, N. Y.

BLAYLOCK, Raymond C., aeronautical engineer born in Vassar, Mich., Sept. 1, 1904; chief engineer, Airplane Div., Curtiss-Wright Corp. Address: 2060 Wyandotte Rd., Columbus 12, O.

BLICK, Robert Edwin, Naval officer born in Peru, Ind., July 8, 1899; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

BOATNER, Bryant L., Air Force officer born in New Orleans, La., Apr. 9, 1907; Major General. Address: Hq. USAF, Washington 25, D. C.

BOGAN, Gerald Francis, Naval officer born in Mackinac Island, Mich., July 27, 1894; Vice Admiral. Address: Navy Dept. Washington, D. C.

BOGER, Robert F., publisher born in Parkersburg, W. Va., Dec. 27, 1900; publisher, *Aviation Week, Engineering News-Record, Construction Methods and Equipment, Construction Daily*. Address: 330 W. 42nd St., New York 18, N. Y.

BOLLINGER, Lynn L., researcher born in Seymour, Ind., Dec. 17, 1912; professor. Address: Harvard Business School, Boston 63, Mass.

BOONE, Walter Frederick, Naval officer born in Berkeley, Cal., Feb. 14, 1898; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

BONNEY, Walter T., public relations executive born in Ludlow, Vt., Jan. 9, 1909; information specialist, National Advisory Committee for Aeronautics. Address: 1724 F St., N. W., Washington, D. C.

BORDEN, Gail, airline executive born in Houston, Tex., Mar. 4, 1905; assistant to president and director of public relations, United Air Lines. Address: 5959 S. Cicero, Chicago, Ill.

BORUM, Fred S., Air Force officer born in Winchester, Ill., Apr. 25, 1892; Major General (temporary). Address: Tinker Air Force Base, Oklahoma City, Okla.

BOTTA, Rico, Naval officer born in Melbourne, Australia, Nov. 2, 1890; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

BOUNDS, George E., public relations director, McDonnell Aircraft Corp. Address: Lambert-St. Louis Municipal Airport, Box 516, St. Louis 3, Mo.*

BOURNE, Thomas B., engineer born in Baltimore County, Md., Jan. 9, 1896; president, Thomas B. Bourne Associates, Inc., Engineers. Address: 1204 Dupont Circle Bldg., Washington, D. C.

BOUTELLE, Richard S., aviation executive born in Vincennes, Ind., July 4, 1898; president, Fairchild Engine & Airplane Corp. Address: Hagerstown, Md.

BOWERSOCK, Justin D., journalist born in Burlington, Ia., Nov. 7, 1901; aviation editor, *Kansas City Star*. Address: 1729 Grand Ave., Kansas City, 17, Mo.

BOWMAN, H. F., secretary-treasurer, Boeing Airplane Co. Address: Box 3107, Seattle 14, Wash.*

BOYD, Albert, Air Force officer born in Rankin, Tenn., Nov. 26, 1906; commanding officer, Muroc Air Force Base, Colonel. Address: Muroc Air Force Base, Cal.

BRACHMAN, D. S., Dr., vice-president, Aero Medical Association. Address: c/o Dr. T. H. Sutherland, 214 S. State St., Marion, O.*

BRACK, Reginald, aviation executive born in Radomisse, Russia, Dec. 28, 1910; general traffic and sales manager, Braniff International Airways. Address: 6043 Walnut Hill Lane, Dallas, Tex.

BRADLEY, Richard Frank, sales engineer born in Chicago, Ill., Apr. 13, 1896; manager, Aviation Div., Standard Oil Co. of Cal. Address: 225 Bush St., San Francisco, Cal.

BRADY, George W., aeronautical engineer born in Indianapolis, Ind., Aug. 22, 1903; director of engineering, Curtiss-Wright Corp., Propeller Div. Address: 41 Elston Rd., Upper Montclair, N. J.

BRAMLEY, Eric, aviation writer born in Scottdale, Pa., Apr. 12, 1916; executive editor, American Aviation Publications. Address: 1025 Vermont Ave., N. W., Washington, D. C.

BRAND, Harrison, Jr., business executive born in Ilion, N. Y., Aug. 24, 1891; secretary-treasurer, Aircraft Industries Association of America, Inc. Address: 610 Shoreham Bldg., Washington 5, D. C.

BRANDT, Carl Amardus, Air Force officer born in Ft. Nibrara, Nebr., Jan. 9, 1906; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.*

BRANIFF, T. E., aviation executive; president, Braniff Airways. Address: Love Field, Dallas 9, Tex.*

BRASHEAR, Harry R., business executive born July 27, 1884; director, Traffic Service, Aircraft Industries Association. Address: 610 Shoreham Bldg., Washington, D. C.

BRAZNELL, Walter W., pilot born in St. Louis, Mo., Dec. 16, 1907; director of flight, American Airlines. Address: 336 Abbey Rd., Manhasset, N. Y.

BREWSTER, Owen, U. S. Senator born in Dexter, Md., Feb. 22, 1888. Address: Senate Office Bldg., Washington, D. C.

BRIEGLEB, William G., aeronautical engineer, designer, instructor, and pilot born in Baltimore, Md., Nov. 3, 1912; owner and operator, El Mirage Flying Field and Soaring School. Address: El Mirage Field, Adelanto, Cal.

BRIMHALL, Dean R., psychologist born in Provo, Utah, Dec. 11, 1886; coordinator of research, Civil Aeronautics Administration. Address: 2000 F St., N. W., Washington, D. C.

BRINCKERHOFF, William W., aviation executive born in Mt. Vernon, N. Y., July 21, 1904; president, Air Carrier Service Corp. Address: 1742 G St., N. W., Washington, D. C.

BRINKLEY, Russ, flight instructor, author, radio producer, and newsreel cameraman born in Pittsburgh, Pa., Mar. 30, 1906; aviation director, Radio Station WHP-CBS. Address: Room 417, Telegraph Bldg., Harrisburg, Pa.

BRITTIN, Lewis Hotchkiss, engineer born in Derby, Conn., Feb. 8, 1877; executive director, The Airfreight Association, Inc. Address: 1025 Vermont Ave., N. W., Washington, D. C.

BROOKS, Charles Franklin, meteorologist born in St. Paul, Minn., May 2, 1891; professor of meteorology, Harvard, and secretary, American Meterological Society. Address: Blue Hill Observatory, Harvard University, Milton 86, Mass.

BROWN, Charles Randall, Naval officer born in Tuscaloosa, Ala., Dec. 13, 1899; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

BROWN, John Nicholas, government official born in New York, N. Y., Feb. 21, 1900. Address: 50 S. Main St., Providence, R. I.

BROWN, J. W., director of flight operations, Southwest Airways Co. Address: P. O. Box 268, So. Francisco, Cal.*

BROWN, N. A., aviation writer, *Aero Digest*. Address: 515 Madison Ave., New York 22, N. Y.*

BRUCHISS, Louis, aeronautical engineer and aviation writer born in Amsterdam, Holland, Mar. 9, 1907; aviation writer, *American Weekly*. Address: 21 W. 75th St., New York, N. Y.

BRUKNER, Clayton J., manufacturing executive born in Ravenna, Nebr., Dec. 18, 1896; president, Waco Aircraft Co. Address: Swailes Road, Troy, O.

BRUNO, Harry A., public relations counsel born in London, England, Feb. 7, 1893; owner, H. A. Bruno and Associates. Address: Suite 4826, 30 Rockefeller Plaza, New York 20, N. Y.

BRUNTON, Frank, airline executive; manager, special projects, American Airlines, Inc., 100 E. 42nd St., New York 17, N. Y.*

BUDD, John F., publisher and editor born in Brooklyn, N. Y., Aug. 3, 1899. Address: 8-10 Bridge St., New York, N. Y.

BULLARD, Lyman A., Jr., aeronautical engineer born in Kalamazoo, Mich., Jan. 17, 1909; chief of flight test, Chance Vought Aircraft Div., United Aircraft Corp. Address: 1500 Argentia Dr., Dallas, Tex.

BURDEN, William A. M., aviation consultant born in New York, N. Y., Apr. 8, 1906. Address: 75 West St., New York, N. Y.

BURGESS, George W., government official born in Berlin, N. H., Jan. 28, 1902; assistant to administrator, Civil Aeronautics Administration. Address: 1411 35th St., Washington, D. C.

BURKE, John W., Jr., attorney born in Washington, D. C., Sept. 19, 1915; director of personnel, Capital Airlines. Address: 2311 Tracy Pl., Washington, D. C.

BURKE, M. F., accountant born in Meriden, Conn., Aug. 3, 1900; personnel director, United Aircraft Corp. Address: 140 Ridgewood Rd., W. Hartford, Conn.

BURNELL, Jack, maintenance executive born in Denver, Colo., 1903; superintendent of maintenance, Monarch Air Lines. Address: 1429 Rosemary St., Denver, Colo.

BURNS, Robert Whitney, Air Force officer born in Stanley, Wis., Sept. 15, 1908; Major

General (temporary). Address: Chief of Staff, U. S. Air Force, Washington 25, D. C.

BURROWS, Reginald, publisher, *Western Flying*. Address: 4328 Sunset Blvd., Los Angeles 27, Cal.

BURTON, Edward F., aeronautical engineer born in Rock Island, Ill., Nov. 6, 1899; chief engineer, Douglas Aircraft Co. Address: 366 So. Westgate Ave., W. Los Angeles, Cal.

CABELL, Charles Pearre, Air Force officer born in Dallas, Tex., Oct. 11, 1903; Major General (temporary). Address: Hqs., U. S. Air Force, Washington, D. C.

CALDWELL, Frank Walker, aeronautical engineer born in Lookout Mt., Tenn., Dec. 20, 1889; director of research, United Aircraft Corp. Address: E. Hartford, Conn.

CALHOUN, C. H., aviation executive; vice-president, engineering and maintenance, Mid-Continent Airlines. Address: Waltower Bldg., 102 E. 9th St., Kansas City 6, Mo.*

CAMERON, Everett S., aviation executive, president and chief engineer, Cameron Aero Engine Corp. Address: 324 Greenwich St., Reading, Pa.*

CANADAY, John E., public relations counsel born in Anderson, Ind., July 29, 1905; director of public relations, Lockheed Aircraft Corp. Address: 10421 Valley Spring Lane, No. Hollywood, Calif.

CANNON, John Kenneth, Air Force officer born in Salt Lake City, Utah, Mar. 9, 1892; Lieutenant General (temporary). Address: U. S. Air Force, Washington 25, D. C.*

CARBONARA, Victor E., vice-president, Kollsman Instrument Div., Square D Co. Address: 80-08 Forty-fifth Ave., Elmhurst, N. Y.*

CARLTON, Roy, journalist born in New York, N. Y., July 29, 1921; aviation editor, *Long Island Press, Long Island Star-Journal*. Address: 247-42 77 Crescent, Bellerose, N. Y.

CARMICHAEL, James H., airline executive born in Newark, N. J., Apr. 2, 1907; president, Capital Airlines. Address: National Airport, Washington, D. C.

CARROLL, Franklin Otis, Air Force officer born in Washington, Ind., Feb. 10, 1893; Major General (permanent). Address: Hqs., Air Materiel Command, Wright Field, Dayton, O.

CARROLL, George A., newspaperman born in Pompey, N. Y., July 16, 1904; aviation editor, *New York Journal-American*. Address: 28-32 213 St., Bayside, L. I., N. Y.

CARTER, Leo A., Santa Monica plant manager, Douglas Aircraft Co., Inc. Address: 3000 Ocean Park Blvd., Santa Monica, Cal.*

CARTER, Sydney, advertising and public relations manager, Luscombe Airplane Corp. Address: P. O. Box 2128, Dallas, Tex.*

CARVER, John R., airline executive; vice-president, secretary and operational manager Robinson Airlines. Address: 121 E. Seneca St., Ithaca, N. Y.*

CASSADY, John Howard, Naval officer born in Spencer, Ind., Apr. 3, 1896; Rear Admiral. Address: Navy Dept., Washington, D. C.

CERNY, Walter J., aeronautical engineer born in Prague, Czechoslovakia, Dec. 13, 1900; director of engineering, Northrop Aircraft, Inc. Address: Hawthorne, Cal.

CHAMBERS, Reed M., aviation insurance underwriter born in Onaga, Kans., Aug. 18, 1894; president, United States Aviation Underwriters, Inc. Address: 80 John St., New York, N. Y.

CHARLTON, E. T., aircraft sales executive born in Yonkers, N. Y., Mar. 18, 1910; export manager, Cessna Aircraft Co. Address: 5800 Franklin Road, Wichita 15, Kans.

CHAUNCEY, Charles Carl, Air Force officer born in Joshua, Tex., Oct. 31, 1889; Major General (permanent). Address: Hq. Tech. Div., Air Training Command, Scott Air Force Base, Ill.

CHIDLAW, Benjamin Wiley, Air Force officer born in Cleves, O., Dec. 18, 1900; Lieutenant General (temporary). Address: Air Adjutant General, U. S. Air Force, Washington 25, D. C.

CHILDS, L. A., chief engineer, Texas Engineering & Manufacturing Co. Address: Grand Prairie, Tex.*

CHRISTOPHER, George T., corporation executive born in Terre Haute, Ind., Oct. 2, 1887; president and general manager, Packard Motor Car Co. Address: Detroit 32, Mich.

CISOWSKY, Stanley J., writer, *Michigan Flying Reporter*. Address: 759 Tilden St., Flint 5, Mich.

CLARK, Harry L., pilot born in Aurora, Ill., Oct. 5, 1908; superintendent of flight, eastern division, American Airlines. Address: LaGuardia Field, N. Y.

CLEGG, Lee Milton, business executive born in Providence, R. I., July 16, 1897; executive vice-president, Thompson Products, Inc. Address: 23555 Euclid Ave., Cleveland 17, O.

CLEVELAND, Carl M., advertising executive born in Green Bay, Wis., Mar. 16, 1903; assistant director of public relations and advertising, Boeing Airplane Co. Address: 5715 58th St., N. W., Seattle, Wash.

CLEVELAND, Reginald M., journalist born in New York, N. Y., Nov. 6, 1886; industrial advertising manager, *New York Times*. Address: 229 W. 43rd St., New York 18, N. Y.

CLINE, Albert vanBibber, public relations counsel born in Columbus, O., Jan. 18, 1915; director of public relations, Northrop Aircraft, Inc. Address: 615 E. Arbor Vitae, Inglewood, Cal.

COBURN, H. W., airline executive; vice-president, traffic and sales, Mid-Continent Airlines. Address: Waltower Bldg., 102 E. 9th St., Kansas City 6, Mo.

COCHRAN, Jacquelin, aviatrix born in Pensacola, Fla.; owner, Cosmetic Manufacturing Co. Address: 639 Fifth Ave., New York, N. Y.*

COFFYN, Frank T., aviation executive born in Charleston, S. C., Oct. 24, 1878; assistant executive, United Helicopters, Inc. Address: Palo Alto, Cal.

COHEN, S. Ralph, public relations counsel born in Elizabeth, N. J., July 9, 1917; public relations officer, International Air Transport Association. Address: International Civil Aviation Bldg., Montreal, Canada.

COHU, La Motte T., corporation executive born in New York City, Sept. 23, 1895; president and general manager, Consolidated Vultee Aircraft Corp. Address: San Diego, Cal.

COLBERT, Leo Otis, hydrographic and geodetic engineer born in Cambridge, Mass., Dec. 31, 1883; director, Coast and Geodetic Survey. Address: Commerce Bldg., Washington 25, D. C.

COLBERT, Stanley L., journalist born in New York City, Oct. 18, 1927; assistant news editor, *Aviation Week*. Address: 28 Grove St., New York, N. Y.

COLBY, Carroll B., aviation writer born in Claremont, N. H., Sept. 7, 1904; executive secretary, Corporation Aircraft Owners Association, Inc. Address: 444 Madison Ave., New York 22, N. Y.

COLE, Michael E., airline traffic manager born in Baltimore, Md., Jan. 7, 1913; general traffic manager, Southwest Airways. Address: So. San Francisco, Cal.

COLLINGS, John A., airline executive born in Washington County, Va., Apr. 6, 1903; vice-president, operations, Transcontinental & Western Air, Inc. Address: 101 W. 11th St., New York, N. Y.

COLLINS, F. B., aviation executive, vice-president and sales manager, Boeing Airplane Co. Address: P. O. Box 3107, Seattle 14, Wash.*

COLLINS, Whitley Charles, aircraft manufacturer born in Des Moines, Iowa, Apr. 28, 1898; president, Radioplane Co., director, Monasco Mfg. Co., and partner, Collins-Powell Co. Address: Beverly Hills, Cal.

COMBS, Thomas Selby, Naval officer born in Lamar, Mo., Mar. 25, 1898; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

CONNELLY, John H., president, Southwest Airways Co. Address: P. O. Box 268, So. San Francisco, Cal.*

CONANT, Frederic Warren, airplane executive born in Santa Barbara, Cal., Feb. 8, 1892; vice-president, Douglas Aircraft Co., Inc. Address: Santa Monica, Cal.

CONDON, Cyril Hyde, attorney born in Waterbury, Conn., Sept. 18, 1902; partner, Condon & Forsyth, and legal adviser to international airline operators. Address: 620 Fifth Ave., New York 20, N. Y.

CONOVER, Harvey, publisher born in Chicago, Ill., Nov. 24, 1892; president and treasurer, Conover Mast Publications. Address: 205 E. 42nd St., New York 17, N. Y..

COOK, J. M., director of advertising, Northwest Airlines, Inc. Address: 1885 University Ave., St. Paul 1, Minn.*

COOK, Max B., aviation editor, Scripps-Howard newspapers. Address: 230 Park Ave., New York 17, N. Y.*

COOK, Orval Ray, Air Force officer born in West Union, Ind., July 27, 1898; Major General (temporary). Address: Wright-Patterson Air Force Base, Dayton, O.

COOKE, David C., editor, *The Aircraft Annual*. Address: 57 E. Carpenter St., Valley Stream, N. Y.*

COOKE, George T., pilot born in Prairie Township, Ill., Jan. 28, 1905; superintendent of operations, Empire Air Lines. Address: 1409 N. 6th St., Boise, Idaho.

COOKE, Richard P., aviation editor, *Wall Street Journal*. Address: 44 Broad St., New York 4, N. Y.*

CORDDRY, Charles, journalist born in Snow Hill, Md., Mar. 20, 1920; aviation writer, United Press. Address: National Press Bldg., Washington, D. C.

CORNWELL, Delbert Strother, Naval officer born in Philippi, W. Va., Apr. 16, 1900; Rear Admiral. Address: U. S. Naval Attache and Naval Attache for Air, American Embassy, London.

COTTON, Robert B., aeronautical engineer born in Philadelphia, Pa., Jan. 10, 1916; chief engineer, engineering and research division, All American Airways. Address: Dupont Airport, Wilmington, Del.

COUPLAND, Richard Cox, Air Force officer born in West Point, Va., Dec. 14, 1893; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.

COX, D. S., chief pilot, western region, Northwest Airlines. Address: 1885 University Ave., St. Paul 1, Minn.*

CRAIG, Howard Arnold, Air Force officer born in Philadelphia, Pa., Dec. 22, 1897; Lieutenant General. Address: U. S. Air Force, Washington 25, D. C.

CRAIG, James Y., aviation executive born in Santiago, Chile; director of flight operations, American Overseas Airlines. Address: Remsen's Lane, Oyster Bay, L. I., N. Y.

CRAIG, Nicholas, sales manager, Pan American-Grace Airways, Inc. Address: 135 E. 42nd St., New York 17, N. Y.*

CRAIGIE, Laurence Carbee, Air Force officer born in Concord, N. H., Jan. 26, 1902; Major General (temporary). Address: USAF Institute of Technology, Wright-Patterson Air Force Base, Dayton, O.

CRANE, J. D., aviation executive born in Gulfport, Miss., Oct. 23, 1908; vice-president, engineering, inspection and planning, National Airlines. Address: Miami, Fla.

CRARY, Harold, airline executive born in Northfield, Minn., June 30, 1888; vice-president, traffic and sales, United Air Lines. Address: 4819 Grand Ave., Western Springs, Ill.

CRAWFORD, Alden Rudyard, Air Force official born in Mt. Sterling, Ill., Nov. 27, 1900; Major General (temporary). Address: Chief, Engineering Div., Air Materiel Command, Dayton, O.

CRISMON, William R., airline executive born in Salt Lake City, Utah, Dec. 28, 1911; operations manager, Challenger Airlines. Address: 2140 Broadmoor St., Salt Lake City, Utah.

CRUISE, Edgar Allen, Naval officer born in Hebron, Nebr., Mar. 20, 1899; Rear Admiral. Address: 1816 Wynnewood Rd., Overbrook, Pa.*

CUNNINGHAM, John A., airline executive born in Kansas City, Kans., Oct. 15, 1907; vice-president, operations, Mid-Continent Airlines. Address: 102 E. 9th St., Kansas City, Mo.

DAMON, Ralph S., airline executive born in Franklin, N. H., July 6, 1897; president, Transcontinental & Western Air, Inc. Address: 630 Fifth Ave., New York, N. Y.

DARR, H. S., airline executive; president, Monarch Air Lines. Address: Stapleton Airfield, Denver 7, Colo.*

DARROW, Richard W., public relations counsel and aviation writer born in Champaign County, O., Sept. 24, 1915; director of public relations and advertising, The Glenn L. Martin Co. Address: 4003 Round Top Rd., Baltimore 18, Md.

DAVIS, Arthur Cayley, Naval officer born in Columbia, S. C., Mar. 14, 1893; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

DAVIS, D. J., engineer born in Detroit, Mich., Apr. 8, 1902; chief industrial engineer, AVCO Manufacturing Corp. Address: 1329 Arlington, Cincinnati, O.

DAVIS, F. E., pilot born in Blackstone, Ill., Apr. 30, 1900; chief engineering pilot, Eastern Air Lines. Address: 565 N. E. 102 St., Miami, Fla.

DAVIS, T. H., corporation official born in Winston-Salem, N. C., Mar. 15, 1918; president, Piedmont Aviation, Inc. Address: P. O. Box 2720, Winston-Salem, N. C.

DAVIS, Thomas, assistant secretary of commerce. Address: Commerce Bldg., Washington 25, D. C.*

DAVISON, F. Turbee, president, The National Air Council. Address: Empire State Bldg., New York 1, N. Y.*

DAWSON, Gene, aviation editor, *The Indianapolis News*. Address: Indianapolis 6, Ind.*

DECKER, Robert Stewart, pilot born in So. Orange, N. J., Oct. 16, 1916; test pilot, Sikorsky Aircraft Div., United Aircraft Corp. Address: 10 Alanson Road, Bridgeport, Conn.

DeFRANCE, Smith J., aeronautical engineer born in Battle Creek, Mich., Jan. 19, 1896; director, Ames Aeronautical Laboratory (NACA). Address: Villa and Fairway Drives, Los Altos, Cal.

DEICHLER, R. E. S., airline executive born in Lancaster, Pa., Apr. 21, 1910; vice president, sales, American Airlines. Address: 28 Vista Road, Great Neck, L. I., N. Y.

DELLINGER, John Howard, Dr., physicist born in Cleveland, O., July 3, 1886; chairman, Radio Technical Committee for Aeronautics. Address: 1724 F St., N. W., Washington, D. C.

DEMME, Robert Eugene, public relations counsel born in Cedarhurst, L. I., N. Y., May 13, 1912; assistant director of public relations, American Overseas Airlines. Address: 17 Sunset Ave., Lynbrook, L. I., N. Y.

de SEVERSKY, Alexander P., aeronautical consultant, engineer and airplane designer born in Tiflis, Russia, June 7, 1894; inventor, designer, author. Address: Rm. 3411, 30 Rockefeller Plaza, New York 20, N. Y.

DEVER, Hayes, public relations counsel born in Pittsburgh, Pa., July 19, 1913; secretary and director, public relations, Capital Airlines. Address: National Airport, Washington 1, D. C.

DEVLIN, Roger V., aviation editor, *Tulsa Tribune*. Address: World Bldg., Tulsa 2, Okla.*

DEXTER, Robert R., associate editor, *Journal of the Aeronautical Sciences*. Address: 2 E. 64th St., New York 21, N. Y.*

DOBBEN, Gerard B., writer born in Fremont, Mich., June 18, 1902; legislative editor, *American Aviation Daily, American Aviation Magazine*. Address: 1504 44th St., N. W., Washington, D. C.

DOE, Thomas Bartwell, business executive born in Danville, Va., Mar. 19, 1883; director, Sperry Corporation. Address: 30 Rockefeller Plaza, New York 20, N. Y.

DOLSON, C. H., pilot born in St. Louis, Mo., May 13, 1906; vice-president, operations, Delta Air Lines. Address: Municipal Airport, Atlanta, Ga.

DOMAN, Carl Templar, engineer born in Elbridge, N. Y., Feb. 24, 1900; vice-president and chief engineer, Aircooled Motors, Inc. Address: 209 Parsons Drive, Syracuse 9, N. Y.

**DOMAN, Glidden S.**, aeronautical engineer born in Syracuse, N. Y., Jan. 28, 1921; president, Doman Helicopters, Inc. Address: Ta'agan Point, Danbury, Conn.

**DOMONKOS, Julius J.**, vice-president, manufacturing, Bell Aircraft Corp. Address: P. O. Box 1, Buffalo 5, N. Y.*

**DOOLITTLE, James Harold**, aviator and business executive born in Alameda, Cal., Dec. 14, 1896; vice-president and director, Shell Union Oil Corp. Address: 50 W. 50th St., New York 20, N. Y.

**DOUGLAS, Donald Wills**, aircraft manufacturer born in Brooklyn, N. Y., Apr. 6, 1892; president, Douglas Aircraft Co. Address: 3000 Ocean Park Blvd., Santa Monica, Cal.

**DOUGLASS, Robert Wilkins, Jr.**, Air Force officer born in Memphis, Tenn., Mar. 8, 1900; Major General (temporary). Address: Dept. of Air Force, Washington 25, D. C.

**DOWNIE, Don**, aviation writer and photographer born in Seattle, Wash., Dec. 11, 1916; head of photo dept. and aviation editor, *Pasadena Star News*, and contributing writer, *Skyways*. Address: 1821 Corson St., Pasadena, Cal.

**DOWNS, T. R.**, personnel manager, Pratt and Whitney Aircraft. Address: 400 S. Main St., E. Hartford 8, Conn.*

**DOYLE, Austin Kelvin**, Naval officer born in New York, N. Y., Nov. 7, 1898; Rear Admiral. Address: Chief, Naval Air Reserve Training, N.A.S., Glenview, Ill.

**DRINKWATER, Terrell Croft**, air transportation executive born in Denver, Colo., July 15, 1908; president, Western Air Lines. Address: 6060 Avion Drive, Los Angeles 45, Cal.

**DRYDEN, Hugh Latimer**, physicist born in Pocomoke City, Md., July 2, 1898; National Advisory Committee for Aeronautics. Address: 1724 F St., N. W., Washington, D. C.

**DUCKWORTH, Herbert Spencer**, Naval officer born in Keosauqua, Iowa, Oct. 23, 1900; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

**DUFF, Donald A.**, president, Challenger Airlines. Address: Stapleton Airfield, Denver, Colo.

**DUNCAN, Donald Bradley**, Naval officer born in Alpena, Mich., Sept. 1, 1896; Vice Admiral. Address: 3000 Thirty-ninth St., N. W., Washington, D. C.*

**DUNN, Francis W.**, public relations counsel born in Buffalo, N. Y., June 22, 1911; director of public relations, Bell Aircraft Corp. Address: P. O. Box 1, Buffalo 5, N. Y.

**DUNN, Raymond M.**, aircraft engineer born in New York, N. Y., Mar. 2, 1914; director of engineering and maintenance, Transcontinental & Western Air, Inc. Address: 8408 Johnson Drive, Merriam, Kans.

**DUNN, Thomas A.**, airline executive born in Asheville, N. C.; assistant to the vice-president, Pan American-Grace Airways, Inc. Address: 135 E. 42nd St., New York 17, N. Y.

**DURGIN, Calvin Thornton**, Naval officer born in Palmyra, N. J., Jan. 7, 1893; Vice Admiral. Address: Navy Dept., Washington 25, D. C.

**DWIGGINS, Don**, aviation writer born in Plainfield, N. J., Nov. 15, 1913; aviation editor, *Los Angeles Daily News*. Address: 1811 N. Brighton St., Burbank, Cal.

**DYER, Joseph L.**, president, Florida Airways, Inc. Address: Municipal Airport, P. O. Box 591, Orlando, Fla.*

**DYKES, Branch T.**, airline executive born in Macksville, Kans., July 11, 1901; vice-president, operations, Colonial Airlines. Address: LaGuardia Field, N. Y.

**EAKES, Mather M., Jr.**, journalist born in Cordele, Ga., June 3, 1912; aviation editor, *Daily Oklahoman*. Address: Oklahoma City, Okla.

**EARLE, Robert L.**, vice-president and general manager, Curtiss-Wright Corp., Propeller Div. Address: Caldwell, N. J.*

**ECHOLS, Oliver P.**, chairman of board and general manager, Northrop Aircraft Inc. Address: Hawthorne, Cal.

**EDGERTON, Joseph Selby**, Air Force officer born in Denver, Colo., Dec. 2, 1899; chief, security review branch, National Military Establishment; Lieutenant Colonel. Address: 1332 Montague St., N. W., Washington 11, D. C.

**EDSON, Peter**, newspaperman born in Hartford City, Ind., Feb. 8, 1896; Washington correspondent, N.E.A. Service. Address: 1013 13th St., N. W., Washington 5, D. C.

**EDWARDS, Howard K.**, physician born in London, England, May 10, 1910; medical director, Eastern Air Lines. Address: 1714 Biscayne Blvd., Miami, Fla.

**EDWARDS, Idwal H.**, Air Force officer born in New York State, Apr. 5, 1895; Lieutenant General (temporary). Address: Dept. of the Air Force, Washington 25, D. C.

**EGGERT, Herbert F.**, marine insurance broker born in Brooklyn, N. Y., Apr. 2, 1887; vice-chairman, Marsh & McLennan, Inc. Address: 70 Pine St., New York 5, N. Y.

**EGTVEDT, C. L.**, chairman of the board, Boeing Airplane Co. Address: Box 3107, Seattle 14, Wash.*

**ELDER, Paul**, director of personnel, Cessna Aircraft Co. Address: 5800 Franklin Road, Wichita 15, Kans.*

**ELLINGTON, Ken**, public relations counsel born in Chicago, Ill., Nov. 3, 1909; public relations director, Republic Aviation Corp. Address: 90 Pine St., Garden City, N. Y.

**ELLIOTT**, Lawrence Clifton, government executive born in Greenville, Tex., Nov. 16, 1901; regional administrator, 4th region, Civil Aeronautics Administration. Address: Box 1689, Fort Worth 1, Tex.

**EMANUEL**, Victor, corporation executive born in Dayton, O., Jan. 31, 1898; chairman and president, AVCO Manufacturing Corp., Lycoming-Spencer Div. Address: 420 Lexington Ave., New York 17, N. Y.

**ENGEL**, Albert Joseph, U. S. Congressman born in New Washington, O., Jan. 1, 1888; Appropriations Committee. Address: House Office Bldg., Washington, D. C.

**ENGLISH**, Burton E., public relations counsel born Jan. 29, 1919; assistant director of public relations, Aircraft Industries Association. Address: 610 Shoreham Bldg., Washington, D. C.

**ENYART**, William R., aviation executive born in Connersville, Ind., Oct. 7, 1904; president, Simmonds Aerocessories, Inc.; president, Federation Aeronautique Internationale. Address: Tarrytown, N. Y.

**ERICKSON**, Horrell Gus, aeronautical preliminary design engineer born in Ft. Smith, Arkansas, Nov. 21, 1914; chief engineer, Texas Engineering and Manufacturing Co., Inc. Address: 6439 Anita, Dallas, Tex.

**EUBANK**, Eugene Lowry, Air Force officer born in Mangum, Okla., Dec. 2, 1892; Major General. Address: Hqs., U. S. Air Force, Washington 25, D. C.

**EUBANK**, John Augustine, lawyer born in Baltimore, Md.; professor of Aeronautical Law, Brooklyn Law School. Address: 32 Broadway, New York, N. Y.

**EVEREST**, Frank Fort, Air Force officer born in Council Bluffs, Iowa, Nov. 13, 1904; Major General (temporary). Address: Hqs., U. S. Air Force, Washington 25, D. C.

**EWEN**, Edward Coyle, Naval officer born in Portsmouth, N. H., May 26, 1897; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

**FAHNESTOCK**, Louis, 3rd, engineer born in Washington, D. C., Oct. 11, 1907; assistant chief engineer, Aircraft Div., Fairchild Engine & Airplane Corp. Address: Hagerstown, Md.

**FAIRCHILD**, Muir Stephen, Air Force officer born in Bellingham, Wash., Sept. 2, 1894; General (temporary). Address: Hq., U. S. Air Force, Washington 25, D. C.

**FAIRCHILD**, Sherman M., aviation executive born in Oneonta, N. Y., Apr. 7, 1896. Address: 30 Rockefeller Plaza, New York, N. Y.*

**FALES**, Herbert G., corporation executive born in Roxbury, Mass., July 14, 1896; director, North American Aviation, Inc. Address: 67 Wall St., New York 5, N. Y.

**FARMER**, Edward H., engineer born in Cleveland, O., June 14, 1906; plant engineer, Lockheed Aircraft Corp. Address: 4220 Franklin Ave., Burbank, Cal.

**FAULKNER**, Stewart, public relations counsel born in Jamestown, N. Y., May 22, 1912; director of advertising and publicity, Continental Air Lines. Address: 1276 Leydon, Denver, Colo.

**FEELY**, Justine, associate editor, *Flying*. Address: 185 N. Wabash Ave., Chicago 1, Ill.*

**FEICK**, Rudolph, secretary, New York branch office and traffic conference, International Air Transport Association. Address: 11 Broadway, New York 4, N. Y.

**FERGUSON**, Kenneth R., aviation executive born in Milbank, S. D., June 21, 1904; vice-president, Northwest Airlines, Inc. Address: 1885 University Ave., St. Paul, Minn.

**FERGUSON**, Malcolm P., business executive born in Elmira Heights, N. Y., June 20, 1896; president, Bendix Aviation Corp. Address: 1104 Fisher Bldg., Detroit 2, Mich.

**FERRIS**, Joseph A., public relations counsel born in Philadelphia, Pa.; director of publicity, Northwest Airlines. Address: 1885 University Ave., St. Paul, Minn.

**FINDLEY**, Earl Nelson, editor and publisher born in Xenia, O., owner and publisher, *U. S. Air Services*. Address: Transportation Bldg., Washington 6, D. C.

**FINLETTER**, Thomas K., born in Philadelphia, Pa., Nov. 11, 1893; lawyer. Address: 2 Rector St., New York, N. Y.*

**FISHER**, Paul W., journalist born in Joplin, Mo., June 22, 1909; director of public relations, United Aircraft Corp. Address: 121 Ridgewood Road, E. Hartford, Conn.

**FLEMING**, Roger C., public relations counsel born in Pittsburg, Kans., Jan. 7, 1893; director of public relations, Allison Div., General Motors Corp. Address: Indianapolis, Ind.

**FLOOD**, Arthur F., aviation executive born in New York, N. Y., May 27, 1907; vice-president and comptroller, Fairchild Engine & Airplane Corp. Address: Hagerstown, Md.

**FLOWER**, Don, aircraft executive born in Franklin, Pa., May 14, 1904; sales manager, Cessna Aircraft Co. Address: Wichita, Kans.

**FLYNN**, F. H., engineer born in Waterford, N. Y., Dec. 27, 1901; service manager, Pratt and Whitney Aircraft. Address: Tolland St., Tolland, Conn.

**FOCKE**, Theodore B., aviation executive born in Cleveland, O., Sept. 16, 1904; vice-president and general manager, Wright Aeronautical Corp. Address: 151 Palisade Ave., Englewood, N. J.

**FORBES, Esther Harrison**, writer born in New Haven, Conn.; associate editor, *Payload—The Air Freight Newsletter*. Address: 322 East 58th St., New York 22, N. Y.

**FORBES, William A.**, advertising executive born in Greenfield, Mass., Jan. 8, 1895; chairman, Platt-Forbes, Inc. Address: 386 Fourth Ave., New York 16, N. Y.

**FORD, Lyman H.**, corporation executive born in Newnan, Ga., May 10, 1889; vice president, general manager and director, Pioneer Parachute Co., Inc. Address: 157 Pitkin St., Manchester, Conn.

**FORMAN, David G.**, manager, Bell Aircraft Corp., Helicopter Div. Address: P. O. Box 1, Buffalo 5, N. Y.*

**FOSTER, Harold L.**, president, Caterpillar Club. Address: Foster Dental Lab., Foster, S. C.*

**FOSTER, Paul L.**, pilot born in Kansas City, Mo., Mar. 16, 1905; chief pilot, southern region, Eastern Air Lines. Address: Miami, Fla.

**FRANCIS, Devon**, journalist born in South Bend, Ind., Apr. 3, 1901; associate editor, *Popular Science Monthly*. Address: Jackson Heights, N. Y.

**FRANK, Morton L.**, accountant born in Philadelphia, Pa., Aug. 21, 1909; treasurer, Bellanca Aircraft Corp. Address: 35 S. Pennewell Dr., Edge Moor Gardens, Del.

**FRANKLIN, James B.**, pilot born in Jefferson County, Tenn., May 4, 1912; vice-president, operations and maintenance, Capital Airlines. Address: National Airport, Washington, D. C.

**FRATER, G. G.**, engineer born in Elkhorn, Wis., July 8, 1896; president and general manager, G. B. Lewis Co. Address: Watertown, Wis.

**FRAZER, Charles D.**, public relations counsel born in Brooklyn, N. Y., Apr. 6, 1908; executive secretary, The National Air Council. Address: 510 E. 33rd St., New York 10, N. Y.

**FREDERICKSON, Paul**, director, flying, Transcontinental and Western Air, Inc. Address: 10 Richards Road, Kansas City, Mo.*

**FRIEDMAN, William Stefan**, aviation writer born in New York, N. Y., Nov. 21, 1912. Address: 41-02 Vernon Blvd., L. I. C. (1), N. Y.

**FRITZ, Lawrence George**, airline executive born in Marine City, Mich., Aug. 7, 1896; vice-president, operations, American Airlines and American Overseas Airlines. Address: 100 E. 42nd St., New York 17, N. Y.

**FROELICH, Michael H.**, journalist, publisher born in New York, N. Y., Dec. 19, 1906; vice-president, Ziff-Davis Publishing Co.; assistant publisher, *Flying*. Address: 350 5th Ave., New York 1, N. Y.

**FROESCH, Charles**, engineer born in Paris, France, Aug. 23, 1896; chief engineer, Eastern Air Lines. Address: 142 Griggs Avenue, Teaneck, N. J.

**FULLER, Curtis**, journalist born in Necedah, Wis., Mar. 2, 1912; editor, *Flying*. Address: 185 N. Wabash Ave., Chicago 1, Ill.

**GALLERY, Daniel Vincent, Jr.**, Naval officer born in Chicago, Ill., July 10, 1901; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

**GAMSU, Sidney M.**, aeronautical engineer born in Gloversville, N. Y., May 1, 1915; chief engineer, McCauley Corp. Address: 20 Wampler Ave., Dayton 5, O.

**GARBER, Paul Edward**, curator, National Air Museum, Smithsonian Institute. Address: Washington 25, D. C.*

**GARDNER, George E.**, air transportation executive born in Fargo, N. D., Nov. 3, 1899; president, Northeast Airlines, Inc. Address: 1700 South Bayshore Lane, Miami, Fla.

**GARDNER, Grandison**, Air Force officer born in Pine Valley, Utah, Sept. 18, 1892; Major General (permanent). Address: U. S. Air Force Washington 25, D. C.

**GARDNER, Lester Durand**, aviation executive born in New York City, Aug. 7, 1876; executive, Institute of Aeronautical Sciences. Address: 251 W. 101st St., New York 25, N. Y.*

**GARDNER, Matthias Bennett**, Naval officer born in Washington, D. C., Nov. 28, 1897; Rear Admiral. Address: Navy Dept., Washington, D. C.

**GARRETT, J. C.**, business executive born in Seattle, Wash., Mar. 8, 1908; president, The Garrett Corp. Address: 9851 Sepulveda Blvd., Los Angeles 45, Cal.

**GARSIDE, Joseph**, president and general manager, E. W. Wiggins Airways, Inc. Address: Norwood, Mass.*

**GASKELL, C. W., Jr.**, chief engineer, Aero Design & Engineering Corp. Address: Culver City Airport, Culver City, Cal.*

**GASSAWAY, Frederic Gerrish**, commercial organization executive born in Portland, Me., June 24, 1888; secretary-manager, Chamber of Commerce, Delaware, Inc. Address: 1112-1114 King St., Wilmington, Del.

**GATCH, Thomas Leigh**, attorney at law, retired, born in Salem, Ore., Aug. 9, 1891; Vice Admiral, U. S. Navy. Address: Failing Bldg., Portland, Ore.

**GATY, John Pomeroy**, aviation executive born in West Orange, N. J., Sept. 24, 1900; vice-president and general manager, Beech Aircraft Corp., Wichita, Kans.

**GAULT, Carroll L.**, accountant born in Montreal, Canada, Sept. 21, 1902; treasurer, United Aircraft Corp. Address: 400 Main St., E. Hartford, Conn.

GEORGE, Joseph Johnson, meteorologist born in Atlanta, Ga., June 20, 1909; superintendent of meteorology, Eastern Airlines. Address: 1931 Sylvan Rd., S. W., Atlanta, Ga.

GEUTING, Joseph Thomas, Jr., association executive born in Springfield, Ill., Feb. 11, 1909; manager, Personal Aircraft Council, Aircraft Industries Association. Address: 116 Woodlawn Ave., Kenwood, Chevy Chase, Md.

GIBSON, Frank, test pilot, Piper Aircraft Corp. Address: Lock Haven, Pa.*

GILBERT, Paul Steck, industrial relations counsel born in Selinsgrove, Pa., Nov. 28, 1895; personnel director, Grumman Aircraft Engine Corp. Address: 215 Avoca Ave., Massa Pegna Park, N. Y.

GILBERT, Warren C., aviation executive born in Culloden, Ga., Oct. 18, 1904; personnel director, Eastern Air Lines. Address: Miami, Fla.

GILL, John Francis, pilot born in Saginaw, Mich., Nov. 19, 1901; chief pilot, eastern division, Eastern Airlines. Address: LaGuardia Airport, New York, N. Y.

GILLEY, Sanford P., Jr., pilot born in Leaksville, N. C., Feb. 11, 1921; operations manager, Piedmont Airlines. Address: Winston-Salem, N. C.

GILMORE, Gordon L., public relations counsel born in Freeborn, Minn., Aug. 4, 1908; director of public relations, Trans World Airline. Address: 630 Fifth Ave., New York 20, N. Y.

GINDER, Samuel Paul, Naval officer born in Altoona, Pa., Feb. 15, 1895; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

GLASS, Fred M., attorney and aviation executive born in Vaiden, Miss.; president, Air Cargo, Inc. Address: 4814 Sedgwick St., N. W., Washington, D. C.

GLOTZBACH, Linus C., lawyer born in Sleepy Eye, Minn., Nov. 23, 1900; vice-president and assistant to the president, Northwest Airlines. Address: 1707 Ford Parkway, St. Paul 5, Minn.

GLOVER, Cato Douglas, Jr., Naval officer born in Centerville, Ala., Sept. 15, 1897; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

GLUHAREFF, Serge E., aeronautical engineer born in St. Petersburg, Russia, Oct. 13, 1903; assistant engineering manager, Sikorsky Aircraft. Address: 185 Lordship Rd., Stratford, Conn.

GOLDBERG, Al, aviation executive born in New York City; superintendent of maintenance, The Flying Tiger Line. Address: 6120 W. 74th St., Los Angeles, Cal.

GOLDSMITH, Richard, business executive born in New York, N. Y., Feb. 4, 1894; president-treasurer, The B G Corporation. Address: 136 W. 52nd St., New York 19, N. Y.

GOODWIN, Hugh H., Naval officer born in Monroe, La., Dec. 21, 1900; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

GOODWIN, R. T., Dr., aviation manager, Shell Oil Co., Inc., Central Aviation Dept. Address: 50 W. 50th St., New York 20, N. Y.*

GOSS, Bert C., public relations counsel born in Springfield, Mo., Jan. 21, 1907; vice-president, Hill & Knowlton, Inc., director of public relations, Aircraft Industries Association of America, Inc. Address: 1203 Highland Dr., Silver Spring, Md.

GRACE, Thomas L., vice-president, operations, Slick Airways. Address: Burbank, Cal.

GRAEBNER, H., Dr., executive council, Airlines Medical Directors Association. Address: 901 Lexington Ave., New York 21, N. Y.*

GRANT, Lucien McKee, Naval officer born in Lancaster, Ky., Nov. 19, 1897; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

GRAY, James Harvey, aviation executive born in Kinmundy, Ill., Oct. 11, 1906; manager, Muroc operations, McDonnell Aircraft Corp. Address: St. Louis 3, Mo.

GRAY, Robert M., aviation editor, *The Commercial Appeal*. Address: 495 Union St., Memphis 1, Tenn.*

GRAYSON, H. A., writer born in Leavenworth, Kans., Dec. 8, 1900; director of publicity, Mid-Continent Airlines. Address: 920 E. 28th St., Kansas City, Mo.

GREENE, William L., engineer born in New York, N. Y., Oct. 23, 1916; chief engineer, Engineering and Research Corp. Address: Riverdale, Md.

GREER, Marshall Raymond, Naval officer born in Riverside, N. C., Mar. 1, 1896; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

GREGG, H. E., personnel manager, Curtiss-Wright Corp., Airplane Div. Address: Columbus 16, O.*

GREGORY, Alfred T., aeronautical engineer born in Brooklyn, N. Y., Sept. 2, 1901; chief engineer, Ranger Aircraft Engine Div., Fairchild Engine and Airplane Corp. Address: Cor. Shelter Rock Rd. and Old Courthouse Rd., Manhasset, N. Y.

GRIFFIN, George W., Jr., born in St. Paul, Minn., Apr. 14, 1914; manager, General News Bureau, General Electric Co. Address: 2164 Stuyvesent St., Schenectady, N. Y.

GRIFFITH, Beverly H., public relations counsel born in Butler, Ga.; director of public relations, Eastern Air Lines. Address: 1307 Sixth Ave., New York 19, N. Y.

GRIFFITH, Melvin S., Jr., business executive born in Baltimore, Md., July 4, 1909; manager, personnel department, Koppers Company, Inc., Aeromatic Propeller Dept. Address: P. O. Box 298, Baltimore 3, Md.

**GRIMES**, Richard V., mechanical engineer born in Denver, Pa., June 8, 1916; chief engineer, Hartzell Propeller Co. Address: 921 South St., Piqua, O.

**GRISWOLD**, Francis Hopkinson, Air Force officer born in Erie, Pa., Nov. 5, 1904; Major General (temporary). Address: War Dept., Washington 25, D. C.

**GROSS**, Robert Ellsworth, airplane manufacturer born in Boston, Mass., May 11, 1897; president, Lockheed Aircraft Corp. Address: P. O. Box 551, Burbank, Cal.

**GRUMMAN**, Leroy Randle, airplane executive born in Huntington, L. I., N. Y., Jan. 4, 1895; chairman of the board, Grumman Aircraft Engineering Corp. Address: Bethpage, L. I., N. Y.

**GUEST**, Clifford, editor, writer, public relations counsel born in Strong City, Okla.; editor, *Planes*, Aircraft Industries Association. Address: 4327 Kentbury Drive, Bethesda, Md.

**GURNEY**, John Chandler, U. S. Senator born in Yankton, S. D., May 21, 1896; member, Appropriations Committee; Armed Services Committee. Address: Senate Office Bldg., Washington, D. C.

**GWINN**, William P., aviation executive born in New York, N. Y., Sept. 22, 1907; general manager and vice-president, Pratt and Whitney Aircraft, United Aircraft Corp. Address: 400 South Main St., East Hartford, Conn.

**HACKETHAL**, Paul F., chief engineer, Aeromatic Aircraft Propellers, Koppers Co., Inc. Address: Baltimore 3, Md.*

**HADDAWAY**, George Edward, aviation publisher born in Fort Worth, Tex., July 6, 1909; president, Air Review Publishing Corp., editor, *Southern Flight*. Address: P. O. Box 750, Dallas, Tex.

**HAGGERTY**, James J., Jr., writer born in Orange, N. J., Feb. 1, 1920; military editor, American Aviation Publications. Address: 1025 Vermont Ave., N. W., Washington, D. C.

**HALBERG**, Stanley O., aviation executive born in Ogden, Utah; general traffic and sales manager, Continental Airlines. Address: Stapleton Airfield, Denver 7, Colo.

**HALE**, Willis H., Air Force officer born in Pittsburg, Kans., Jan. 7, 1893; Major General (permanent). Address: Hq., U. S. Air Force, Washington 25, D. C.

**HALL**, Grover Budd Hartley, Naval officer born in Franklinville, N. Y., Jan. 28, 1900; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

**HALL**, William Evens, Air Force officer born in McAlester, Okla., Oct. 22, 1907; Major General (temporary). Address: Dept. of the Air Force, Washington 25, D. C.

**HAMMOND**, George, business executive born in Brooklyn, N. Y., Nov. 29, 1907; executive vice president, Carl Byoir Associates. Address: RFD 1, Bridgeport, Conn.

**HAND**, Alfred, government official born in Scranton, Pa., Mar. 18, 1898; assistant to deputy administrator, Civil Aeronautics Administration. Address: Commerce Bldg., Washington 25, D. C.

**HANKS**, Stedman Shumway, airport engineer born in Manchester, Mass., July 17, 1889; trustee, Colonel, USAFR. Address: 27 W. 44th St., New York 18, N. Y.

**HANLEY**, Thomas J., Jr., Air Force officer born in Coshocton, O., Mar. 29, 1893; Major General, Chief, Military Personnel Procurement Service Division. Address: Rm. 3062, Navy Bldg., Washington 25, D. C.

**HANNAUM**, George F., business executive born Dec. 12, 1905; director, Industry Planning Service, Aircraft Industries Association. Address: 610 Shoreham Bldg., Washington, D. C.

**HANSEL**, Valentine, business executive born in Brooklyn, N. Y., Feb. 15, 1907; manager of sales, Peter A. Frasse & Co., Inc. Address: 17 Grand St., New York 13, N. Y.

**HARDISON**, Osborne Bennett, Naval officer born in Wadesboro, N. C., Dec. 22, 1892; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

**HARE**, Emlen S., investment research executive born in Philadelphia, Pa., Nov. 26, 1882; president, Hare's Research and Management, Ltd. Address: 19 Rector St., New York 6, N. Y.

**HARLIN**, John E., pilot born in Puxico, Mo., July 25, 1906; captain, Transcontinental & Western Air, Inc. Address: Hockessin, Del.

**HARMON**, Hubert Reilly, Air Force officer born in Chester, Pa., Apr. 3, 1892; Lieutenant General (temporary). Address: U. S. Air Force Representative, United Nations Military Staff Committee, 2 Park Ave., New York 16, N. Y.

**HARMON**, Reginald C., Air Force officer born in Olney, Ill., Feb. 5, 1900; Major General (temporary), The Judge Advocate General. Address: Hq., U. S. Air Force, Washington 25, D. C.

**HARPER**, Robert Wells, Air Force officer born in Seattle, Wash., Nov. 7, 1900; Major General (temporary). Address: CG, Air Training Command, Barksdale Air Force Base, Shreveport, La.

**HARRILL**, William Keen, Naval officer born in Knoxville, Tenn., May 3, 1892; Rear Admiral. Address: U. S. Naval Representative, United Nations Military Staff Committee, 2 Park Ave., New York 16, N. Y.

**HARRIS**, Arthur W. D., editor, *Aviation Maintenance and Operations*. Address: 205 E. 42nd St., New York 17, N. Y.*

**HARRIS**, Joseph S., aviation executive born in Chicago, Ill., July 4, 1904; manager, aviation department, Shell Oil Co., Inc. Address: 50 W. 50th St., New York 20, N. Y.

HARRIS, R. P., chief pilot, Mid-Continent Airlines. Address: Waltower Bldg., 102 E. 9th St., Kansas City 6, Mo.*

HARRISON, Lloyd, Naval officer born in Takoma Park, Md., Aug. 9, 1898; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

HART, Donald W., sales manager, Wisconsin Central Airlines. Address: Municipal Airport, Madison, Wis.*

HARTRANFT, Joseph B., Jr., aviation executive born in Buffalo, N. Y., May 24, 1913; general manager, Aircraft Owners and Pilots Association. Address: 8600 Jones Mill Road, Chevy Chase, Md.

HARTSHORNE, James D., aviation reporter, *Cleveland Plain Dealer*. Address: Superior Ave., N. E., at E. 6th St., Cleveland 14, O.*

HARTT, Julian, newspaperman born in Jackson, Mich., Mar. 3, 1916; aviation editor, *Los Angeles Examiner*. Address: 11th & Broadway, Los Angeles, Cal.

HARTZELL, Robert N., president, Hartzell Propeller Co., Div. of Hartzell Industries, Inc. Address: Piqua, O.*

HATCH, L. Boyd, executive vice-president, Atlas Corporation. Address: 33 Pine St., New York 5, N. Y.*

HATCH, Robert W., meteorologist born in Minneapolis, Minn., Jan. 30, 1915; chief meteorologist, Mid-Continent Airlines. Address: Oakwood, North Kansas City, Mo.

HATCHER, George A., aviation executive born in Bellaire, O., Dec. 14, 1911; director of customer relations, Fairchild Engine & Airplane Corp. Address: Hagerstown, Md.

HAYNES, Caleb Vance, Air Force officer born in Mount Airy, N. C., Mar. 15, 1895; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.*

HAYWARD, Leland, airline executive and theatrical producer born in Nebraska City, Nebr., Sept. 13, 1902; chairman of the board, Southwest Airways. Address: 250 W. 57th St., New York, N. Y.

HAZEN, Ronald McKean, aircraft engine engineer and executive born in Wahpeton, N. D., Oct. 3, 1897; director of engineering, Allison Div., General Motors Corp. Address: Indianapolis, Ind.

HEGENBERGER, Albert Francis, Air Force officer born in Boston, Mass., Sept. 30, 1895; Major General. Address: Dept. of Air Force, Washington 25, D. C.

HEINEMANN, Edward H., aeronautical engineer born in Saginaw, Mich., Mar. 8, 1908; chief engineer, El Segundo Plant of Douglas Aircraft Co. Address: El Segundo, Cal.

HENDERSON, George R., Naval officer born in Pawtucket, R. I., July 6, 1893; Rear Admiral. Address: Navy Dept. Washington 25, D. C.*

HENSHEL, Walter M., public relations director, Braniff International Airways. Address: Dallas, Tex.

HERLIHY, John Albert, air transport executive born in Wilton, N. H., June 21, 1904; vice-president, operations, United Airlines. Address: Stapleton Airfield, Denver 7, Colo.

HERMAN, Fred W., aeronautical engineer born in Beloit, Kans., Apr. 7, 1892; plant manager, Douglas Aircraft Co., Inc. Address: 3855 Lakewood Blvd., Long Beach, Cal.

HERMES, Raymond, chief engineer, Aeronca Aircraft Corp. Address: Municipal Airport, Middletown, O.*

HIBBARD, Hall Livingstone, aeronautical engineer born in Fredonia, Kans.; vice-president and chief engineer, Lockheed Aircraft Corp. Address: 8002 Fountain Ave., Los Angeles 46, Cal.

HICKEY, Robert Ferdinand, Naval officer born in Red Bluff, Cal., Dec. 28, 1897; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

HIGGINS, Francis M., business executive born in Stevens Point, Wis.; president, Wisconsin Central Airlines, Inc. Address: Municipal Airport, Madison, Wis.

HILLER, Stanley, Jr., helicopter manufacturer born in San Francisco, Cal.; president, United Helicopters, Inc. Address: 233 Arden Ave., Menlo Park, Cal.

HINER, Louis C., newspaperman born in Astoria, Oregon, Apr. 19, 1919; aviation editor, *The Indianapolis News*. Address: 1305 N. Delaware St., Indianapolis, Ind.

HOAG, Earl Seeley, Air Force officer born in Sioux City, Iowa, May 30, 1895; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.*

HODGES, James Pratt, Air Force officer born in Oakley, Md., Oct. 7, 1894; Major General (permanent). Address: Dept. of Air Force, Washington 25, D. C.

HOERNIG, Otto W., aviation executive born in Kansas City, Mo., June 28, 1909; assistant secretary and director, Luscombe Airplane Corp. Address: 501 Miller Circle, Garland, Tex.

HOFFMAN, K. H., personnel director, Allison Division, General Motors Corp. Address: Indianapolis 6, Ind.*

HOGG, Bertram J., chief pilot, Hawaiian Airlines, Ltd. Address: Inter-Island Bldg., P. O. Box 3287, Honolulu 1, T. H.*

HOGIN, J. M., chief pilot, Northwest Airlines. Address: 1885 University Ave., St. Paul 1, Minn.*

HOLMAN, M. D., vice-president, operations, Florida Airways, Inc. Address: P. O. Box 591, Orlando, Fla.*

HOLT, Carlyle H., aviation editor, *The Boston Globe*. Address: 244 Washington St., Boston 7, Mass.*

**HOLZAPFEL,** Harrison W., aeronautical engineer born in Portland, Ore., Oct. 16, 1917; engineering manager, Western Air Lines. Address: 6060 Avion Dr., Los Angeles 45, Cal.

**HOOK,** H. Arthur, government official born in Baltimore, Md., Sept. 7, 1901; chief, airports division, sixth region, Civil Aeronautics Administration. Address: 471 Sycamore Road, Santa Monica Canyon, Santa Monica, Cal.

**HOPKINS,** Frederick Mercer, Jr., Air Force officer born in New York City, June 8, 1895; Major General (permanent). Address: U. S. Air Force, Washington 25, D. C.

**HOPKINS,** Nat W., advertising and public relations counsel born in Alton, Ill., Mar. 30, 1897; advertising manager, Continental Motors Corp. Address: Curtis Bldg., Detroit 2, Mich.

**HOPPER,** Rea E., engineer born in Dallas, Oregon, Apr. 1, 1906; chief engineer, Hughes Aircraft Co. Address: 11351 Montana Ave., Los Angeles 24, Cal.

**HORNER,** H. Mansfield, aircraft executive born in New Haven, Conn., Sept. 12, 1903; president, United Aircraft Corp. Address: 400 Main St., E. Hartford 8, Conn.

**HOSKINS,** John Madison, Naval officer born in Pineville, Ky., Oct. 22, 1898; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

**HOTCHKISS,** Henry G., lawyer born in New York, N. Y., Mar. 4, 1893; counsel for Curtiss-Wright Corp., Wright Aeronautical Corp. and Aircraft Industries Association of America, Inc. Address: 1148 Fifth Ave., New York, N. Y.

**HOTZ,** Robert B., writer born in Milwaukee, Wis., May 29, 1914; news editor, *Aviation Week*. Address: 4612 49th St., N. W., Washington, D. C.

**HOWARD,** Benjamin, general manager, Aircraft Div., Fairchild Engine and Airplane Corp. Address: Hagerstown, Md.*

**HOWARD,** N. F., salesman born in Coffeyville, Kans., Jan. 6, 1912; sales manager, Funk Aircraft Co. Address: Coffeyville, Kans.

**HOYT,** Kendall K., aviation writer born in Washington, D. C., Oct. 6, 1903; editor, *Letter to Airmen*. Address: 1226 Nat'l Press Bldg., Washington 4, D. C.

**HUBER,** E. J., public relations counsel born in Kenosha, Wis., Feb. 8, 1906; public relations director, Piasecki Helicopter Corp. Address: 6 Longview Dr., Springfield, Pa.

**HUDSON,** Alfred M., aviation executive born in Pittsburgh, Pa., July 4, 1911; vice-president, public relations and advertising, Colonial Airlines. Address: 630 Fifth Ave., New York, N. Y.

**HUFF,** H. P., Jr., airline executive born in El Paso, Tex., July 26, 1920; assistant to vice-president, operations, Slick Airways, Inc. Address: Burbank, Cal.

**HUGHES,** Albert D., writer born in Cambridge, Mass., Apr. 23, 1907; aviation and radio editor, *Christian Science Monitor*. Address: One Norway St., Boston 15, Mass.

**HUGHES,** Howard Robard, manufacturer, aviator, motion picture producer born in Houston, Tex., Dec. 24, 1905; president, Hughes Aircraft Co. Address: Florence Ave. at Teale St., Culver City, Cal.

**HUGHES,** John A., newspaperman born in New York, N. Y., Aug. 17, 1914; aviation editor, *New York Daily News*. Address: 220 E. 42nd St., New York, N. Y.

**HULSE,** Frank Wilson, aviation executive born in Augusta, Ga., Sept. 12, 1912; president, Southern Airways, Inc. Address: Municipal Airport, Birmingham, Ala.

**HUNSAKER,** Jerome Clarke, aeronautical engineer born in Creston, Iowa, Aug. 26, 1886; dept. head, aeronautical engineering, Mass. Inst. of Technology, and chairman, Nat'l Advisory Committee for Aeronautics. Address: 10 Louisburg Square, Boston, Mass.

**HUNT,** R. V., chairman, west coast, committee on procurement legislation, Aircraft Industries Association of America, Inc. Address: 610 Shoreham Bldg., Washington 5, D. C.*

**HUNTER,** Croil, airline executive born in Fargo, N. D., Feb. 18, 1893; president and general manager, Northwest Airlines. Address: 1885 University Ave., St. Paul 1, Minn.

**HURLEY,** Roy T., aviation executive born in New York, N. Y., June 3, 1896; president, Curtiss-Wright Corp. Address: Owenoke Park, Westport, Conn.

**HYLAND,** Lawrence A., engineer born in Nova Scotia, Canada, Aug. 26, 1897; vice-president, Bendix Aviation Corp. Address: 316 South Glenhurst Dr., Birmingham, Mich.

**INGERSOLL,** Stuart Howe, Naval officer born in Springfield, Mass., June 3, 1898; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

**IRVIN,** Leslie L., parachute manufacturer and designer born in Los Angeles, Cal., Sept. 10, 1895; president, Irvin Air Chute Co., Inc. Address: 1670 Jefferson Ave., Buffalo 8, N. Y.

**ISAACSON,** Leslie A., personnel executive born in Minneapolis, Minn., June 23, 1894; personnel manager, Boeing Airplane Co. Address: Rt. 1, Box 804, Kirkland, Wash.

**JACOB,** C. W., air transport executive born in Rogers, Tex., June 18, 1907; vice-president and secretary, American Airlines; vice-president and director, American Overseas Airlines. Address: Paper Mill Road, Plandome, L. I., N. Y.

**JACOBS,** Albert R., engineer and business executive born in Hampton, Pa., May 7, 1894; president, Jacobs Aircraft Engine Co. Address: 750 Wueen St., Pottstown, Pa.

**JACOBY, M. M.**, chief pilot, Pioneer Air Lines. Address: Municipal Airport, P. O. Box 12188, Houston 12, Tex.*

**JANAS, Sigmund, Jr.**, aviation executive born in Sacramento, Cal., 1923; vice-president, traffic, Colonial Airlines. Address: 61 Summit Ave., Bronxville, N. Y.

**JANES, Paul N.**, aviation reporter and writer born in Kent, O., Sept. 12, 1913; aviation editor, *The Indianapolis Star*. Address: 6914 N. Keystone Ave., Indianapolis, Ind.

**JANSEN, Peter N.**, executive vice-president, Helicopters, Inc. Address: E. Main St., P. O. Box 95, Stratford, Conn.*

**JENNINGS, Ralph Edward**, Naval officer born in New York, N. Y., June 14, 1897; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

**JOHNSON, Clarence L.**, aeronautical engineer born in Michigan, 1910; chief research engineer, Lockheed Aircraft Corp. Address: Burbank, Cal.

**JOHNSON, Dave**, aviation writer and pilot born in Portland, Ore., Oct. 17, 1913; company pilot and aviation editor, *Statesman* newspapers. Address: 1316½ North 10th St., Boise, Ida.

**JOHNSON, Leon William**, Air Force officer born in Columbia, Mo., Sept. 13, 1904; Major General (temporary). Address: Dept. of Air Force, Washington 25, D. C.

**JOHNSON, Louis**, Secretary of Defense, National Military Establishment. Address: Pentagon Bldg., Washington 25, D. C.*

**JOHNSON, O. Z.**, airline executive born in Augusta, Ga., Sept. 8, 1909; maintenance superintendent, Pan American-Grace Airways. Address: Panagra, Lima, Peru.

**JOHNSON, William Davis**, Naval officer born in Deatsville, Ala., Aug. 2, 1897; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

**JOHNSTON, Samuel Paul**, aviation executive born in Pittsburgh, Pa., Aug. 3, 1899; director, Institute of the Aeronautical Sciences. Address: 2 E. 64th St., New York 21, N. Y.

**JONES, Charles S.**, business executive born in Castleton, Vt., Jan. 11, 1894; president, Academy of Aeronautics. Address: Washington Crossing, Pa.

**JONES, Harold A.**, member, Civil Aeronautics Board. Address: Commerce Bldg., Washington 25, D. C.*

**JONES, J. Edwin**, president, Pacific Overseas Airlines. Address: Ontario, Cal.*

**JONES, Junius Wallace**, Air Force officer born in Jackson, La., Apr. 3, 1890; Major General. Address: Hq, SMAMA, McClellan AFB, McClellan, Cal.

**JONES, M. H.**, engineering and maintenance manager, Chicago and Southern Airlines. Address: Memphis Municipal Airport, Memphis 2, Tenn.*

**JOYCE, Temple N.**, engineer born in Baltimore, Md., June 27, 1895; president, Wing Engineering Corp. Address: 1502 Court Square Bldg., Baltimore 2, Md.

**JURDEN, Leonard W.**, government official born in Marshall, Mo., Feb. 24, 1897; regional administrator, fifth region, Civil Aeronautics Administration. Address: City Hall, Kansas City, Mo.

**KAHLE, Keith**, airline executive born in Sistersville, W. Va.; president, Central Airlines, Inc., and Keith Kahle Aviation, Inc. Address: 6109 Camp Bowie Blvd., Fort Worth, Tex.

**KAHN, Roger W.**, musical composer and aviator born in Morristown, N. J., Oct. 19, 1907; service manager and test pilot, Grumman Aircraft Engineering Corp. Address: 654 Madison Ave., New York, N. Y.

**KALITINSKY, Andrew**, engineer born in Russia; chief engineer, NEPA division, Fairchild Engine and Airplane Corp. Address: Hagerstown, Md.*

**KAMAN, Charles H.**, aeronautical engineer born in Washington, D. C., June 15, 1919; president, Kaman Aircraft Corp. Address: Bradley Field, Windsor Locks, Conn.

**KARANT, Max**, aviation writer born in Chicago, Ill., Mar. 13, 1913; assistant general manager and editorial director, Aircraft Owners and Pilots Association. Address: 10 Alcott Road, Bethesda, Md.

**KARTVELI, Alexander A.**, engineer born in Russia; vice-president, chief engineer, Republic Aviation Corp. Address: Huntington Station, L. I., N. Y.

**KEEN, Harold**, aviation editor, San Diego *Tribune-Sun*. Address: 2nd and Broadway, San Diego 12, Cal.*

**KEIF, Aubrey**, aviation executive born in La Junta, Colo., Aug. 22, 1900; manager, aviation division, The Texas Co. Address: 1075 Park Ave., New York, N. Y.

**KEIL, Larry E.**, writer born in St. Paul, Minn., Nov. 7, 1909; director of public relations, Chicago and Southern Air Lines. Address: 924 Aley Rd., Memphis, Tenn.

**KELLER, L. Scott**, chief pilot, Challenger Airlines. Address: Stapleton Airfield, Denver 7, Colo.*

**KELSEY, H. D.**, manager, Aircraft Gas Turbine Division, General Electric Co. Address: 920 Western Ave., West Lynn, Mass.*

**KEMP, Jack R.**, public relations counsel born in Mingus, Tex., Mar. 31, 1921; director of public relations, Pioneer Airlines. Address: Houston, Tex.

**KENNEDY,** Stanley Carmichael, aviation executive born in Honolulu, T. H., July 7, 1890; president and general manager, Hawaiian Airlines, Ltd. Address: P. O. Box 3287, Honolulu 1, T. H.

**KENNEY,** George C., born in Yarmouth, Nova Scotia, Aug. 6, 1889; General (temporary). Address: U. S. Air Force, Washington 25, D. C.*

**KENNEY,** Robert T., public relations counsel born in Chicago, Ill., Mar. 13, 1917; director of public relations, Aircraft Div., Fairchild Engine and Airplane Corp. Address: Hagerstown, Md.

**KEPNER,** William E., Air Force officer born in Miami, Ind., Jan. 6, 1893; Major General (permanent). Address: CG, APG, Eglin AFB, Florida.

**KERSHAW,** E. J., vice-president, operations, National Airlines. Address: 3240 N.W. 27th Ave., Miami 37, Fla.*

**KETCHAM,** Dixwell, Naval officer born in Buena Park, Ill., Dec. 2, 1899; Rear Admiral. Address: 1280 Bay Laurel Drive, Menlo Park, Cal.

**KINCAID,** Alvan Cleveland, Air Force officer born in Orleans, Ind., Sept. 25, 1892; Major General (temporary). Address: War Dept., Washington 25, D. C.

**KINCHELOE,** T. T., chief pilot, air transport division, All American Airways. Address: National Airport, Washington, D. C.*

**KINDELBERGER,** James Howard, aeronautical engineer and executive born in Wheeling, W. Va., May 8, 1895; chairman of board and chief executive officer, North American Aviation. Address: Los Angeles Airport, Los Angeles 45, Cal.

**KING,** Jack S., airline executive born in Americus, Ga., Feb. 17, 1914; chief flight superintendent, Delta Air Lines. Address: Municipal Airport, Atlanta, Ga.

**KINGSLEY,** Harold S., general manager, Fairchild Personal Planes Division, Fairchild Engine and Airplane Corp. Address: Strother Field, P. O. Box 555, Winfield, Kans.*

**KINNUCAN,** James W., engineer born in St. Paul, Minn., Oct. 30, 1899; chief engineer, aircraft division, Continental Motors. Address: 1017 Cornell Rd., Muskegon, Mich.

**KIRBY,** N. A., personnel manager, Curtiss-Wright Corp., propeller division. Address: Caldwell, N. J.*

**KITCHEN,** Gerald S., airline executive born in Farnam, Nebr., Oct. 29, 1912; manager traffic and sales, Challenger Airlines. Address: 1250 Cherry St., Denver, Colo.

**KLEMIN,** Alexander, aeronautical consultant born in London, England, May 15, 1888; helicopter editor, *Aero Digest;* editor, *International Handbook of Aeronautical Engineering.* Address: Anderson Road, Greenwich, Conn.

**KLEMPERER,** Wolfgang B., aeronautical engineer born in Dresden, Germany, Jan. 18, 1893; research engineer, Douglas Aircraft Co. Address: 738 So. Bristol Ave., Los Angeles 24, Cal.

**KLINE,** Art, aviation writer born in Staten Island, N. Y., July 9, 1906; aviation columnist, *Staten Island Advance.* Address: 1267 Castleton Ave., Staten Island 10, N. Y.

**KLINE,** W. E., engineer born in Harrisburg, Pa., Aug. 10, 1892; director of Federal Airways, Civil Aeronautics Administration. Address: Commerce Bldg., Washington 25, D. C.

**KNERR,** Hugh Johnston, Air Force officer born in Fairfield, Iowa, May 30, 1887; Major General. Address: The Inspector General, Hqs., U. S. Air Force, Washington 25, D. C.

**KOCH,** A. S., assistant administrator, Aviation Safety, Civil Aeronautics Administration. Address: Commerce Bldg., Washington 25, D. C.*

**KOEPNICK,** Louis R., aeronautical engineer born in Dayton, O., July 27, 1909; chief, training transport and special aircraft branch, procurement division, Air Materiel Command. Address: 2904 Avon Way, Dayton, O.

**KRAFT,** Ned O., engineer born in Belleville, Ill., Dec. 20, 1905; sales engineer, Aluminum Co. of America. Address: 1200 Ring Bldg., Washington, D. C.

**KROGER,** William, writer born in Washington, D. C., Oct. 24, 1913; assistant managing editor, *Aviation Week.* Address: McGraw-Hill Publishing Co., New York, N. Y.

**KUTER,** Laurence Sherman, Air Force officer born in Rockford, Ill., May 28, 1905; Major General (temporary). Address: Military Air Transport Service, Andrews Air Force Base, Washington, D. C.

**LAHM,** Frank P., Air Force officer, retired, born in Mansfield, O., Nov. 17, 1877; president, Early Birds. Address: 1737 N. Whitley Ave., Hollywood 28, Cal.

**LAIRD,** A. W., pneumatic and hydraulic control engineer born in Machias, N. Y., Mar. 30, 1900; assistant to president, The New York Air Brake Co. Address: 420 Lexington Ave., New York, N. Y.

**LAMBETH,** R. A., vice-president, treasurer, North American Aviation. Address: Municipal Airport, Los Angeles 45, Cal.*

**LaMOTTE,** Ralph R., engineer born in Dayton, O., Apr. 25, 1906; chief engineer, aeroproducts division, General Motors Corp. Address: 290 Springbrook Blvd., Dayton, O.

**LAND,** Emory Scott, Naval officer born Jan. 9, 1879; president, Air Transport Association of America. Address: 1107 16th St., N. W., Washington 6, D. C.

**LANDERS, Willard L.,** aviation executive born in Philadelphia, Pa., Feb. 12, 1913; assistant general manager, Fairchild Aircraft Div., Fairchild Engine & Airplane Corp. Address: 31 Greenfield Rd., Hagerstown, Md.

**LANDON, Truman Hempel,** Air Force officer born in Maryville, Mo., Feb. 11, 1905; Major General (temporary). Address: J.S.S.C., Pentagon, Washington 25, D. C.

**LANG, Chester Henry,** corporation official born in Erie, Pa., Jan. 12, 1893; vice-president, General Electric Co. Address: 1 River Rd., Schenectady 5, N. Y.

**LANGEWIESCHE, Wolfgang,** aviation writer born in Dusseldorf, Germany, Apr. 29, 1907; research pilot, Kollsman Instrument Division, Square D Co. Address: 77 E. 5th St., Huntington Sta., New York, N. Y.

**LANGSTAFF, Douglas O.,** business executive born in Castalian Springs, Miss., Aug. 14, 1894; executive director, City of New Orleans Aviation Board. Address: Moisant International Airport, Kenner, La.

**LARNED, Wharton E.,** pilot born in Detroit, Mich., Oct. 25, 1907; superintendent of flying, United Air Lines. Address: 2215 Dahlia St., Denver, Colo.

**LAUDAN, F. P.,** vice president, manufacturing, Boeing Airplane Co. Address: Box 3107, Seattle 14, Wash.*

**LAWLER, John A.,** aviation executive born in Indianapolis, Ind., June 28, 1901; president, Aeronca Aircraft Corp. Address: Middletown, O.

**LAWRENCE, Charles White,** Air Force officer born in Parkville, Mo., Mar. 28, 1901; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.*

**LEDERER, Jerome,** aeronautical engineer born in New York, N. Y., Sept. 26, 1902; director, Flight Safety Foundation; technical advisor, United States Aviation Underwriters. Address: 515 Madison Ave., New York, N. Y.

**LEDERER, L. G., Dr.,** medical director, Capital Airlines: president, Airlines Medical Directors. Address: National Airport, Washington 1, D. C.*

**LEE, Ben S.,** aviation writer born in Fort Worth, Tex., Sept. 9, 1915; associate editor, *Armed Force Magazine, Army and Navy Bulletin.* Address: 1833 Jefferson Pl., N.W., Washington, D. C.

**LEE, Joshua Bryan,** government official born in Childersburg, Ala., Jan. 23, 1892; member, Civil Aeronautics Board. Address: Commerce Bldg., Washington 25, D. C.

**LEE, Robert Merrill,** Air Force officer born in Hinsdale, N. H., Apr. 13, 1909; Major General (temporary). Address: Dept. of the Air Force, Washington 25, D. C.

**LEICHTER, Jerry,** free lance aviation writer born in New York, N. Y., Jan. 3, 1918. Address: 24-32 42nd St., Long Island City 3, N. Y.

**LeMAY, Curtis E.,** Air Force officer born in Ohio, Nov. 15, 1906; Lt. General. Address: Hq., Strategic Air Command, Offutt Air Force Base, Omaha, Nebr.

**LESTER, Everard Mason,** engineer born in Norwich, Conn., July 31, 1906; director of engineering, Ranger Aircraft Engines. Address: 70 Midland Ave., Huntington, N. Y.

**LEVERONE, Louis E.,** business executive born in Wakefield, Mass., Apr. 29, 1880; president, National Aeronautics Association; president, Automatic Canteen Co. of America. Address: 620 N. Lake Rd., Lake Forest, Ill.*

**LEWIS, John Miles,** air transport executive born in Michigan City, Ind., June 18, 1909; vice-president, operations, Monarch Air Lines. Address: Stapleton Airfield, Denver 7, Colo.

**LINDBERGH, Charles A.,** aviator born in Detroit, Mich., Feb. 4, 1902; aviation consultant, United Aircraft Corp. Address: Darien, Conn.

**LINDSAY, Richard Clark,** Air Force officer born in Minneapolis, Minn., Oct. 31, 1905; Major General (temporary). Address: Hq., U. S. Air Force, Washington 25, D. C.

**LIONEL, Daniel L.,** aviation editor, *The Brooklyn Eagle.* Address: 24 Johnson St., Brooklyn 1, N. Y.*

**LIPSCOMB, Willis Grandy,** business executive born in Petersburg, Va., Jan. 21, 1901; vice-president, traffic and sales, Pan American Airways. Address: 135 E. 42nd St., New York 17, N. Y.

**LITCH, Ernest Wheeler,** Naval officer born in Boston, Mass., Nov. 22, 1897; Rear Admiral; Chief, Naval Air Advanced Training Command. Address: U. S. Naval Air Station, Corpus Christi, Tex.

**LITCHFIELD, Paul W.,** corporation official born in Boston, Mass., July 26, 1875; president, Goodyear Aircraft Corp. Address: 1144 E. Market St., Akron, O.*

**LITTLEWOOD, William,** airlines executive born in New York, N. Y., Oct. 21, 1898; vice-president, engineering, American Airlines. Address: LaGuardia Field, N. Y.

**LITTRELL, Gaither,** public relations, Aircraft Industries Association. Address: 7660 Beverely Blvd., Los Angeles 36, Cal.*

**LOENING, Grover,** aircraft engineer born in U. S. Consulate, Bremen, Germany, Sept. 12, 1888; aeronautical consultant, National Advisory Committee for Aeronautics; board member, National Air Museum; director, Fairchild Engine and Airplane Corp.; chairman of the board and director, Roosevelt Field, Inc. Address: Shoreham Hotel, Washington, D. C.

**LOMBARDO, Thomas P.**, aeronautical engineer born in New York, N. Y., Jan. 17, 1922; chief engineer, Pioneer Air Lines. Address: 7221 Blue Ridge Dr., Houston, Tex.

**LONG, John Edward**, pilot born in Avert, Mo., Aug. 2, 1908; chief pilot, Flying Tiger Line. Address: 4652 Sepulveda Blvd., Sherman Oaks, Cal.

**LONG, William Francis**, aviation executive born in New Florence, Mo., Oct. 19, 1894; president and owner, Terrell Aviation School and Brady Aviation School. Address: 3414 Shorecrest Dr., Dallas, Tex.*

**LONNQUEST, Theodore Clayton**, Naval officer born in Lynn, Mass., Apr. 10, 1894; Rear Admiral. Address: Deputy Chief, Bureau of Aeronautics, Navy Dept., Washington 25, D. C.

**LOOMIS, Robert C.**, director, flight test and research, Consolidated Vultee Aircraft Corp. Address: San Diego 12, Cal.*

**LOVE, Robert M.**, airline executive born in Brooklyn, N. Y., Mar. 5, 1909; president and director, All American Airways. Address: 210 Greenhill Ave., Wilmington 99, Del.

**LOVELACE, William Randolph, II**, surgeon born in Springfield, Mo., Dec. 30, 1907; Colonel, Medical Reserve Surgical Staff and member, board of governors, Lovelace Clinic. Address: Lovelace Clinic, Albuquerque, N. M.

**LOVELL, Lawrence, Jr.**, inventor and engineer born in Port Henry, N. Y., Aug. 7, 1915; president, Reaction Motors, Inc. Address: 203 Diamond Spring Rd., Denville, N. J.

**LOWE, E. L.**, chief pilot, Florida Airways. Address: Municipal Airport, P. O. Box 591, Orlando, Fla.*

**LUETHI, C. F.**, system chief pilot, Northwest Airlines. Address: 1885 University Ave., St. Paul 1, Minn.*

**LUNDQUIST, W. G.**, engineer born in Wright County, Minn., Sept. 25, 1903; chief engineer, Wright Aeronautical Corp. Address: 32 Hollis Drive, Hohokus, N. J.

**LUX, Joe**, president, Empire Air Lines. Address: Gowman Field, Box 268, Boise, Idaho.*

**LYMAN, L. D.**, aviation executive born in Easthampton, Mass., Apr. 24, 1891; vice president, United Aircraft Corp. Address: 230 Park Ave., New York, N. Y.

**LYON, Edwin Bowman**, Air Force officer born in Las Cruces, N. M., Dec. 8, 1892; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.*

**McADAMS, Joseph Edward**, manufacturer born in Worthington, Ind., Nov. 11, 1880; president and treasurer, The Steel Products Engineering Co. Address: 1205 W. Columbia St., Springfield, O.

**McCABE, Emmett A.**, public relations and advertising counsel born in Erie, Pa., May 18, 1907; director of public relations, Consolidated Vultee Aircraft Corp. Address: San Diego, Cal.

**McCARRAN, Patrick A.**, U. S. Senator born in Reno, Nev., Aug. 8, 1876. Address: Senate Office Bldg., Washington, D. C.*

**McCARTHY, J. F.**, aviation executive born in Brooklyn, N. Y., Jan. 4, 1893; director, vice-president and treasurer, Curtiss-Wright Corp. Address: 30 Rockefeller Plaza, New York 20, N. Y.

**McCLARREN, Ralph H.**, engineer born in Pittsburgh, Pa., July 17, 1906; associate director, The Franklin Institute. Address: Philadelphia 3, Pa.

**McCLELLAND, Harold Mark**, Air Force officer born in Tiffin, Ia., Nov. 4, 1893; Major General. Address: Hq., U. S. Air Force, Washington 25, D. C.

**McCONNELL, Robert Perche**, Naval officer born in Oakland, Calif., July 8, 1895; Rear Admiral. Address: Navy Dept., Washington 25. D. C.*

**McDONALD, George Clement**, Air Force officer born in Philadelphia, Pa., Apr. 27, 1892; Major General (temporary). Address: Hq., U. S. Air Force, Washington 25, D. C.

**McDONNELL, James S., Jr.**, aviation executive born in Denver, Colo., Apr. 9, 1899; president, McDonnell Aircraft Corp. Address: P. O. Box 516, St. Louis 3, Mo.

**McINTYRE, James Dennett**, Air Force officer born in West Point, N. Y., Apr. 9, 1893; Major General (retired). Address: War Dept., Washington 25, D. C.

**McKAUGHAN, R. Earl**, air transport executive born in Lawton, Okla., June 26, 1909; president, Trans-Texas Airways. Address: 2112 Commerce Bldg., Houston, Tex.

**McKEE, William Fulton**, Air Force officer born in Chilhowie, Va., Oct. 17, 1906; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.

**McKNIGHT, Phil**, public relations and advertising counsel born in Humboldt, Kans., Jan. 6, 1911; public relations director, Beech Aircraft Corp. Address: Wichita, Kans.

**McLARREN, Robert**, engineering writer born in Fort Worth, Tex., Mar. 7, 1918; engineering editor, *Aviation Week*. Address: Kirk Hill Farm, R. F. D. 2, Germantown, Md.

**McMAHON, Frederick William**, Naval officer born in New Haven, Conn., Feb. 23, 1898; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

**McMULLEN, Clements**, Air Force officer born in Largo, Fla., Feb. 5, 1892; Major General (permanent). Address: War Dept., Washington 25, D. C.

McNARNEY, Joseph T., Air Force officer born in Emporium, Pa., Aug. 28, 1893; General (temporary). Address: Office Secretary of Defense, Washington 25, D. C.

McNARY, J. William, engineer born in Harrisburg, Pa., Oct. 13, 1914; assistant chief engineer, Piper Aircraft Corp. Address: Lock Haven, Pa.

McNAUGHTON, Kenneth Perry, Air Force officer born in Alto, Mich., June 18, 1903; Major General (temporary). Address: Hq., U. S. Air Force, Washington 25, D. C.

McQUISTON, Irving Matthew, Naval officer born in Waltham, Mass., June 27, 1895; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

McSURELY, Alexander, aviation writer born in Hillsboro, O., July 14, 1908; associate editor, *Aviation Week*. Address: 4626 N. Carlyn Spring Rd., Arlington, Va.

MacCRACKEN, William P., Jr., lawyer born in Chicago, Ill., Sept. 17, 1888; chairman, Joint Aviation Users' Conference, National Aeronautics Association. Address: 2933 Benton Pl., N. W., Washington, D. C.*

MAGILL, Gilbert W., president and treasurer, Rotor-Craft Corp. Address: 1204 Airway Dr., Grand Central Airport, Glendale 1, Cal.*

MAGIN, Francis W., manufacturer born in Chicago, Ill., Apr. 15, 1883; president, Square D Co. Address: 6060 Rivard St., Detroit 11, Mich.*

MAHARRY, William A., public relations counsel born in Zanesville, O., Apr. 12, 1911; public relations manager, airplane division, Curtiss-Wright Corp. Address: 2490 Bexford Pl., Columbus 9, O.

MAJNERI, Ludwig A., mechanical engineer born in Salzburg, Austria, Feb. 9, 1900; hydraulic development work. Address: 781 Washington Rd., Grosse Pointe 30, Mich.

MALKIN, Richard, author and journalist born in New York, N. Y., Jan. 27, 1913; managing editor, *Air Transportation*. Address: 67-61 223rd Place, Bayside, N. Y.

MANSFIELD, Harold, public relations counsel born in White Salmon, Wash., Apr. 18, 1912; director of public relations and advertising, Boeing Airplane Co. Address: 1611 S. W. 170th St., Seattle, Wash.

MARA, William A., public relations counsel born in St. Louis, Mo., Sept. 29, 1895; director of advertising and publicity, Bendix Aviation Corp.; general manager, television and broadcast receiver division, Bendix Radio Division. Address: 23828 Rockford Dr., Dearborn, Mich.

MARCHANT, Guy O., president, Central Airlines. Address: P. O. Box 5163, Farley Station, Oklahoma City, Okla.*

MARCUS, Charles, vice-president, engineering, Bendix Aviation Corp. Address: Fisher Bldg., Detroit 2, Mich.*

MARQUARDT, Roy E., aeronautical engineer born in Burlington, Iowa, Dec. 24, 1917; president, Marquardt Aircraft Co. Address: 7801 Hayvenhurst Ave., Van Nuys, Cal.

MARRIOTT, Joseph S., aviation executive born in Modesto, Cal., July 5, 1895; regional administrator, Civil Aeronautics Administration. Address: 6132 Citrus Ave., Los Angeles 43, Cal.

MARTIN, Erle, aeronautical engineer born in Tullahoma, Tenn., July 24, 1907; general manager, Hamilton Standard Division, United Aircraft Corp. Address: 364 Main St., E. Hartford 8, Conn.

MARTIN, Glenn L., airplane manufacturer born in Macksburg, Ia., Jan. 17, 1886; chairman of the board, Glenn L. Martin Co. Address: Baltimore 3, Md.

MARTIN, Harold Montgomery, Naval officer born in Bay Mills, Mich., Jan. 18, 1896; Rear Admiral. Address: Chief of Naval Air Technical Training, NAS, Memphis, Tenn.

MASON, Dale G., aviation executive born in Winona, Minn., June 7, 1917; vice-president, operations, Roscoe Turner Aero. Corp. Address: 2325 E. 66th St., Indianapolis, Ind.

MASTERSON, Norman, director of public relations and advertising, All American Aircraft, Inc. Address: 3700 E. Carson St., Long Beach 8, Cal.*

MAURO, Ben J., business administrator born in Sewickley, Pa., 1918; chairman of the board and president, Taylorcraft, Inc. Address: 719 Harbaugh St., Sewickley, Pa.

MAXFIELD, William T., engineer born in Salt Lake City, Utah, May 27, 1900; director of maintenance and engineering, Braniff International Airways. Address: 4538 University, Dallas, Tex.

MEACHAM, Holland E., lawyer born in Clinton, Okla., Mar. 25, 1916; personnel director, Slick Airways. Address: 1931 W. Magnolia St., San Antonio, Tex.

MEREWETHER, Arthur F., meteorologist born in East Providence, R. I., July 7, 1902; superintendent of meteorology, American Airlines. Address: LaGuardia Field, N. Y.

MESKER, D. L., superintendent of flying, Transcontinental and Western Air, Inc. Address: 10 Richards Rd., Kansas City 6, Mo.*

MESSENGER, George M., airline executive born in St. Paul, Minn., July 2, 1912; vice-president, Pacific Overseas Airlines. Address: 603 South Lark Ellen, West Covina, Cal.

MEYERS, Allen H., aircraft manufacturer born in Allenhurst, N. J., Sept. 4, 1908; president and chief engineer, Meyers Aircraft Co. Address: Tecumseh, Mich.

MICKEL, Merlin H., writer born in Cedar Rapids, Ia., Aug. 25, 1903; managing editor, *Aviation Week*. Address: 313 Park St., Westfield, N. J.

MILES, Arthur Clark, Naval officer born in Denver, Colo., Mar. 9, 1893; Vice Admiral. Address: Navy Dept., Washington 25, D. C.*

MILES, Marvin G., newspaperman born in Los Angeles, Cal., May 22, 1911; aviation editor, *Los Angeles Times*. Address: 202 W. 1st St., Los Angeles, Cal.

MILLAR, Richard William, aviation executive born in Denver, Colo., Jan. 8, 1899; director, Northrop Aircraft, Inc. Address: Hawthorne, Cal.

MILLER, David L., airline executive born in Johnston, Pa., Mar. 24, 1904; director, traffic and sales, All American Airways. Address: 1015 10th St., New Alexandria, Va.

MILLER, James Wescott, airline executive born in Washington, D. C., May 3, 1893; president, Mid-Continent Airlines. Address: Waltower Bldg., 102 E. 9th St., Kansas City 6, Mo.

MILLER, Thomas Marshall, lawyer born in Mineral Wells, Tex., Oct. 19, 1910; general traffic and sales manager, Chicago and Southern Air Lines. Address: Whitehaven, Tenn.

MILLER, W. H., assistant vice-president, operations and operations manager, American Airlines. Address: 100 E. 42nd St., New York 17, N. Y.*

MINGOS, Howard, free lance writer born in Athens, Pa., Apr. 24, 1891; author and executive. Address: 299 W. 12th St., New York 4, N. Y.

MITMAN, Carl W., government official born in Newburg, Pa., Apr. 27, 1889; assistant to the secretary for the National Air Museum, Smithsonian Institution. Address: 3738 North 4th St., Arlington, Va.*

MOCKLER, Don Ryan, public relations counsel born in St. Louis, Mo., Sept. 15, 1903; public relations executive, Personal Aircraft Council, Aircraft Industries Association. Address: 809 Carroll Ave., Takoma Park, Md.

MOEBUS, Lucian Angel, Naval officer born in Van Wert, O., Jan. 28, 1900; Rear Admiral. Address: Navy Dept. Washington 25, D. C.

MOGENSEN, W. A., certified public accountant born in Racine, Wis., July 11, 1897; vice-president and treasurer, AVCO Manufacturing Corp. Address: 530 Park Ave., New York, N. Y.

MONROE, Max M., business executive born in Lebanon, O., Dec. 8, 1892; general manager aeroproducts division, General Motors Corp. Address: Dayton, O.

MONTAGU, Ralph T. D., aeronautical engineer born in Buffalo, N. Y., Aug. 28, 1916; president and general manager, Sentinel Aircraft, Inc. Address: Box 547, Ann Arbor, Mich.

MONTGOMERY, Alfred Eugene, Naval officer born in Omaha, Neb., June 12, 1891; Rear Admiral. Address: Seattle, Wash.

MOONEY, Albert S., Jr., airline pilot born in Billings, Mont., June 23, 1900; regional chief pilot, Western Air Lines. Address: 1123 Alpine Dr., Salt Lake City, Utah.

MOONEY, Al W., president, Mooney Aircraft Inc. Address: Wichita, Kans.*

MOORE, William S., government official born in Fort Worth, Tex., Nov. 21, 1896; chief, Airman Division, Civil Aeronautics Administration. Address: Commerce Bldg., Washington 25, D. C.

MORELAND, William Robert, public relations counsel born in Alexandria, Ind., July 22, 1911; president, Moreland, Amick & Black. Address: 3521 North Knoll Dr., Hollywood 28, Cal.

MORGAN, David William Rosen, engineer-executive born in Martins Ferry, O., Sept. 16, 1892; vice-president in charge of South Philadelphia works, steam division and aviation gas turbine division, Westinghouse Electric Corp. Address: Lester Branch P. O., Philadelphia 13, Pa.

MORGAN, Thomas Alfred, aviation executive born in Vance County, N. C., Sept. 27, 1887; president and chairman of the board, Sperry Corp. Address: 30 Rockefeller Plaza, New York 20, N. Y.

MOSELEY, C. C., aviation executive born in Boise, Ida., July 21, 1894; president, Grand Central Airport Co. and Cal-Aero Technical Institute. Address: 1310 Air Way, Glendale 1, Cal.

MOSER, Nick, newspaperman born in Leesport, Pa., July 9, 1915; aviation writer, *Reading Eagle*. Address: 30 North Fourth St., Reading, Pa.

MOUNTSIER, Robert, writer born in Bellevernon, Pa.; aviation editor, *The New York Sun*. Address: New York 15, N. Y.

MOWRER, David A., aeronautical engineer born in Paris, France, Dec. 5, 1912; chief service engineer, Boeing Airplane Co. Address: Seattle, Wash.

MULLIN, Sam S., lawyer born in Syracuse, N. Y., Nov. 28, 1914; president and director, Cleveland Pneumatic Tool Co. Address: RD 3, Shaker Blvd., Chagrin Falls, O.

MURRAY, George Dominic, Naval officer born in Boston, Mass., July 6, 1889; Vice Admiral. Address: 3402 Q St., N. W., Washington, D. C.

MURRAY, J. Lawrence, aviation writer, *Schenectady Gazette*. Address: 322 State St., Schenectady, N. Y.*

MYERS, Charles T., Air Force officer born in Mannington, W. Va., Feb. 10, 1900; Major General (permanent). Address: Vice Commander, Continental Air Command, Mitchel AFB, N. Y.

NEELY, Frederick R., free lance aviation writer. Address: 104 W. Bellefonte Ave., Alexandria, Va.*

NELSON, H. O., president, Arizona Airways. Address: 237 Adams Hotel Bldg., Phoenix, Ariz.*

NELSON, Henry P., manufacturer born in Norway, Sept. 7, 1907; president, Menasco Manufacturing Co. Address: 805 So. San Fernando Blvd., Burbank, Cal.

NEPRUD, Robert E., editor, *Air Force Times*. Address: 1115 18th St., N. W., Washington 6, D. C.*

NEUMANN, Ray, public relations director, Slick Airways. Address: Municipal Airport, P. O. Box 656B, San Antonio, Tex.*

NEVILLE, Leslie E., aviation executive born in New York, N. Y., July 9, 1902; assistant to senior vice president, Curtiss-Wright Corp. Address: 1261 Princeton Rd., West Englewood, N. J.

NEWILL, E. B., general manager, Allison Division, General Motors Corp. Address: Speedway, Indianapolis, Ind.*

NICHOLSON, Charles A., Naval officer born in Utica, N. Y., Apr. 15, 1895; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

NICKERSON, H. W., maintenance executive born in Bethaney, Mo., Oct. 28, 1911; superintendent of maintenance, Piedmont Airlines. Address: 228 Lockland Ave., Winston-Salem, N. C.

NIEDELMAN, Samuel, aeronautical engineer born in Warsaw, Poland, Dec. 6, 1904; president, Aviquipo. Inc. Address: 25 Beaver St., New York, N. Y.

NOETZEL, Ray E., aviation maintenance executive born in Milwaukee, Wis., Mar. 9, 1918; superintendent of maintenance, Wisconsin Central Airlines. Address: Madison, Wis.

NORDLINGER, S. G., aeronautical engineer born in Washington, D. C., Oct. 15, 1909; director of sales, Ranger Aircraft Engines Division, Fairchild Engine and Airplane Corp. Address: Farmingdale, L. I., N. Y.

NORRIS, John, aviation writer, *Washington Post*. Address: 1337 E St., N. W., Washington 4, D.C.*

NORSTAD, Lauris, Air Force officer born in Minneapolis, Minn., Mar. 24, 1907; Lieutenant General (temporary). Address: Hq., U. S. Air Force, Washington 25, D. C.

NORTHROP, John Knudsen, aeronautical engineer born in Newark, N. J., Nov. 10, 1895; president, Northrop Aircraft, Inc. Address: Hawthorne, Cal.

NOWLAND, Bob Edward, Air Force officer born in Peoria, Ill., Mar. 10, 1891; Major General (permanent). Address: U. S. Air Force, Washington 25, D. C.

NOYES, Blanche, flier and executive born in Cleveland, O., June 23, 1900; chief, air route marking branch, aviation extension division, office of aviation development, Civil Aeronautics Administration. Address: 2120 16th St., N. W., Washington, D. C.

NUGENT, Richard Emmel, Air Force officer born in Altoona, Pa., Dec. 12, 1902; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.

NUTT, Arthur, mechanical engineer born in New Rochelle, N. Y., Feb. 6, 1895; aircraft engineering and manager, Packard Motor Car Co. Address: 1330 Laskey Road, Box 85, Toledo, O.*

OAKLEY, Bert T., corporation executive born in Castle Gate, Utah, July 15, 1915; secretary, Sperry Corp. Address: 30 Rockefeller Plaza, New York 20, N. Y.

O'BRIEN, J. L., director of personnel, Northeast Airlines. Address: Logan International Airport, 239 Prescott St., E. Boston 28, Mass.*

O'CONNELL, Joseph J., Jr., lawyer born in Saranac Lake, N. Y., Nov. 8, 1905; chairman, Civil Aeronautics Board. Address: 9506 St. Andrews Way, Silver Spring, Md.

ODLUM, Floyd B., finance and investments executive born in Union City, Mich., Mar. 30, 1892; president, Atlas Corp. and chairman of the board, Consolidated Vultee Aircraft Corp. Address: 33 Pine St., New York 5, N. Y.

O'DONNELL, Emmett, Jr., Air Force officer born in Brooklyn, N. Y., Sept. 15, 1906; Major General (temporary). Address: CG, 15th Air Force, Colo. Springs, Colo.

OERTEL, Robb C., aviation executive born in Washington, D. C., Mar. 31, 1898; manager, Marketing Aviation, Esso Standard Oil Co. Address: 15 W. 51st St., New York, N. Y.

OFSTIE, Ralph Andrew, Naval officer born in Eau Claire, Wis., Nov. 16, 1897; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

OGDEN, D. G., chief pilot, American Airlines. Address: 100 E. 42nd St., New York 17, N. Y.*

O'KEEFE, Daniel M., meteorologist born in Southington, Conn., Sept. 8, 1914; chief meteorologist, Capital Airlines. Address: 1305 South Taylor St., Arlington, Va.

OLD, William Donald, Air Force officer born in Uvalde, Tex., Nov. 21, 1901; Major General (permanent). Address: Air Adjutant General, Washington 25, D. C.

OLSON, Harold E., aviation executive born in Goldfield, Nev., Dec. 28, 1915; factory service manager, Wichita Division, Boeing Airplane Co. Address: 3434 Orchard St., Wichita, Kans.

ORTHWEIN, William Robert, Jr., aviation executive born in St. Louis, Mo., Feb. 12, 1917; manager, personnel division, McDonnell Aircraft Corp. Address: P. O. Box 516, St. Louis 3, Mo.

OSBORN, Robert R., aeronautical engineer born in Philadelphia, Pa., Nov. 19, 1900; chief engineer, McDonnell Aircraft Corp., Lambert-St. Louis Municipal Airport. Address: Box 516, St. Louis 3, Mo.

**PAINE, John A.**, aviation consultant born in Denver, Colo., Jan. 13, 1914; facilitation officer, International Air Transport Association. Address: 4870 Cote des Neiges Road, Montreal, Canada.

**PARKER, J. Brooks B.**, aviation and general insurance underwriter born in Philadelphia, Pa.; senior partner, Parker and Co. Address: 1616 Walnut St., Philadelphia 3, Pa.

**PARKS, Oliver Lafayette**, airline executive born in Minonk, Ill., June 10, 1899; president, Parks Air Lines, Inc.: founder and president, Parks Aircraft Sales and Service, Inc.; founder, Parks College of Aeronautical Technology. Address: Parks Metropolitan Airport, E. St. Louis, Ill.

**PARRISH, Wayne W.**, editor and publisher born in Decatur, Ill., May 2, 1907; editor and publisher, American Aviation Publications. Address: 1025 Vermont Ave., N. W., Washington 5, D. C.

**PARTRIDGE, Earle Everard**, Air Force officer born in Winchendon, Mass., July 7, 1900; Major General (permanent). Address: CG, Hq, 5th Air Force, APO 710, c/o PM, San Francisco, Cal.

**PATTERSON, William Allan**, air transport executive born in Honolulu, T. H., Oct. 1, 1899; president, United Air Lines. Address: 5959 S. Cicero Ave., Clearing Sta., Chicago 38, Ill.

**PAYNE, John C.**, business executive born June 24, 1883; director, Airport Service, Aircraft Industries Association. Address: 610 Shoreham Bldg., Washington, D. C.

**PEACH, Robert E.**, airline executive born in Syracuse, N. Y., Mar. 9, 1920; executive vice president and general manager, Robinson Airlines. Address: 204 Hook Place, Ithaca, N. Y.

**PEALE, Mundy I.**, aviation executive born in Joliet, Ill., June 15, 1906; president and general manager, Republic Aviation Corp. Address: 40 Chestnut St., Garden City, L. I., N. Y.

**PEARSON, Chester Charles**, aircraft executive born in El Monte, Cal., July 15, 1906; president and general manager, The Glenn L. Martin Co. Address: Darlington, Md.

**PEDLER, James S.**, business executive born in Muskegon, Mich., Oct. 24, 1891; sales manager, aeronautical division, B. F. Goodrich Co. Address: 563 Delaware Ave., Akron, O.

**PELLETIER, George E.**, journalist born in Lowell, Mass., Aug. 28, 1900; special assistant to Secretary of the Navy. Address: 3400 39th St., N. W., Washington, D. C.

**PELOQUIN, Alfred L.**, newspaperman born in Bay City, Mich., Sept. 3, 1921; aviation editor, City Hall Reporter. Address: 1021 N. Lincoln Ave., Bay City, Mich.

**PERKINSON, William J.**, aviation reporter, *The Baltimore Sun*. Address: Balto. & Charles Sts., Baltimore 3, Md.*

**PERRY, Hugh R.**, business executive born in Bridgeton, N. J., Dec. 15, 1890; vice-president and general manager, WACO Aircraft Co. Address: 820 W. Race St., Troy, O.

**PERRY, John**, Naval officer born in Greenville, S. C., July 29, 1897; Rear Admiral. Address: Navy Dept., Washington, D. C.

**PETERSON, C. Gilbert**, mechanical engineer born in Buffalo, N. Y.; chief engineer, Railway Express Agency. Address: 230 Park Ave., New York, N. Y.

**PETERSON, Ivar C.**, aeronautical engineer born July 11, 1915; director, Technical Service, Aircraft Industries Association. Address: 610 Shoreham Bldg., Washington, D. C.

**PHELAN, Arthur James**, engineer born in Manchester, England, Jan. 9, 1903; vice-president and chief engineer, The Turbodyne Corp. Address: 621 Via de la Paz, Pacific Palisades, Cal.

**PHELPS, Glenn**, architect born in Lutesville, Mo., July 3, 1894; national president, Caterpillar Club. Address: 101 Park Ave., New York, N. Y.

**PHILLIPS, Joseph Alan**, aeronautical engineer born in Lynchburg, Va., June 6, 1909; president and chief engineer, Allied Aircraft Co. Address: 2828 E. Harry, Wichita, Kans.

**PHILLIPS, Rufus C., Jr.**, president, Airways Engineering Corp. Address: 1212 18th St., N. W., Washington, D. C.

**PIASECKI, Frank N.**, aeronautical engineer born in Philadelphia, Pa., Oct. 24, 1919; president, Piasecki Helicopter Corp.; member, NACA subcommittee on helicopters. Address: 147 S. Lansdowne Ave., Lansdowne, Pa.

**PIERSOL, N.**, public relations counsel, Pacific Overseas Airlines. Address: Ontario, Cal.*

**PIERSON, Warren Lee**, banker and lawyer born in Princeton, Minn., Aug. 29, 1896; chairman of the board, Transcontinental and Western Air; and director, Air Transport Association of America. Address: 630 Fifth Ave., New York 4, N. Y.

**PIKE, Howard K.**, aeronautical engineer born in Goshen, N. H., 1916; chief engineer, National Airlines. Address: 3240 N. W. 27th Ave., Miami, Fla.

**PIPER, Thomas Edward**, aeronautical engineer born in Chicago, Ill., Feb. 26, 1907; chief materials and process engineer, Northrop Aircraft, Inc. Address: Hawthorne, Cal.

**PIPER, William Thomas**, airplane manufacturer born in Knapps Creek, N. Y., Jan. 8, 1881, president and treasurer, Piper Aircraft Corp. Address: Lock Haven, Pa.

**PITCAIRN, Harold Frederick**, manufacturer born in Bryn Athyn, Pa., June 20, 1897; president, Autogiro Co. of America. Address: 1616 Walnut St., Philadelphia 3, Pa.

**PLATT, Ralph G.**, aviation writer born in Cleveland, O., Sept. 25, 1907; aviation editor, *Cleveland News*. Address: 2 Coveland Dr., Avon Lake, O.

PLETT, Walter P., government official born in Boston, Mass., Sept. 26, 1906; regional administrator, eighth region, Civil Aeronautics Administration. Address: Anchorage, Alaska.

PLUMLEY, Charles Albert, U. S. Congressman born in Northfield, Vt., Apr. 14, 1875; member, Appropriations Committee. Address: 402 House Office Bldg., Washington, D. C.

POGUE, Lloyd Welch, lawyer born in Grant, Ia., Oct. 21, 1899; member, Pogue and Neal law firm and chairman, Committee on Aeronautical Law of the American Bar Association. Address: 730 Southern Bldg., Washington 5, D. C.

POWER, Thomas Sarsfield, Air Force officer born in New York, N. Y., June 18, 1905; Major General (temporary). Address: Hq., U. S. Air Force, Washington 25, D. C.

POWERS, Edward Michael, Air Force officer born in LeRoy, Ill., Sept. 4, 1892; Major General (permanent). Address: U. S. Air Force, Washington 25, D. C.*

POWNALL, Charles Alan, Naval officer born in Atglen, Pa., Oct. 4, 1887; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

PRESCOTT, Robert W., airline executive born in Fort Worth, Tex., May 5, 1913; president, Flying Tiger Line. Address: Lockheed Air Terminal, Burbank, Cal.

PREWITT, Richard H., aviation executive born in Lexington, Ky., Jan. 22, 1901; president, Prewitt Aircraft Co. Address: Wallingford, Pa.

PRICE, John Dale, Naval officer born in Augusta, Ark., May 18, 1892; Vice Admiral; Vice Chief of Naval Operations. Address: National Defense Bldg., Washington 25, D. C.

PRICE, Wesley, writer born in Albany, N. Y., Mar. 6, 1904; associate editor (aviation), *Saturday Evening Post.* Address: R. D. No. 2, Doylestown, Pa.

PRIDE, Alfred Melville, Naval officer born in Somerville, Mass., Sept. 10, 1897; Rear Admiral; Chief of Bureau of Aeronautics. Address: Navy Bldg., Washington 25, D. C.

PRIESTER, A. A., vice-president and chief engineer, Pan American World Airways System. Address: 135 E. 42nd St., New York 17, N. Y.*

PRILL, George C., aeronautical engineer born in New York, N. Y., May 16, 1920; assistant secretary of technical committee, International Air Transport Association. Address: 4855 Cote St. Luc., Montreal, Canada.

PRINCE, Albert I., aviation writer, *The Hartford Times.* Address: Hartford 1, Conn.*

PRUDDEN, Earl D., aviation executive born in Duluth, Minn., Apr. 6, 1895; vice president, Ryan Aeronautical Co. Address: 1301 W. Sassafras St., San Diego, Cal.

PRYOR, Samuel Frazier, Jr., airline executive born in Ferguson, Mo., Mar. 1, 1898; vice president and assistant to the president, Pan American World Airways System. Address: 135 E. 42nd St., New York 17, N. Y.

PUFFER, Samuel R., engineer born in Troy, Vt., Feb. 18, 1896; assistant manager of engineering, Aircraft Gas Turbine Division, General Electric Co. Address: 920 Western Ave., West Lynn, Mass.

PURCELL, Jack, public relations counsel born in New York, N. Y., Dec. 28, 1911; manager, System News Bureau, Capital Airlines. Address: 4409 Four Mile Run, Arlington, Va.

PUTNAM, Carleton, airline executive born in New York, N. Y., Dec. 19, 1901; chairman of the board, Chicago and Southern Air Lines. Address: 2740 32nd St., N. W., Washington 8, D. C.

PUTT, Donald L., Air Force officer born in Sugarcreek, O., May 14, 1905; Brigadier General; director, research and development, U. S. Air Force. Address: U. S. Air Force, Washington 25, D. C.

QUESADA, Elwood Richard, Air Force officer born in Washington, D. C., Apr. 13, 1904; Lieutenant General (temporary). Address: Hq., U. S. Air Force, Washington 25, D. C.

RADFORD, Arthur William, Naval officer born in Chicago, Ill., Feb. 24, 1896; Admiral. Address: Commander in Chief Pacific and U. S. Pacific Fleet, c/o F.P.O., San Francisco, Cal.

RAMEY, Roger Maxwell, Air Force officer born in Emblem, Tex., Sept. 9, 1905; Major General (temporary). Address: Hq., 8th Air Force. Fort Worth, Tex.

RAMSEY, DeWitt Clinton, retired naval officer born in Whipple Barracks, Ariz., Oct. 2, 1888; president and general manager, Aircraft Industries Association of America. Address: 3661 Upton St., N. W., Washington 8, D. C.

RAMSPECK, Robert, business executive born in Decatur, Ga., Sept. 5, 1890; executive vice-president, Air Transport Association of America. Address: 1107 16th St., N. W., Washington 6, D. C.

RAWLINGS, Edwin William, Air Force officer born in Milroy, Minn., Sept. 11, 1904; Lieutenant General (temporary). Address: Hq., U. S. Air Force, Washington 25, D. C.

RAY, James Garrett, airline consultant born in Floresville, Tex., Oct. 27, 1896; partner, Ray and Ray. Address: 1507 M St., N. W., Washington, D. C.

RAYMOND, Arthur Emmons, aircraft executive born in Boston, Mass., Mar. 24, 1899; vice-president, engineering, Douglas Aircraft Co. Address: 3000 Ocean Park Blvd., Santa Monica, Cal.

RAYMOND, William T., lawyer born in New York, N. Y., Nov. 3, 1912; director, governmental affairs, Air Transport Association of America. Address: 1107 16th St., N. W., Washington 6, D. C.

**READ,** Mrs. Leland B., national president, Women's National Aeronautical Association of the U. S. Address: 3722 Melba Place, St. Louis 20, Mo.*

**REEDER,** Paul E., airline executive born in Columbus, Ind., Apr. 6, 1906; manager, area flight operations, Honolulu division, United Air Lines. Address: 783 W. Greenwich Place, Palo Alto, Cal.

**REES,** William Lehigh, Naval officer born in Louisville, Ky., Nov. 18, 1900; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

**REESE,** Clarence J., aviation executive born in Muncie, Ind., Aug. 25, 1900; president, Continental Aviation & Engineering Corp. Address: Muskegon, Mich.

**REEVES,** Erwin J., president, The Soaring Society of America, Inc. Address: 228 Boston Post Rd., Weston 93, Mass.*

**REEVES,** John Walter, Naval officer born in Haddonfield, N. J., Apr. 25, 1888; Vice Admiral. Address: 200 H Ave., Coronado, Cal.*

**REGAN,** Herbert Ed, Naval officer born in Carson City, Nev., Apr. 8, 1900; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

**REICHELDERFER,** Francis Wilton, government official born in Harlan, Ind., Aug. 6, 1895; Chief of U. S. Weather Bureau. Address: Weather Bureau, Washington, D. C.

**REID,** Henry John Edward, aeronautical engineer born in Springfield, Mass., Aug. 20, 1895; director, Langley Aeronautical Laboratory. Address: Langley Field, Va.

**REINEY,** Virginia, journalist born in Port Arthur, Tex., Jan. 22, 1922; aviation editor, *Beaumont Journal.* Address: 3924 Procter St., Port Arthur, Tex.

**REINKE,** James E., meteorologist and aircraft dispatcher born in Jefferson, Wis., Apr. 18, 1917; superintendent of flight, Colonial Airlines. Address: LaGuardia Field, N. Y.

**RENSTROM,** Arthur George, aeronautical librarian born in Willmar, Minn., Oct. 30, 1905; assistant chief, aeronautics division, Library of Congress. Address: Washington 25, D. C.

**RENTSCHLER,** Frederick Brant, aircraft manufacturer born in Hamilton, O., Nov. 8, 1887; chairman, United Aircraft Corp. Address: 400 So. Main St., E. Hartford 8, Conn.

**RENTZEL,** D. W., administrator, Civil Aeronautics Administration. Address: Commerce Bldg., Washington 25, D. C.*

**RHEINSTROM,** Charles A., advertising executive born in Philadelphia, Pa., Jan. 10, 1902; senior vice-president, Erwin, Wasey & Co. Address: 420 Lexington Ave., New York, N. Y.

**RICE,** George K., superintendent, flying, Transcontinental & Western Air, Inc. Address: Los Angeles Airport, 5700 Avion Dr., Los Angeles 45, Cal.*

**RICE,** R. H., vice-president and chief engineer, North American Aviation, Inc. Address: Municipal Airport, Los Angeles 45, Cal.*

**RICHARDSON,** William Lloyd, Air Force officer born in Saginaw, Mich., Dec. 14, 1901; Brigadier General. Address: c/o Adjutant General, U. S. Air Force, Washington 25, D. C.

**RICHMOND,** William F., airline pilot born in Winthrop, Minn., Oct. 18, 1909; system chief pilot, Northwest Airlines. Address: 5428 Park Ave., Minneapolis, Minn.

**RICKENBACKER,** Edward Vernon, airline executive born in Columbus, O., Oct. 8, 1890; president and general manager, Eastern Air Lines. Address: 10 Rockefeller Plaza, New York 20, N. Y.

**RICKLEFS,** James S., corporation executive born in Monticello, Ia., Mar. 9, 1914; president, Rick Helicopters, Inc. Address: 25 Berkeley Sq., Los Angeles 7, Cal.

**RILEY,** Arthur A., newspaperman born in Boston, Mass., Apr. 7, 1894; aviation editor, *Boston Globe;* vice-president, International Aviation Writers Association. Address: Boston, Mass.

**ROBBINS,** Thomas Hinckley, Naval officer born in Paris, France, May 11, 1900; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

**ROBERTS,** Carlene, assistant vice-president, American Airlines. Address: 100 E. 42nd St., New York 17, N. Y.*

**ROBERTSON,** Keith E., sales manager, All American Aircraft, Inc. Address: 3700 E. Carson St., Long Beach 8, Cal.*

**ROBERTSON,** William M., government official born in DeSoto, Mo., Jan. 25, 1897; regional administrator, second region, Civil Aeronautics Administration. Address: 3594 Kingsboro Rd., N. E., Atlanta, Ga.

**ROBINSON,** Frederick F., corporation executive born in Watertown, N. Y., Oct. 21, 1904; president, National Aviation Corp. Address: 184 East End Ave., New York, N. Y.

**ROCHLEN,** Ava Michael, public relations counsel born in Crimea, June 16, 1891; director of public relations, Douglas Aircraft Co. Address: 3000 Ocean Park Blvd., Santa Monica, Cal.

**RODEY,** Pearce Coddington, lawyer born in Albuquerque, N. M., Nov. 8, 1889; member, Rodey, Dickason and Sloan; counsel, 1st Nat'l Bank. Address: 1st Nat'l Bank Bldg., Albuquerque, N. M.

**RODGERS,** George C., engineer-lawyer born in Glady, W. Va., May 6, 1907; manager electronic and rocket departments, Curtiss-Wright Corp., Propeller Division. Address: 91 Beverly Rd., Montclair, N. J.

**ROIG,** Harold Joseph, airline official born in Poughkeepsie, N. Y., July 7, 1885; director, Pan American-Grace Airways. Address: 7 Hanover Sq., New York, N. Y.

ROSE, Donald Frank, journalist and lecturer born in Street, Somerset, England, June 29, 1890; columnist, *The Evening Bulletin* (Philadelphia). Address: Filbert and Juniper Sts., Philadelphia 5, Pa.

ROSEN, George, aeronautical engineer born in Boston, Mass., Oct. 29, 1914; chief aerodynamicist, Hamilton Standard Division, United Aircraft Corp. Address: 14 Gerard St., Manchester, Conn.

ROSS, Orrin E., engineer born in Chicago, Ill., 1895; president, Ross Aircraft Corp. Address: 420 Lexington Ave., New York 17, N. Y.

ROTH, C. F. B., president and general manager, Aircooled Motors, Inc. Address: Liverpool Rd., Syracuse 8, N. Y.*

ROUGH, Howard F., government official born in St. Joseph, Mo., Jan. 31, 1891; assistant to the administrator, Civil Aeronautics Administration. Address: Commerce Bldg., Washington 25, D. C.

ROYCE, Donald, Naval officer born in Marquette, Mich., Apr. 2, 1892; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

RUSSELL, Fred, managing editor, *Western Flying*. Address: 4328 Sunset Blvd., Los Angeles 27, Cal.

RYAN, Edward J., public relations counsel born in Coshocton, O., Nov. 1, 1907; director of public relations, North American Aviation. Address: Los Angeles Airport, Los Angeles 45, Cal.

RYAN, Oswald, lawyer born in Anderson, Ind., Apr. 11, 1888; vice-chairman, Civil Aeronautics Board. Address: Commerce Bldg., Washington 25, D. C.

RYAN, R. O., aviation executive born in Columbia, Mo., 1913; division manager, Consolidated Vultee Aircraft Corp. Address: Fort Worth, Tex.

RYAN, T. Claude, airplane manufacturer born in Parsons, Kans., Jan. 3, 1898; president and general manager, The Ryan Aeronautical Co. Address: Lindbergh Field, San Diego, Cal.

RYDER, Edmund L., airline executive born in Seattle, Wash., May 31, 1904; president, Pacific Overseas Airlines. Address: Ontario International Airport, Ontario, Cal.

ST. JOHN, Walton B., salesman born in Bear Lake, Pa., May 25, 1908; general sales manager, Aeronca Aircraft. Address: Hotel Manchester, Middletown, O.

SALLADA, Harold Bushnell, Naval officer born in Williamsport, Pa., Jan. 23, 1895; Vice Admiral. Address: c/o Navy Dept., Washington 25, D. C.

SALTER, Tom, aeronautical engineer born in Wichita, Kans., Oct. 1, 1910; vice-president and chief engineer, Cessna Aircraft Co. Address: 140 N. Clifton, Wichita, Kans.

SALTONSTALL, Leverett, U. S. Senator born in Chestnut Hill, Mass., Sept. 1, 1892; member, Armed Services and Appropriations Committees. Address: Senate Office Bldg., Washington, D. C.

SANDERS, Robert, aeronautical engineer born in Washington, D. C., Mar. 25, 1908; president and general manager, Sanders Aviation, Inc. Address: Riverdale, Md.

SANDERSON, John, corporation executive born in Philadelphia, Pa., Feb. 23, 1891; vice-president and treasurer, The Sperry Corp. Address: 30 Rockefeller Plaza, New York 20, N. Y.

SANDSTROM, Roy J., aeronautical engineer born in Cadillac, Mich., Mar. 19, 1912; executive chief engineer, Bell Aircraft Corp. Address: 172 Woodcrest Blvd., Kenmore, N. Y.

SAUNDERS, Harold K., pilot born in Longisland, N. C., Jan. 13, 1921; chief pilot, Piedmont Airlines. Address: Winston Salem, N. C.

SAUNDERS, Keith, writer born in Elizabeth City, N. C., Feb. 21, 1910; staff member, American Aviation Magazine and Daily. Address: 1025 Vermont Ave., N. W., Washington 5, D. C.

SAVILLE, Gordon Phillip, Air Force officer born in Macon, Ga., Sept. 14, 1902; Major General (temporary). Address: Hq., Air Defense Command, Mitchel AFB, New York, N. Y.

SCHAEFER, J. Earl, aviation executive born in Wichita, Kans., June 11, 1893; vice-president, Boeing Airplane Co.; general manager, Wichita Division. Address: Seattle, Wash.

SCHEUER, George A., newspaperman born in Fulton county, Ind., June 10, 1905; aviation writer, *South Bend Tribune*. Address: South Bend, Ind.

SCHLATTER, David Myron, Air Force officer born in Carey, O., Nov. 21, 1901; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.

SCHOEFFEL, Malcolm Francis, Naval officer born in Rochester, N. Y., Apr. 3, 1898; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

SCHOLLE, Howard A., trustee born in New York, N. Y., Sept. 12, 1885; member, Aeronautical Archives Committee, Institute of the Aeronautical Sciences. Address: Lakeville, Conn.

SCHROEDER, Leslie L., attorney born in Minnesota City, Minn., Jan. 4, 1903; commissioner of aeronautics, Minnesota Department of Aeronautics. Address: 6025 Park Ave., Minneapolis, Minn.

SCHWARZENBACH, J. C., aeronautical engineer born in Qugue, N. Y., Aug. 6, 1918; president, U. S. Propellers, Inc. Address: 3270 E. Foothill Blvd., Pasadena 8, Cal.

SCHWEIZER, Ernest, aeronautical engineer born in New York, N. Y., 1912; president and chief engineer, Schweizer Aircraft Corp. Address: Elmira, N. Y.

**SCOTT, Forbes W.,** aviation editor, *The Joliet Herald News.* Address: 1055 Taylor St., Joliet, Ill.*

**SCHWEIZER, Paul A.,** aeronautical engineer born in New York, N. Y., 1913; vice-president and general manager, Schweizer Aircraft Corp. Address: Elmira, N. Y.

**SCOTT, George F.,** airline executive born in Dixon, Ill., 1909; general sales manager, Northeast Airlines. Address: Logan International Airport, Boston, Mass.

**SEBOLD, Raymond C.,** engineer born in Fort Wayne, Ind., Dec. 3, 1906; director of engineering, Consolidated Vultee Aircraft Corp. Address: LaJolla, Cal.

**SEIFERT, Harold B.,** vice-president, operations, Pioneer Air Lines. Address: Municipal Airport, P. O. Box 12188, Houston 12, Tex.*

**SENIOR, Mil,** union official born in Campgaw, N. J., June 1, 1912; vice-president, ALCEA-ARA-CIO. Address: Rm. 313, 5 Beekman St., New York 7, N. Y.

**SENSENICH, Harry M.,** business executive born in Lititz, Pa., 1903; president and treasurer, Sensenich Corp. Address: Lancaster, Pa.

**SEREPHINE, Gene,** aviation public relations counsel born in New York, N. Y., Apr. 27, 1917; director of news bureau, Colonial Airlines. Address: 630 Fifth Ave., New York, N. Y.

**SESSLER, Robert G.,** chemist born in Roanoke, Va., Mar. 9, 1909; president, Monocoup Aircraft and Engine Corp. Address: Melbourne, Fla.

**SETTLE, T. G. W.,** Naval officer born in Washington, D. C., Nov. 4, 1895; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

**SHARP, Edward Raymond, Dr.,** mechanical engineer born in Elizabeth City County, Va., Mar. 9, 1894; director, Lewis Flight Propulsion Laboratory, National Advisory Committee for Aeronautics. Address: 89 Hartman St., Cleveland, O.

**SHARPLES, Laurence P.,** chairman of the board and treasurer, Aircraft Owners and Pilots Association. Address: Washington Bldg., 15th and New York Ave., Washington, D. C.*

**SHATTO, Stanley R.,** aviation executive born in Reger, Mo., Dec. 29, 1908; vice-president, maintenance and engineering, Western Air Lines. Address: 6060 Avion Dr., Los Angeles 45, Cal.

**SHAWE, David,** business executive born in Prineville, Ore.; vice-president, assistant to the publisher, American Aviation Publications. Address: 1025 Vermont Ave., N. W., Washington 5, D. C.

**SHEAFFER, Daniel Miller,** railroad official born in Pittsburgh, Pa., Sept. 20, 1885; assistant to operating vice president, Pennsylvania Railroad Co. Address: 1581 Broad St. Sta. Bldg.. Philadelphia, Pa.

**SHEEHAN, M.,** attorney born in New York, N. Y., June 2, 1907; International Air Transport Association. Address: Central Station Bldg., Montreal, Canada.

**SHELLY, Allen Parker,** aeronautical engineer born in Atchison, Kans., 1908; director of engineering and maintenance, Continental Air Lines. Address: Stapleton Airfield, Denver 7, Colo.

**SHERMAN, Forrest Percival,** Naval officer born in Washington, D. C., Oct. 30, 1896; Vice Admiral. Address: Chief of Naval Operations, Washington, D. C.

**SHIELDS, Paul V.,** chairman of the board, Curtiss-Wright Corp. Address: Main and Passaic Sts., Wood Ridge, N. J.*

**SHILLITO, Frederick H.,** doctor of medicine born in Kalamazoo, Mich., June 5, 1905; medical director, Atlantic Division, Pan American Airways. Address: LaGuardia Field, Jackson Heights, N. Y.

**SHIPPEN, William H.,** aviation editor, *The Washington Star.* Address: Washington Star Bldg., Washington 4, D. C.*

**SHOEMAKER, J. M.,** chief engineer, Chance Vought Aircraft Div., United Aircraft Corp. Address: 550 S. Main St., Stratford, Conn.*

**SHOULTS, David Roy,** aeronautical engineer born in Storms, O., June 23, 1903; vice-president, engineering, The Glenn L. Martin Co. Address: Baltimore 3, Md.

**SHRADER, R. C.,** airline executive born in Osceola, Nebr., Apr. 6, 1896; vice-president, Braniff Airways. Address: Highlander Apartments, Dallas, Tex.

**SIBLEY, Robert B.,** newspaperman born in Worcester, Mass., Mar. 13, 1901; aviation editor, *Boston Traveler.* Address: 80 Mason St., Boston, Mass.

**SIKORSKY, Igor I.,** aeronautical engineer born in Kiev, Russia, May 25, 1889; engineering manager, Sikorsky Aircraft Div., United Aircraft Corp. Address: Sikorsky Aircraft, Bridgeport, Conn.

**SILSBEE, Nathaniel F.,** business executive born in Boston, Mass., Dec. 24, 1895; secretary, Corporate Aircraft Owners' Association. Address: 89 Lincoln Blvd., Merrick, N. Y.

**SIMMEN, Floyd B.,** general sales manager, Aeronca Aircraft Corp. Address: Municipal Airport, Middletown, O.*

**SINCLAIR, Howard William,** government official born in Portland, Me., Oct. 24, 1892; chief, aviation education division, office of aviation development, Civil Aeronautics Administration. Address: Rm. 1504, Bldg. T-4, 17th and Constitution Ave., Washington 25, D. C.

**SIX, Robert F.,** airline executive born in

Stockton, Cal., June 25, 1907; president, Continental Air Lines. Address: Denver, Colo.*

SLATTERY, Edward E., Jr., public relations counsel born in Boston, Mass., May 8, 1911; chief, public information, Civil Aeronautics Board. Address: 3728 Manor Rd., Chevy Chase, Md.

SLAUGHTER, Lomis, Jr., engineer born in Austin, Tex., Sept. 15, 1915; chief engineer, Anderson, Greenwood & Co. Address: 2338 Bolsover, Houston, Tex.

SLICK, Earl F., president, Slick Airways. Address: Municipal Airport, P. O. Box 656B, San Antonio, Tex.*

SLONIM, J. A., aeronautical engineer born in New York, N. Y., May 7, 1906; general manager, pilotless plane division, Fairchild Engine and Airplane Corp. Address: 150 Secatogue Ave., Farmingdale, L. I., N. Y.

SMART, Millard K., chief engineer, Monocoupe Airplane and Engine Corp. Address: Box 266, Melbourne, Fla.*

SMELTZER, Alexander C., teacher born in New York, N. Y., Nov. 27, 1896; instructor, Aerodynamics & Aviation Mechanics. Address: 3715 79th St., Jackson Heights, N. Y.

SMITH, C. R., airline executive born in Minerva, Tex., Sept. 9, 1899; president, American Airlines. Address: 100 E. 42nd St., New York 17, N. Y.

SMITH, Clyde R., pilot born in Clarks Summit, Pa., Dec. 21, 1914; engineering test pilot and flight analyst, Piper Aircraft Corp. Address: 311 N. Fairview, Lock Haven, Pa.

SMITH, Ferris M., aeronautical engineer born in Watkins Glen, N. Y., June 24, 1905; vice-president, engineering, Radioplane Co. Address: 1939 Foothill Dr., Glendale 1, Cal.

SMITH, Frederic Harrison, Jr., Air Force officer born in Fort Monroe, Va., June 30, 1908; Major General (temporary). Address: Hqs., U. S. Air Force, Washington 25, D. C.

SMITH, Frederick Dodge, airline pilot born in Roseville, N. J., Feb. 16, 1899; captain, Colonial Airlines. Address: 46 Cove Dr., Manhasset, N. Y.

SMITH, Frederick H., aviation executive born in Gloucester, Mass., 1907; president, Island Air Ferries, Inc. Address: MacArthur Airport, Long Island, N. Y.

SMITH, Lane W., airline pilot born in Laconia, N. H., Mar. 19, 1914; regional chief pilot, Western Air Lines. Address: 309 Via Linda Vista, Hollywood Riviera, Redonda Beach, Cal.

SMITH, Rex, editor born in Gate City, Scott County, Va., June 17, 1900; vice-president, public relations, American Airlines and American Overseas Airlines. Address: 100 E. 42nd St., New York 17, N. Y.

SMITH, Robert J., president, Pioneer Air Lines. Address: Municipal Airport, P. O. Box 12188, Houston 12, Tex.*

SMITH, Theodore R., aeronautical engineer born in Oroville, Cal., Nov. 5, 1906; president, Aero Design and Engineering Corporation. Address: Culver City Airport, Culver City, Cal.

SMITH, Warren R., aviation executive born in Mount Vernon, N. Y., Aug. 10, 1916; director of public relations and assistant to the president, Fairchild Engine and Airplane Corp. Address: Blue Ridge Summit, Md.

SMITHSON, James S., aircraft manufacturer born in Barstow, Cal., Mar. 26, 1906; vice-president, factory manager, North American Aviation. Address: Municipal Airport, Los Angeles 45, Cal.

SOUCEK, Apollo, Naval officer born in Medford, Okla., Feb. 24, 1897; Rear Admiral. Address: Navy Dept., Washington, D. C.

SPAATZ, Carl, retired Air Force officer born in Boyertown, Pa., June 28, 1891; contributing editor, *Newsweek*. Address: 1522 34th St., N. W., Washington, D. C.

SPENCER, Leslie V., aviation writer and advertising executive born in Florence, Tenn., Nov. 15, 1892; vice-president, Bermingham, Castleman & Pierce, Inc. Address: 136 E. 38th St., New York 16, N. Y.

SPRAGUE, Thomas Lamison, Naval officer born in Lima, O., Oct. 2, 1894; Rear Admiral. Address: Navy Dept., Washington 25, D. C.*

SPRINGER, Thomas Eric, aviation executive born in Tennessee, Jan. 23, 1892; plant manager, El Segundo plant, Douglas Aircraft Co. Address: 877 S. Bundy Dr., W. Los Angeles, Cal.

SQUIER, Carl B., vice-president, sales, Lockheed Aircraft Corp. Address: 2555 N. Hollywood Way, Burbank, Cal.*

STANIEK, H. F., assistant chief engineer, Piasecki Helicopter Corp. Address: Woodland Ave. & P.R.R., Morton, Pa.*

STANTON, A. H., director, personnel and training, Braniff Airways. Address: Love Field, Dallas 9, Tex.*

STANTON, Charles I., aviation executive born in Medford, Mass., July 28, 1893; director, School of Airways, Aeronautical Institute of Technology of Brazil. Address: COCTA, Edificio Nova Estacao de Passageiros, Aeroporto Santos Dumont, Rio de Janeiro, Brazil.

STEARLEY, Ralph F., Air Force officer born in Brazil, Ind., July 25, 1898; Brigadier General. Address: Hqs., 14th Air Force, Orlando, Fla.

STEFAN, Karl, U. S. Congressman born near Zebravkov, Bohemia, Mar. 1, 1884; member, Appropriations Committee. Address: New House Office Bldg., Washington, D. C.

STERN, Ben, publicist born in Boston, Mass., Mar. 19, 1904; director, office of aviation information, Civil Aeronautics Administration. Address: Commerce Bldg., Washington 25, D. C.

STERN, E. Theodore, public relations counsel. Address: 247 Park Ave., New York 17, N. Y.*

STEWART, Sidney A., aviation executive born in Pittsburgh, Pa., Sept. 22, 1897; president, Chicago and Southern Air Lines. Address: 640 Anderson St., Memphis, Tenn.

STEWART, William H., business executive born in Kingston, N. Y., Apr. 13, 1880; president, Stewart Technical School and Stewart Automobile Co. Address: 253-7 W. 64th St., New York 23, N. Y.

STINEMAN, Fred J., aircraft executive born in Monett, Mo., Sept. 10, 1910; chief engineer, Long Beach plant, Douglas Aircraft Co. Address: 3855 Lakewood Blvd., Long Beach, Cal.

STOCKWELL, Richard E., editor born in Neillsville, Wis., Mar. 12, 1917; editor, aviation operations, Conover-Mast Publications. Address: 205 E. 42nd St., New York 17, N. Y.

STONE, Charles Bertody, III, Air Force officer born in Fort McPherson, Ga., Mar. 28, 1904; Major General (temporary). Address: Hqs., A.M.C., Dayton, O.

STOTTS, Eugene R., pilot born in Aurora, Mo., Aug. 10, 1903; pilot, American Airlines. Address: 10240 3rd Ave., Inglewood, Cal.

STOUT, William Bushnell, aeronautical engineer born in Quincy, Ill., Mar. 16, 1880; director, National Aeronautics Association. Address: 1322 W. Palm Lane, Phoenix, Ariz.

STOVALL, W. R., director, medical service, Civil Aeronautics Administration. Address: Commerce Bldg., Washington, D. C.*

STOWELL, James Somers, Air Force officer born in Syracuse, N. Y., June 17, 1900; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.*

STRANAHAN, Duane, manufacturer born in Brookline, Mass., Sept. 25, 1903; vice-president, Champion Spark Plug Co. Address: 577 E. Front St., Perrysburg, O.

STRATEMEYER, George Edward, Air Force officer born in Cincinnati, O., Nov. 24, 1890; Lieutenant General (temporary). Address: Commanding General, Far East Air Forces, A.P.O. 925, c/o P.M., San Francisco, Cal.

STREBIG, James J., newspaperman born in Fort Wayne, Ind., June 26, 1907; aviation editor, The Associated Press. Address: 330 Star Bldg., Washington 4, D. C.

STREETT, St. Clair, Air Force officer born in Washington, D. C., Oct. 6, 1893; Major General (permanent). Address: Department of the Air Force, Washington 25, D. C.

STROHMEIER, William D., public relations counsel born in Newton, Mass., Mar. 20, 1916; president, Strohmeier Associates. Address: Suite 601, 475 Fifth Ave., New York, N. Y.

STROUKOFF, Michael, engineer born in Ekterinoslav, Russia, Jan. 29, 1883; president and chief engineer, Chase Aircraft Co. Address: Lawrenceville Road, Lawrenceville, N. J.

STUART, Donald M., electrical engineer born in Des Moines, Ia., Aug. 15, 1905; director, technical development, Civil Aeronautics Administration. Address: 4709 Overbrook Rd., Washington, D. C.

STUART, Harold C., government official born in Okalahoma City, Okla.; assistant secretary of the Air Force. Address: The Pentagon, Washington 25, D. C.*

STUART, John, aviation writer, *The New York Times*. Address: 229 W. 43rd St., New York 18, N. Y.*

STUDEBAKER, Ford, aviation executive born in Pensacola, Fla., May 18, 1899; vice-president, operations and development, Hawaiian Airlines. Address: 3264 Huelani Dr., Honolulu, T. H.

STUMP, Felix Budwell, Naval aviator born in Parkersburg, W. Va., Dec. 15, 1894; Vice Admiral. Address: Navy Dept., Washington 25, D. C.

STUNKEL, Reagen C., engineer born in Beaumont, Tex., Oct. 6, 1909; president, Aviation Maintenance Corp. Address: 3651 Los Feliz Blvd., Beaumont, Tex.

STURHAHN, Edward M., aviation executive born in New Rochelle, N. Y., May 15, 1906; executive assistant to administrator, Civil Aeronautics Administration. Address: Temporary 5 Bldg., Washington, D. C.

SULLIVAN, Gladys M., editor born in Brooklyn, N. Y.; aviation and travel editor, *Brooklyn Eagle*. Address: 44 Clinton St., Brooklyn, N. Y.

SULLIVAN, John Dwight, attorney born in New York, N. Y., Oct. 23, 1893; member of firm, Murphy, Block, Sullivan & Sawyer. Address: 280 Broadway, New York 7, N. Y.

SUTTON, Harry A., aeronautical engineer born in Geneva, Nebr., Jan. 28, 1895; director of engineering, Ryan Aeronautical Co. Address: 8121 Camino Del Sol, LaJolla, Cal.

SWIRBUL, Leon A., president, Grumman Aircraft Engineering Corp. Address: Bethpage, L. I., N. Y.*

SWITZER, Wendell Gray, Naval officer born in Topeka, Kans., Sept. 30, 1898; Rear Admiral. Address: Commander, U. S. Naval Ordnance Test Station, Inyokern, China Lake, Cal.

SYMINGTON, W. Stuart, government official born in Amherst, Mass., June 26, 1901; Secretary of the Air Force, National Military Establishment. Address: The Pentagon, Washington, D. C.

TALBERT, Ansel E., aviation writer, *The New York Herald-Tribune*. Address: 230 W. 41st St., New York 18, N. Y.*

TAYLOR, B. C., corporation executive born in Dayton, O.; president and treasurer, McCauley Corp. Address: 1840 Howell Ave., Dayton, O.

TAYLOR, Leland R., aviation executive born in Los Angeles, Cal., Apr. 22, 1912; assistant to the president and assistant secretary, North American Aviation. Address: 1465 Stone Canyon Road, Los Angeles, Cal.

TAYLOR, Mervin Francis, aeronautical weight engineer born in Sealevel, N. C., Dec. 8, 1913; staff weight engineer, Glenn L. Martin Co. Address: 241 Linden Ave., Towson, Md.

TERRELL, Robert S., manager, publicity and advertising, Southwest Airways. Address: P. O. Box 268, So. San Francisco, Cal.*

THAYER, Jack, system chief pilot, Western Air Lines. Address: 6060 Avion Dr., Los Angeles 45, Cal.*

THIEBLOT, Armand J., aeronautical engineer born in Paris, France, Dec. 10, 1903; chief engineer, Fairchild Aircraft Div., Fairchild Engine and Airplane Corp. Address: 1324 Hamilton Blvd., Hagerstown, Md.

THOMAS, Glenn E., chief pilot, western region, Eastern Airlines. Address: Moisant Airport, New Orleans, La.*

THOMPSON, "Bish," aviation editor, *The Evansville Press*. Address: 2nd and Vine Sts., Evansville, Ind.*

THOMSON, John B., president, Thomson Industries, Inc., Aircraft Specialties Div. Address: 1029 Plandome Rd., Manhassett, L. I., N. Y.*

THORP, John W., aeronautical engineer born in San Joaquin Co., Cal., June 20, 1912; president, Thorp Aircraft Co.; chief engineer, Aviation Maintenance Corp. Address: 354 E. Cypress, Burbank, Cal.

TICE, J. W., Dr.; president, Aero Medical Association. Address: 214 S. State St., Marion, O.*

TICHENOR, Frank, publisher, Aeronautical Digest Publishing Corp. Address: 515 Madison Ave., New York 22, N. Y.*

TILLINGHAST, T. E., mechanical engineer born in Providence, R. I., May 29, 1893; president, United Aircraft Service Corp.; sales manager, Pratt and Whitney Aircraft Div. of United Aircraft Corp. Address: 61 Ledyard Road, West Hartford, Conn.

TILLISCH, Jan Henrik, physician born in Canby, Minn., Sept. 16, 1908; assistant professor, Mayo Foundation and Executive Council, Airlines Medical Directors Association. Address: 102-110 2nd Ave., S. W., Rochester, Minn.

TIMBERLAKE, Patrick Weston, Air Force officer born in Fort Greble, R. I., Dec. 25, 1901; Major General (temporary). Address: Munitions Board, Washington 25, D. C.

TODD, Walter Edwin, Air Force officer born in Gonzales, Tex., June 25, 1906; Major General (temporary). Address: Air Adjutant General, Department of Air Force, Washington 25, D. C.

TOMLINSON, William Gosnell, Naval officer born in Leavenworth, Kans., Dec. 17, 1897; Rear Admiral. Address: c/o Navy Dept., Washington 25, D. C.*

TOWNSON, George, pilot and maintenance technician born in Philadelphia, Pa., June 8, 1915; test pilot and treasurer, Helicopter Engineering and Research Corp. Address: 4608 Vista St., Philadelphia, Pa.

TRACY, Charles Louis, newspaperman born in Bellevue, O., Sept. 30, 1916; aviation editor, *Cleveland Press*. Address: 1636 Blossom Park Ave., Lakewood 7, O.

TREMAN, S. Michael, aeronautical engineer born in Silver Creek, N. Y., Mar. 1, 1913; manager, missiles div., pilotless plane div., Fairchild Engine and Airplane Corp. Address: 122 Powell Pl., Hempstead, N. Y.

TRIGG, Leslie John, aeronautical engineer born in Detroit, Mich., Aug. 21, 1917; chief engineer, Sensenich Corp. Address: 507 W. James St., Lancaster, Pa.

TRIPPE, Juan Terry, airline executive born in Seabright, N. J., June 27, 1899; president, Pan American World Airways System. Address: 135 E. 42nd St., New York 17, N. Y.

TROMBOLD, George J., aviation executive born in Chanute, Kans., Nov. 5, 1908; personnel director, Boeing Airplane Co., Wichita Div. Address: Wichita, Kans.

TROTMAN, E. Russell, writer born in Springfield, Mass., July 17, 1915; public relations counsel, Hamilton Standard Div., United Aircraft Corp. Address: E. Hartford 8, Conn.

TSONEFF, Stephen, chief engineer, U. S. Propellers, Inc. Address: 3270 E. Foothill Blvd., Pasadena 8, Cal.*

TUCKER, Harrison R., aircraft engineer born in Fairmont, W. Va., 1891; president, Tucker Industries, Inc. Address: 1900 E. 24th St., Cleveland, O.

TUNNER, William H., Air Force officer born in Elizabeth, N. J., July 14, 1906; Major General (temporary); Deputy Commander, Operations, MATS. Address: Department of the Air Force, Washington 25, D. C.

TURNER, Howard McMath, Air Force officer born in Avoca, Ia., Feb. 21, 1902; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.

TURNER, Roscoe, aviator and aviation executive born in Corinth, Miss., Sept. 29, 1895; president, Roscoe Turner Aeronautical Corp. Address: Municipal Airport, Indianapolis, Ind.

TUTTLE, Arnold Dwight, physician born in Sturgis, S. D., Feb. 26, 1881; medical director, United Air Lines. Address: 5959 S. Cicero Ave., Chicago 38, Ill.

TWINING, Nathan Farragut, Air Force officer born in Monroe, Wis., Oct. 11, 1897; Lieutenant General (temporary). Address: Fort Richardson, Alaska.

UHRICH Harold R., aeronautical engineer born in Millersville, Pa., Dec. 13, 1912; chief engineer, Aeromatic Propeller Dept., Metal Products Div., Koppers Company, Inc. Address: 4117 Taylor Ave., Baltimore 6, Md.

**UPSTON, John Edwin**, Air Force officer born in Tawas City, Mich., Sept. 9, 1890; Major General (temporary). Address: Hqs., Fourth Air Force, Hamilton AFB, Hamilton, Cal.

**VALK, William E.**, patent attorney born in Washington, D. C., Aug. 29, 1889; director of patents, Curtiss-Wright Corp.; president, Manufacturers Aircraft Association. Address: Ridgewood, N. J.

**VANAMAN, Arthur William**, Air Force officer born in Millville, N. J., May 9, 1892; Major General (permanent). Address: U. S. Air Force, Washington 25, D. C.

**VANDENBERG, Hoyt Sanford**, Air Force officer born in Milwaukee, Wis., Jan. 24, 1899; General (temporary). Address: Chief of Staff, U. S. Air Force, Washington 25, D. C.

**VANIK, Milford F.**, aeronautical engineer born in Cleveland, O., July 29, 1906; staff engineer, airworthiness requirements, Boeing Airplane Co. Address: 6001 Seward Park Ave., Seattle 8, Wash.

**VAN HORN, R. H.**, director of maintenance and engineering. Braniff Airways. Address: Love Field, Dallas 9, Tex.*

**VAN NOSTRAND, George**, assistant vice president, American Airlines. Address: 1437 K St., N. W., Washington 5, D. C.*

**VAN VUREN, John**, pilot born in Chicago, Ill., Sept. 20, 1906; assistant chief pilot, Chicago base, Delta Air Lines. Address: 3929 Grand Ave., Western Springs, Ill.

**VAN ZANDT, John Parker**, aviation economist and author born in Chicago, Ill., Jan. 16, 1894; editor, *World Aviation Annual*. Address: 903 16th St., N. W., Washington 6, D. C.

**VEST, George W.**, government official born in Buckner, Mo., Aug. 26, 1894; regional administrator, third region, Civil Aeronautics Administration. Address: O'Hare Field, Chicago International Airport, Park Ridge, Ill.

**VICTORY, John Francis**, business executive born in New York, N. Y., Jan. 23, 1892; executive secretary, National Advisory Committee for Aeronautics. Address: 1724 F St., N. W., Washington 25, D. C.

**VILLIERS, Charles A.**, president, American Rocket Society, Inc. Address: Rm. 719, 29 W. 39th St., New York 18, N. Y.*

**VINCENT, Roy F.**, personnel director, Continental Air Lines. Address: Stapleton Airfield, Denver 7, Colo.*

**WAGENECK, Russell L.**, maintenance official born in Garrison, Ill., Dec. 4, 1910; director of maintenance, Slick Airways. Address: 6204 Goodland Pl., N. Hollywood, Cal.

**WAGNER, Frank DeChant**, Naval officer born in Pottstown, Pa., Aug. 22, 1893; Rear Admiral. Address: c/o Navy Dept., Washington 25, D. C.*

**WAGNER, William**, public relations counsel born in Boise, Ida., July 28, 1909; public relations manager, Ryan Aeronautical Co. Address: 3421 Whittier St., San Diego 6, Cal.

**WALLACE, Dwane L.**, corporation executive born in Belmont, Kans., Nov. 29, 1911; president, Cessna Aircraft Co. Address: Wichita, Kans.

**WALLACE, Malcolm C.**, pilot born in Houston, Tex., Sept. 3, 1913; superintendent of flight operations, Slick Airways. Address: Burbank, Cal.

**WALNER, William R.**, pilot born in Wynnewood, Okla., June 20, 1905; assistant chief pilot, Braniff Airways. Address: Dallas, Tex.

**WALSH, Robert LeGrow**, Air Force officer born in Walla Walla, Wash., July 25, 1894; Major General (temporary). Address: U. S. Air Force, Washington 25, D. C.

**WALTON, Leo Andrew**, Air Force officer born in Salem, Ore., Oct. 7, 1890; Major General (retired). Address: 884 Audubon Lane, Winter Park, Fla.

**WARD, Carrol Kramer**, aviation executive born in Kansas City, Mo., Oct. 30, 1905; director of personnel, Mid-Continent Airlines. Address: 5540 Norwood, Kansas City, Kans.

**WARD, Henry DeC.**, treasurer, American Meteorological Society. Address: 5 Joy St., Boston 8, Mass.*

**WATERHOUSE, Helen**, journalist born in Watertown, Mass., May 31, 1900; aviation editor and reporter, *Akron Beacon Journal*. Address: Westgate Manor, Akron, O.

**WATSON, Forrest**, president, National Flying Farmers Association. Address: Thomas, Okla.*

**WATTLES, Gurdon W.**, president and treasurer, Air Investors, Inc. Address: 40 Wall St., New York 5, N. Y.*

**WAUGH, John D.**, industrial publicist born in Herington, Kans., June 26, 1919; public relations counsel, Pendray and Leibert. Address: 55 W. 42nd St., New York 18, N. Y.

**WEBB, Leland D.**, aeronautical engineer born in Chicago, Ill., Apr. 7, 1891; vice president, western region, Aircraft Industries Association. Address: 21756 Malibu Road, Malibu, Cal.

**WEBSTER, Robert M.**, Air Force officer born in Boston, Mass., Oct. 10, 1892; Major General (permanent). Address: U. S. Air Force, Washington 25, D. C.*

**WEDBERG, Frank A.**, aeronautical engineer born in Bridgeport, Conn., Aug. 1, 1903; section head, materials and photo. lab.; Nat'l Aircraft Standards Committee Representative: Aircraft Research and Testing Committee Representative. Address: 1143 S. Cassingham Rd., Columbus 9, O.

**WEIKERT, John Maurice**, Air Force officer born in McKnightstown, Pa., Sept. 29, 1898; Major General (temporary). Address: c/o Air Adjutant General, U. S. Air Force, Washington 25, D. C.

**WEILER, J. F.**, chief pilot, Continental Air Lines. Address: Stapleton Airfield, Denver 7, Colo.*

**WELLS, Edward C.**, aeronautical engineer born in Boise, Ida., Aug. 26, 1910; vice-president, engineering, Boeing Airplane Co. Address: 3339 Cascadia Ave., Seattle 44, Wash.

**WELLS, Lester A.**, aviation executive born in Baltimore, Md., May 28, 1900; president, Engineering and Research Corp. Address: 10 E. Blackthorne St., Chevy Chase, Md.

**WELLS, T. A.**, aircraft executive born in Corning, Ia., Mar. 12, 1907; vice-president, chief engineer, Beech Aircraft Corp. Address: 5 Lynnwood Blvd., Wichita, Kans.

**WELSH, William W.**, aviation executive born in Alma, Colo., Sept. 16, 1893; technical assistant to the president, Fairchild Engine & Airplane Corp. Address: Hagerstown, Md.

**WENTZ, Daniel S., II**, aviation writer born in Hanover, Pa., Dec. 15, 1919; managing editor, *American Aviation Daily*. Address: 2000 Connecticut Ave., N. W., Washington 8, D. C.

**WEYLAND, Otto Paul**, Air Force officer born in Riverside, Cal., Jan. 27, 1902; Major General (temporary). Address: The National War College, Washington 25, D. C.

**WHARTON, R. H.**, lawyer born in Birmingham, Ala., June 10, 1915; director of personnel, Delta Airlines. Address: Municipal Airport, Atlanta, Ga.

**WHEELER, M. H.**, chief pilot, Northeast Airlines. Address: Logan International Airport, 239 Prescott St., E. Boston 28, Mass.

**WHELAN, Bernard L.**, aviation executive born in Cincinnati, O., Nov. 19, 1890; general manager, Sikorsky Aircraft. Address: Bridgeport 1, Conn.

**WHITAKER, Sidney F.**, pilot born in Phoenix, Miss., Oct. 25, 1895; assistant chief pilot, Delta Airlines. Address: Box 476, Miami Springs, Fla.

**WHITE, Thomas Dresser**, Air Force officer born in Walker, Minn., Aug. 6, 1901; Major General (permanent). Address: U. S. Air Force, Washington 25, D. C.*

**WHITEHEAD, Ennis Clement**, Air Force officer born in Westphalia, Kans., Sept. 3, 1895; Lieutenant General (temporary). Address: CG, Con AC, Mitchel AFB, Hempstead, N. Y.

**WHITEHEAD, Richard Francis**, Naval Officer born in Fall River, Mass., Jan. 1, 1895; Rear Admiral. Address: Navy Dept., Washington 25, D. C.

**WHITMAN, Ray P.**, aircraft executive born in Washington, D. C., Apr. 7, 1895; 1st vice-president, sales, Bell Aircraft Corp. Address: P. O. Box One, Buffalo 5, N. Y.

**WHITNEY, C. V.**, assistant secretary of Commerce. Address: Commerce Bldg., Washington 25, D. C.*

**WHITNEY, E. N.**, airline executive born in Syracuse, N. Y., Oct. 27, 1902; director, flight operations, Western Air Lines. Address: 6060 Avion Dr., Los Angeles 45, Cal.

**WHITTEN, Lyman Perley**, Air Force officer born in Malden, Mass., Mar. 25, 1897; Major General (permanent). Address: Commanding General, Newfoundland Base Command, APO 862, c/o PM, New York, N. Y.

**WHYTE, Jessel Stuart**, business executive born in Chicago, Ill., Nov. 25, 1890; director, president and general manager, MacWhyte Co. Address: 2904 14th Ave., Kenosha, Wis.

**WIEGMAN, Clarence H.**, engineer born in Detroit, Mich., Sept. 11, 1902; chief engineer, Lycoming-Spencer Div., AVCO Manufacturing Corp. Address: Williamsport 38, Pa.

**WILD, Arthur W.**, business executive born in England, 1905; vice-president, Continental Motors Corp. Address: 1366 Whittier Rd., Grosse Pointe, Mich.

**WILFORD, E. Burke**, president and chief engineer, Pennsylvania Aircraft Syndicate Ltd. Address: Wilford Bldg., Philadelphia 4, Pa.*

**WILKINSON, Paul Howard**, journalist born in St. Paul, Minn., Feb. 2, 1895; editor and publisher, *Aircraft Engines of the World*. Address: 225 Varick St., New York 14, N. Y.

**WILLIAMS, Alford J.**, business executive born in New York, N. Y., July 26, 1896; manager, aviation department, Gulf Oil Corp. and Gulf Refining Co. Address: Gulf Bldg., 7th and Grant Sts., Pittsburgh 19, Pa.*

**WILLIAMS, Betty Jane**, commercial flight instructor born in Wilkes-Barre, Pa., Apr. 2, 1919; aeronautical technical writer, North American Aviation. Address: 3629 Lavelle Dr., Los Angeles 65, Cal.

**WILLIAMS, Lawrence E.**, aviation executive born in Jamestown, N. Y., Mar. 13, 1897; vice president, McDonnell Aircraft Corp. Address: 2923 Foxall Rd., N.W., Washington, D. C.

**WILLIAMS, Paul Langdon**, Air Force officer born in Detroit, Mich., Apr. 16, 1894; Major General (permanent). Address: U. S. Air Force, Washington 25, D. C.

**WILLIAMS, Roger**, newspaperman born in Oakland, Cal., Sept. 4, 1916; aviation editor, *San Francisco News*. Address: Oakland, Cal.

**WILLIAMSON, John H.**, pilot born in Dyson, S. C., Apr. 18, 1906; assistant chief pilot, Delta Air Lines. Address: 611 W. Lyle Ave., College Park, Ga.

**WILLINGHAM, G. W.**, chief pilot, West Coast Airlines. Address: Boeing Field, P. O. Box 516, Georgetown Station, Seattle 8, Wash.*

**WILSON**, Alfred M., business executive born in Minneapolis, Minn., Dec. 31, 1903; vice-president, aeronautical div., Minneapolis Honeywell Regulator Co. Address: 2747 4th Ave., South, Minneapolis, Minn.

**WILSON**, Gill Robb, newspaperman born in Clarion County, Pa., Sept. 18, 1893; aviation columnist, *New York Herald Tribune*. Address: 230 W. 41st St., New York 18, N. Y.

**WISENER**, William T., personnel manager, Luscombe Airplane Corp. Address: P. O. Box 2126, Dallas, Tex.*

**WITHINGTON**, S. B., corporation official born in Hillsdale, Mich., Feb. 27, 1895; vice-president and general manager, Lycoming-Spencer Div., AVCO Manufacturing Corp. Address: Williamsport 38, Pa.

**WITZE**, Claude O., aviation editor, *The Providence Journal*. Address: 75 Fountain St., Providence 2, R. I.*

**WOLFE**, Kenneth Bonner, Air Force officer born in Denver, Colo., Aug. 12, 1896; Major General (permanent). Address: U. S. Air Force, Washington 25, D. C.

**WOOD**, Charles R., Jr., pilot born in Kokomo, Ind., June 8, 1908; chief helicopter test pilot; manager, Helicopter Customers Service. Address: 438 Park Road, St. Louis 19, Mo.

**WOOD**, Lysle Austin, aeronautical engineer born in Renville, Minn., Feb. 23, 1904; chief engineer, Boeing Airplane Co. Address: Seattle, Wash.

**WOOD**, Robert H., journalist born in Pratt, Kans., Nov. 4, 1911; editor, *Aviation Week*. Address: 330 W. 42nd St., New York, N. Y.

**WOODMAN**, Duncan A., insurance broker born in New York, N. Y., Feb. 26, 1887; president, Duncan A. Woodman, Inc. Address: 100 E. 42nd St., New York 17, N. Y.

**WOODWARD**, Harper, attorney born in Rochester, N. Y., Nov. 26, 1909; counsel and aviation advisor to Laurance S. Rockefeller. Address: Rm. 5600, 30 Rockefeller Plaza, New York, N. Y.

**WOOLMAN**, C. E., president and general manager, Delta Air Lines. Address: Municipal Airport, Atlanta, Ga.*

**WRIGHT**, Ben, public relations counsel born in Saginaw, Mich., July 14, 1911; director of public relations, American Airlines and American Overseas Airlines. Address: 100 E. 42nd St., New York, N. Y.

**WRIGHT**, Theodore Paul, aircraft engineer and executive born in Galesburg, Ill., May 25, 1895; vice-president for research, Cornell University, and president, Cornell Aeronautical Laboratory, Inc. Address: Cornell University, Ithaca, N. Y.

**YOUNG**, Ora W., government official born in Greenville, O., Mar. 25, 1893; regional administrator, region one, Civil Aeronautics Administration. Address: Federal Bldg., International Airport, Jamaica, L. I., N. Y.

**YOUNG**, Raymond W., mechanical engineer born in St. Joseph, Mo., Apr. 9, 1899; vice-president, engineering, Wright Aeronautical Corp. Address: Box 85, Hohokus, N. J.

**ZIFF**, William B., publisher, born in Chicago, Ill., Aug. 1, 1898; publisher, Flying Magazine. Address: 185 N. Wabash, Chicago, Ill.

**ZIPP**, Harold W., aircraft engineer born in Lincoln, Neb., Sept. 10, 1906; chief engineer, Boeing Airplane Co. Address: 5001 E. Lewis, Wichita 8, Kans.

**ZWICKY**, Fritz, Dr., born in Varna, Bulgaria, Feb. 14, 1898; director of research, Aerojet Engineering Corp. Address: Azusa, Cal.*

# PLANES THAT MADE U. S. AVIATION HISTORY

The planes described on the following pages do not pretend to give a complete panorama of U. S. aviation history. The list was held to a few planes which contributed to either the development of aviation or to a dramatic aspect of its history in this nation.

THE EDITORS.

## KITTY HAWK

(1903)

**On Dec. 17, 1903, at Kitty Hawk, N. C., Orville Wright left the ground in the first heavier-than-air craft to maintain controlled sustained flight, covering about 120 feet in 12 seconds.**

**On their first powered plane the Wright brothers used a four cylinder, horizontal, liquid-cooled engine with a 4 in. bore and a 4 in. stroke, developing 12 hp at 1,025 rpm. It turned over 1,200 rpm by the time of first flight. While called a Wright engine, most of the actual development and construction was done by Charles Taylor.**

**The pilot flew the plane from a prone position on the lower wing a little to the left of center and was able to achieve directional control by rolling to either side, his hips being positioned in a "cradle" which activated the mechanism for the wing warping in conjunction with the rudder control. The elevator surfaces were on struts forward of the wing, the rudder aft.**

**Each wing of the biplane was divided into eight bays. Spars were made of spruce and ribs of second-growth ash. The wing was covered with untreated, unbleached muslin. Steel wire was used for wing bracing.**

**The gear of the *Kitty Hawk* consisted of two skids, which, for take-off, were carried on a platform attached to a monorail. Two chain-driven wooden propellers, one located on either side of the center section, were 8 ft. in diameter, turning over 356 rpm in opposite directions.**

**Wright Glider Flight, 1902**

### SPECS

**SPAN: 40 ft. 4 in.; LENGTH: 19 ft. 9 in.; HEIGHT: 8 ft.; CHORD: 6 ft. 5 in.; WING AREA: 510 sq. ft.; EMPTY WEIGHT: 605 lb.; HORIZONTAL CONTROL AREA: 48 sq. ft.; GROSS WEIGHT: 745 lb.; RUDDER AREA: 20 sq. ft. WING LOADING: 1.46 lb. per sq. ft. POWER LOADING: 62 lb. per hp. MAXIMUM SPEED: 31 mph.**

**LOCATION: Post-flying adventures of the *Kitty Hawk* almost rivaled its early history. Smithsonian wanted to display it, but Orville Wright refused in 1918 when the Institution displayed the Langley *Aerodrome* as the first heavier-than-air craft capable of flight. Ten years later, Mr. Wright shipped the plane to England for exhibit, providing it could be recalled at any time while he lived, and kept if not recalled before he died. Smithsonian conducted a campaign to placate Mr. Wright which ended successfully in 1942. War prevented the return from England, where the *Kitty Hawk* was stored first in a subway, later in a Welsh coal mine. When Orville died on Jan. 30, 1948, he had specified in an unsigned will that the plane be returned, making further negotiations necessary. The plane finally arrived in Washington, Nov. 22, 1948, where it is now permanently displayed at the National Air Museum, Smithsonian Institution.**

## JUNE BUG
(1908)

**The *June Bug* was a single-engine, pusher type biplane that evolved from experiments by the Aerial Experiment Association headed by Alexander Graham Bell, Glenn Curtiss as Director of Experiments. Preceded by the *Red Wing*, Mar. 12, 1908, and the *White Wing*, May 22, the *June Bug*, largely a Curtiss design, flew 1,266 ft. on its first flight, June 21. Curtiss flew the *June Bug* in the Scientific American Cup Races July 4, 1908, and won their trophy for the first public flight of one kilometer (0.62137 mi.) in America.**

**Complete specs are not available for this model, but it is known that it had a span of 42 ft. and was powered by a Curtiss 8 cyl. air-cooled engine.**

**LOCATION: Not in existence, except for propeller, located in the National Air Museum, Smithsonian Institution, Washington, D. C.**

## WRIGHT EX
(1911)

**Pusher type biplane, built by Wright brothers.**

**The EX was a modification of the Wright Model B, and was used primarily for exhibition purposes. It was in this type that Calbraith Rodgers made the first transcontinental flight in 1911.**

### SPECS

**SPAN, 38 ft. 6 in.; LENGTH: 28 ft.; HEIGHT: 8 ft. WING LOADING: 2.7 lb. per sq. ft. EMPTY WEIGHT: 850 lb.; GROSS WEIGHT: 1,270 lb.**

**LOCATION: National Air Museum, Smithsonian Institution, Washington, D. C.**

## CURTISS PUSHER
(1909-10)

**A single-engine biplane, built by Glenn Curtiss.**

**The type originally designed with forward elevator was flown by Curtiss in the first International Air Meet at Rheims, France, Aug. 29, 1909, to win the Gordon-Bennett Speed Trophy at 47 mph. In 1910, broke, Curtiss flew his pusher, *Albany Flyer*, from Albany to New York (May 29) to win $10,000 from the New York *World* as the first person to make the flight. Curtiss flew the 142.5 miles in 2 hr. 50 min., with one stop enroute for refueling. The next year the U. S. Navy bought a Curtiss pusher, the first plane used by that branch of the service. It was in this type that Eugene Ely flew from the deck of the *USS Birmingham*, Nov. 13, 1910. He also landed it on the deck of the *USS Pennsylvania*, Jan. 18, 1911.**

**In 1912, the front elevator was moved to the rear, which gave the plane the popular name of *Headless Pusher*.**

### SPECS

**SPAN: 33 ft. 4 in.; LENGTH: 25 ft. 2 in.; HEIGHT: 8 ft. 2 in.; WEIGHT: 903 lb.**

**LOCATION: National Air Museum, Smithsonian Institution, Washington, D. C.**

## AMERICA
(1914)

**A Curtiss twin-engine, pusher-type, boat-hull biplane, first heavier-than-air craft to be designed and built for a trans-Atlantic flight.**

**Backed by Rodman Wanamaker, Glenn Curtiss built the plane, assisted by Dr. A. F. Zahm, Alfred Verille and other prominent engineers. World War I blocked a trans-Atlantic attempt and the *America* was sold to the Eng-**

lish for coast patrol. England bought 62 others of this general type, and numerous orders from other countries followed.

Many innovations were used to make this plane outstanding at load-lifting and long-distance flying. Among these were an airfoil section that became a pattern for modern airfoils, and planing fins extending from the hull.

### SPECS

SPAN: 72 ft.; WEIGHT: 5,000 lb.; POWERPLANT: 2 eight-cyl. OX engines, 100 hp each; SPEED: 75 mph; RANGE: 1,100 miles.

LOCATION: Unknown if extant.

## JENNY (JN-4)
### (1917-18)

Two-place tractor biplane, built by Curtiss Aeroplane Co.

About 95% of U. S. World War I pilots, and a large number of Allied fliers, trained in the *Jenny;* and after the war she starred as a mail plane, crop-duster, stunt plane, and barnstormer. Over 8,000 were manufactured.

### SPECS (JN-4D)

SPAN UPPER PLANE: 43 ft. 7⅜ in; SPAN LOWER PLANE: 33 ft. 11¼ in.; LENGTH: 27 ft. 4 in.; HEIGHT: 9 ft. 10⅝ in. EMPTY WEIGHT: 1,580 lb.; GROSS WEIGHT: 2,130 lb.; MAXIMUM SPEED LEVEL FLIGHT: 75 mph; RATE OF CLIMB: 3,000 ft. in 10 min.; POWERPLANT: OX 8-cyl. "V", 90 hp at 1,400 rpm; FUEL CAPACITY: 21 gal. FUEL CONSUMPTION: 9 gal. per hr.

LOCATION (JN-4D): National Air Museum, Smithsonian Institution, Washington, D. C. and Museum of Science and Industry, Chicago, Ill.

## DH-4
### (1917-18)

Two-place tractor biplane.

The DH-4, an English design, became the only American production model during World War I. An all-purpose fighting plane, it had a speed of about 120 mph, a bomb load of 10 25-lb. bombs, was armed with four machine guns, and carried a camera, radio, and oxygen equipment.

By the war's end, 3,227 U. S.-built planes had been completed; 1,885 went overseas, 667 reached advance zones, and 200 saw actual combat.

### SPECS

SPAN: 42 ft., 3 in.; LENGTH: 29 ft., 7 in.; HEIGHT: 10 ft., 8 in.; EMPTY WEIGHT: 2,400 lb.; GROSS WEIGHT: 4,230 lb.; POWERPLANT: 400 hp Liberty engine; MAXIMUM SPEED: 124.7 mph; FUEL CAPACITY: 94 gal.; ENDURANCE: 2.6 hr.; CLIMB: 15,000 ft. in 24 min.; CEILING: 15,424 ft.

LOCATION: The first production model in this country was completed by the Dayton-Wright Airplane Co., Dayton, O., in Oct. 1917, and is now in the National Air Museum, Smithsonian Institution, Washington, D. C.

## MARTIN BOMBER
### (1918)

Twin-engine bomber biplane built by Glenn L. Martin Co.

This was the first bomber designed and built in America. It improved heavy-plane construction, using hollow struts for the first time, a stronger and lighter rib structure, and improved short-field performance. The MB-1 also brought quantity aircraft production to the industry, while improving on the precision of the previous hand-made models. The MB-1 was also used for mail, coast and forestry survey patrol, and freight.

### SPECS

SPAN: 71 ft. 5 in.; LENGTH: 45 ft.; HEIGHT: 14 ft.; SPEED, FULLY LOADED: 118.5 mph; POWERPLANT: two 400 hp Liberty engines; CEILING: 16,000 ft.; RATE OF CLIMB, FULLY LOADED: 10,000 ft. in 15 min.; CLIMB ON SINGLE ENGINE: 3,000 ft.

LOCATION: Unknown if extant.

## NC-4
### (1919)

Six-place, 4-engine, boat-hull biplane built by Curtiss Aeroplane and Motor Corp., in cooperation with the U. S. Navy. Designation meant N(avy), C(urtiss).

**The NC-4 was the first plane to complete a trans-Atlantic flight when it landed May 27, 1919 at Lisbon, Portugal. Three NC's took off from Rockaway, Long Island, for the trans-Atlantic attempt, but the NC-1 and the NC-3, landing at sea to take bearings, were stopped by damage from high waves. The crew of the NC-1 was picked up by the S.S. *Ionia* before their plane sank. The NC-3 taxied 205 miles in 52 hr. under her own power to Ponta Delgada, Azores.**

**The successful NC-4 crossing was as follows: May 8, Rockaway to Cape Cod; May 14, Chatham to Halifax; May 15, Halifax to Trepassey, Newfoundland; May 16-17, Trepassey to Horta, Azores; May 20, Horta to Ponta Delgada, Azores; May 27, Ponta Delgada to Lisbon, Portugal; May 30, Lisbon to Mondego River, Portugal; May 30, Mondego River to Ferrol, Spain; May 31, Ferrol to Plymouth, England. Total airline distance from Rockaway to Plymouth, 4,532 miles; total flying time, 53 hr., 58 min.**

## CREW

**Lt. Comdr. A. C. Read, flight commander; Lt. Elmer Stone, USCG, pilot; Lt. (jg) Walter Hinton, pilot; Chief Mechanics Mate, Eugene S. Rhodes; Ens. H. C. Rodd, USNR; Lt. J. L. Breese, reserve engineer (deplaned at Newfoundland).**

**In Sept., 1918, the first of the four NC's ordered by the Navy was completed and assembled for tests at Rockaway Naval Air Station. Test flights began Oct. 4, and showed much better lifting and speed performance than wind tunnel tests had indicated. Three high-compression engines were installed to increase the load from 22,000 lb. to 25,000 lb. Later, four high-compression Liberty engines (on NC-2), one tractor and one pusher tandem in a nacelle on either side of the center nacelle, increased take-off load to 28,100 lb. Increased propeller efficiency came when a tractor and pusher were used tandem in the center section with one tractor on either side. All three of the NC's were so equipped for their trans-Atlantic attempts.**

## SPECS

**SPAN: 126 ft.; LENGTH: 69 ft. 3½ in.; HEIGHT: 24 ft. 5 in.; EMPTY WEIGHT: 15,874 lb.; POWERPLANT: four 400 hp Liberty "Twelves" (high compression type); FUEL CAPACITY: 1,800 gal.; MAXIMUM SPEED: light load, 90 mph; full load, 81 mph; CLIMB TO 1,000 FT.: 5 min.**

**LOCATION: National Air Museum, Smithsonian Institution, Washington, D. C.**

# T-2
## (1922)

**A single-engine, cantilevered (one of the first), high-wing monoplane designed by Anthony Fokker and built by Fokker Aircraft Corp.**

**The U. S. Army bought two of these for study. Best known was the T-2. It became the "flying laboratory" for testing Liberty engines. On Apr. 16-17, 1922, piloted by Lts. Kelly and Macready of the Army Air Service, the T-2 set a new endurance record by flying 36 hr. 5 min. On May 2-3, 1923, the T-2 made the first non-stop transcontinental flight, flying 2,520 miles from New York to San Diego in 26 hrs. 50 min. 3 sec.**

## SPECS

**SPAN: 79 ft. 10 in.; LENGTH: 49 ft. 2 in.; HEIGHT: 11 ft.; EMPTY WEIGHT: 5,940 lb.; POWERPLANT: 400 hp Liberty; FUEL CAPACITY: 725 gal.; SPEED, 75-110 mph.**

**LOCATION: National Air Museum, Smithsonian Institution, Washington, D. C.**

# WORLD CRUISER
## (1924)

**Two-place, single-engine, high-wing, land or sea monoplane built by Douglas Co.**

**The U. S. Army Air Service World Flight Squadron, flying this model, left Sand Point, Seattle, Wash., at 8:47 a.m., Apr. 6, 1924, on the first successful round-the-world flight. Of the four planes that started, only two, the *New Orleans* and *Chicago*, were able to finish. Oil pressure failure forced the *Boston* to land in a heavy sea on Aug. 3, damaging the plane beyond repair. A *Boston II* was outfitted and finished the flight. The *Seattle* left Chignik for Dutch Harbor but crashed in bad weather.**

**On Sept. 28 at 1:30 p.m., 175 days after take-off, the flight was completed over a distance of 26,345 miles; total flying time, 363 hr.**

**The Douglas World Cruiser became an important stepping stone in the field of long-range transport types, adding a great deal to aviation know-how. Donald Douglas designed it with long-range economical commercial transports as**

his ultimate goal, and was aided by his design background on bombers and torpedo planes.

### CREWS

*Chicago:* Lt. Lowell H. Smith, commanding officer and pilot; Lt. Leslie P. Arnold, alternate pilot and mechanic. *New Orleans:* Lt. Erik H. Nelson, engineering officer and pilot; 2nd Lt. John Harding, Jr., mechanic. *Boston:* Lt. Leigh Wade, pilot; Sgt. Henry H. Ogden, mechanic. *Seattle:* Maj. Frederick L. Martin (commander of flight before crash), pilot; Sgt. Alva L. Harvey, pilot and mechanic.

### SPECS

SPAN: 50 ft.; LENGTH: 36 ft. 6 in.; HEIGHT: 13 ft. 7 in.; EMPTY WEIGHT: landplane, 7,380 lb.; seaplane, 8,180 lb.; POWERPLANT: 400 hp Liberty; FUEL CAPACITY: 450 gal. MAXIMUM SPEED: landplane, 103 mph; seaplane, 100 mph; CRUISING RANGE: landplane, 2,200 miles; seaplane, 1,650 miles.

LOCATION: *(Chicago)*, National Air Museum, Smithsonian Institution, Washington, D. C.

## FORD TRIMOTOR
(1925-29)

A corrugated all-metal transport designed by William B. Stout and built by the Ford Motor Co.

Known as the *Tin Goose*, the Ford trimotor became a production model in 1925. In the next four years, 195 were built at about $49,-000 each. Notably stable and dependable, in their heyday they carried most U. S. passengers; and reached a 10,467,167-mile flight total in 1931. Maj. R. W. "Shorty" Schoeder and John A. Collings were test pilots.

The Ford trimotor, *Floyd Bennett*, carried Richard E. Byrd; Bernt Balchen, pilot; Harold June, radio operator and pilot, and A. C. McKinley, photographer, on the first flight over the South Pole, Nov. 29, 1929.

### SPECS

SPAN: 74 ft.; LENGTH: 49.5 ft.; WEIGHT LOADED: 10,130 lb.; POWERPLANT: 3 Wright "Whirlwinds," 220 hp each. Many powerplant combinations were used on this model. The *Floyd Bennett* on its Antarctic flight was equipped with a Wright "Cyclone" and two Wright "Whirlwinds."

LOCATION: *(Floyd Bennett)*, Edison Institute, Dearborn, Mich.

## R3C-2
(1925)

A single-engine, single-phase tractor biplane, built by Curtiss Aeroplane and Motor Co. as an Army racer.

The R3C-2, piloted by Cy Bettis, won the Pulitzer Trophy Race at Mitchel Field, L. I., Oct. 12, 1925, by averaging 248.99 mph. On Oct. 25, with pontoons, and flown by Lt. James Doolittle, the R3C-2 won the Schneider Trophy with an average speed of 232.573 mph. Records for this plane included: closed circuit over 100 km, 249.34 mph; 100 km, 234.772 mph; 200 km, 248.975 mph. As a seaplane: straightaway 3 km, 245.713 mph; closed circuit, 232.573 mph; 100 km, 234.772 mph; 200 km, 234.355 mph.

Many features in this racer were used later on a number of our standard pursuit models.

### SPECS

SPAN: 22 ft.; LENGTH: 20 ft.; HEIGHT: 8 ft. 3 in.; EMPTY WEIGHT: 2,300 lb.; POWERPLANT: Curtiss V-1400, 665 hp.

LOCATION: National Air Museum, Smithsonian Institution, Washington, D. C.

## SAN FRANCISCO
(1926-27)

A 2-place, single-engine, amphibian biplane with retractable gear built by Loening Aeronautical Engineering Corp.

The *San Francisco* was one of five Loening U. S. Army Air Corps planes in the Pan American Goodwill Flight (first mass amphibian flight) that left San Antonio, Tex. Dec. 21, 1926, under the command of Maj. H. A. Dargue. Twenty-one republics were visited from Texas to Mexico, Central America, across the Andes into Southern Chile, up the South American coast, across the Caribbean Sea, up the North American Atlantic coast to Washington, D. C. where the flight ended May 2, 1927. Total distance, 22,065 miles.

### CREWS

*New York:* Maj. H. A. Dargue and Lt. E. C. Whitehead; *San Antonio:* Capt. Arthur B. McDaniel and Lt. Charles Robinson; *San Francisco:* Capt. Ira C. Eaker and Lt. Muir S. Fairchild; *Detroit:* Capt. Clinton F. Woolsey and

**Lt. John W. Benton; *St. Louis:* Lt. Bernard S. Thompson and Lt. Leonard D. Weddington.**

**The Loening amphibian was designed when the DH-4B was the popular all-purpose aircraft in this country. Loening's plane passed existing performance specifications, with the added advantage of water operation.**

## SPECS

**SPAN: 45 ft.; LENGTH: 34 ft. 8 in.; HEIGHT: 11 ft. 8 in.; EMPTY WEIGHT: 3,780 lb.; USEFUL LOAD: 2,020 lb. WING LOADING: 11.5 lb. per sq. ft. FUEL CAPACITY: 200 gal.; RANGE: 1,000 miles; CRUISING SPEED: 100 mph; POWERPLANT: inverted 400 hp Liberty.**

**LOCATION: National Air Museum, Smithsonian Institution, Washington, D. C.**

# SPIRIT OF ST. LOUIS
(1927)

**A high-wing monoplane built in sixty days by Ryan with special design work by Donald Hall of Ryan, Lindbergh assisting.**

**Prior to his Atlantic crossing Lindbergh set a new transcontinental record of 21 hr., 20 min. (elapsed flying time) in the *Spirit of St. Louis* in a flight from San Diego, Cal. to Curtiss Field, N. Y. (May 9-11, 1927), with one stop in St. Louis, Mo.**

**Lindbergh took off from Roosevelt Field, N. Y., at 6:52 a.m., May 20, 1927, for a solo, non-stop, trans-Atlantic flight to Paris. He flew over New England, Labrador, and Newfoundland before heading out over the Atlantic to Ireland. The next afternoon he crossed the coast of Ireland only two miles off course. After flying across the Irish Sea, south England and over the English Channel, he landed at LeBourget Field, Paris, at 4:22 p.m. (New York time), 33 hr. 30 min. after leaving Roosevelt Field. He flew 3,610 miles and won the $25,000 Raymond Orteig Prize.**

**From July 20, 1927, to Oct. 23, 1927, he flew the *Spirit of St. Louis* on a 48-state tour, covering 22,350 miles, and on Dec. 14 began a Pan American tour making the first leg from Washington to Mexico City non-stop.**

## SPECS

**SPAN: 46 ft.; LENGTH: 27 ft. 3 in.; HEIGHT: 8 ft.; CHORD: 7 ft.; POWERPLANT: Wright J-5-C, 223 bhp at 1,800 rpm; PROPELLER: Standard Steel Propeller Co.—dural set at 16¾ degrees pitch; EMPTY WEIGHT: 2,150 lb.; USEFUL LOAD: 2,985 lb. WING LOADING: 16.1 lb. per sq. ft. (start of flight), 7.57 lb. per sq. ft. (end of flight). MAXIMUM SPEED, FULLY LOADED: 124 mph; ECONOMIC SPEED, FULLY LOADED: 97 mph at 1,670 rpm; RANGE (calculated): between 4,040 and 4,110 miles.**

**LOCATION: National Air Museum, Smithsonian Institution, Washington, D. C. (The *Spirit of St. Louis* was deposited with the Smithsonian Institution by Lindbergh after he had flown it over 42,000 miles. It was first put on display in the Museum, May 13, 1928).**

# MISS COLUMBIA
(1927)

**A single-engine, high-wing monoplane built by G. M. Bellanca.**

***Miss Columbia* made a trans-Atlantic flight beginning at New York, June 4, 1927, and ending for lack of fuel, at Eisleben, Germany, 108 miles from Berlin, the planned goal. Piloted by Clarence Chamberlin, with owner Charles Levine as passenger, the *Miss Columbia* set a world record for non-stop long-distance flight. An airline distance of 3,911 miles was flown (actual distance in avoiding weather was close to 4,500 miles) in 42 hr. 45 min.**

**Before her Atlantic crossing the *Miss Columbia* won the Light Efficiency Trophy of the Aviation Town and Country Club of Detroit in the 1925 New York Air Races, scoring more than 200 points ahead of her nearest rival.**

**On June 29-30, 1930, with Roger Q. Williams and J. Errol Boyd as pilots, and Harry P. Connor, navigator, the *Miss Columbia* made the first round trip, non-stop, New York-to-Bermuda flight; 1,560 miles, in 17 hr. 8 min.**

**On October 9, 1930, Capt. Boyd and Lt. Harry P. Connor took off from Harbor Grace, Newfoundland, for the *Miss Columbia's* second trans-Atlantic hop. The following day in the late afternoon a clogged fuel line forced the plane down at Tresco Island. On the 11th the flight continued to Croydon, London, Eng. Total flying time, 27 hr. 3 min.**

**The eight-year-old *Miss Columbia*, with Boyd and two companions, Robert G. Lyon and Har-**

old Palmer Davis, flew non-stop 2,471 miles from New York to St. Marc, Haiti, June 10-11, 1933 in about 24 hr.

## SPECS

SPAN: 46 ft. 6 in.; LENGTH: 26 ft. 9 in.; HEIGHT: 8 ft. 9 in.; WING CHORD: 6 ft. 7 in.; POWERPLANT: Pratt and Whitney 125 hp (cruising); FUEL CONSUMPTION: 10¾ miles per gal. at 97 mph; MAXIMUM SPEED: 130 mph (1,200 lb. payload); CRUISING SPEED: 110 mph (1,025 lb. payload).

LOCATION: the *Miss Columbia* was destroyed by fire in July, 1935. Other planes of this model unknown if extant.

# QUESTION MARK
(1929)

The *Question Mark* was a U. S. Army Air Corps trimotored, high-wing monoplane designed by Anthony Fokker and built by Fokker Aircraft Corp.

On New Year's morning, 1929, it took off to attempt a new world endurance record. Refueling was done in the air by Douglas biplanes piloted by Capt. Ross G. Hoyt and Lt. Odas Moon. Forty-three contacts were made (nine at night), transferring 5,660 gal. of gas, 245 gal. of oil, and other supplies. On the seventh day one of the engines failed and the plane landed at Los Angeles Municipal Airport, point of original take-off. All records had been broken with the time of 150 hr. 40 min. 51 sec.

## CREW

Maj. Carl Spaatz, commander; Capt. Ira Eaker, Lt. Elwood R. Quesada, and Lt. Harry A. Halverson, pilots; and Staff Sgt. Roy Hooe, mechanic.

The flight of the *Question Mark* inspired several other successful endurance attempts the same year. James Kelly and Reginald L. Robbins took off from Fort Worth, Tex. in a reconditioned Ryan monoplane, the *Fort Worth,* and set a new endurance record of 172 hr. 32 min. 2 sec. Byron K. Newcomb and Roy L. Mitchell, in their Stinson "Detroiter," *City of Cleveland,* left Cleveland Airport on June 28, and didn't land until they had established a record of 174 hr. 59 sec. The *Angeleno,* a Buhl "Airsedan," flown by Loren W. Mendell and Roland B. Reinhart, took off from Culver City, Cal., July 2, and another new record—246 hr. 43 min. 2 sec. The day after the *Angeleno* landed, Dale Jackson and Forest O'Brine started a flight in a Robin monoplane, built by Curtiss-Robertson, to test the new Curtiss "Challenger" engine. It was not intended to attempt a new endurance record, but during the flight it was announced that a try would be made. After 18 days the fliers were asked to land by company officials. The new record now stood at 420 hr. 21 min. 30 sec. (This record was raised to 647 hr. 28 min. by these fliers in the same plane July 21 to Aug. 17, 1930.)

The Texas Company sponsored a flight by Lt. N. B. Mamer and Art Walker who took off August 15 in their Buhl sesquiplane, *Spokane Sun God,* to test refueling on a cross-country endurance flight. Several refueling planes were stationed along their route to New York and return: 115 hr. 45 min. later the plane returned to its starting point in Spokane, Wash., after flying 7,200 miles, exceeding the record for non-stop flight which had been held by the *Graf Zeppelin* on its record flight from Friedrichshafen to Tokyo.

## SPECS

SPAN: 71 ft. 2 in.; LENGTH: 48 ft. 4 in.; GROSS WEIGHT: 9,715 lb.; POWERPLANT: 3 Wright R-790-1, 225 hp each.

LOCATION: The *Question Mark* is not preserved as a unit, but the center engine is on display in the National Air Museum, Smithsonian Institution, Washington, D. C. An example of this model is the *Southern Cross* on display at the Melbourne Museum, Melbourne, Australia. Charles E. Kingsford-Smith and his crew made many notable flights in this plane including one from Oakland, Calif., to Brisbane Australia, May 31 to June 9, 1930; a distance of 7,400 miles in 83 hr. 15 min. elapsed flying time.

## AVIATION WONDERS

Lord Thomson, former Secretary of State for Air in Great Britain, holds safety is vital to progress and 80 mph fast enough. The future of aviation depends upon safety, and what is most needed at present for civil aviation is a plane that will fly low and slowly, in the opinion of Lord Thomson, who sailed early this morning on the Olympic.—*New York Times,* Dec. 22, 1928.

## WINNIE MAE
(1931)

**A 2-place (modified from 7-place) single-engine, cantilevered high-wing monoplane (Lockheed Vega) built by Detroit Aircraft Corp.**

**Wiley Post, pilot, and Harold Gatty, navigator, left Roosevelt Field, N. Y., June 23, 1931 on a successful round-the-world flight ending July 1. 15,474 miles were covered in 8 days 15 hr. 51 min. (total flying time, 4 days 10 hr. 8 min.), setting a new record and beating their own guess of ten days for the flight.**

**On July 15, 1933, Post started a record-breaking solo round-the-world flight in the *Winnie Mae*, following about the same course, but making eleven stops instead of fourteen. He set a new record of 7 days 18 hr. 49 min.**

**Other record-breaking flights of the *Winnie Mae* included: Los Angeles to Chicago, 9 hr. 9 min. 4 sec. Aug. 27, 1930; Los Angeles to Cleveland in sub-stratosphere (340 mph) Mar. 15, 1935.**

**On altitude flights, the gear was dropped after takeoff to reduce weight and drag. To eliminate propeller damage on "belly" landings, a crank operated from the cockpit set the propeller horizontally.**

### SPECS

**SPAN: 41 ft.; LENGTH: 27 ft. 6 in.; HEIGHT: 8 ft. 2 in.; EMPTY WEIGHT: 2,595 lb.; POWERPLANT: Pratt and Whitney supercharged "Wasp," 425 hp.**

**LOCATION: National Air Museum, Smithsonian Institution, Washington, D. C. (Purchased by special Congressional appropriation from Mrs. Post for $25,000. Received by the Museum, Dec. 2, 1935.)**

## S-42
(1934)

**A 32-passenger boat monoplane manufactured by the Sikorsky Aircraft Corp.**

**Built for Pan American Airways for Caribbean and trans-ocean service, the S-42 was the first clipper flying boat, and a marked advance in long-range transport design. Test pilot was Capt. Boris Sergievsky.**

**Among the records, for this class, set by the S-42 were: Altitude: 6,671.7 ft., load of 16,608 lb., Apr. 26, 1934; 20,406.7 ft., load of 11,023 lb. May 17, 1934. Speed (Aug. 1, 1934): 157.58 mph over 621.369 miles; 157.319 mph over 1,242.739 miles; 157.58 mph over 621.369 miles, load, 1,102.31 lb.; 157.58 mph over 621.369 miles, load, 2,204.62 lb.; 157.58 mph over 621.369 miles, load, 4,409.24 lb.; 157.319 mph over 1,242.739 miles, load, 1,102.31 lb.; 157.319 mph over 1,242.739 miles, load, 2,204.62 lb.; 157.319 mph over 242.739 miles, load, 4,409.24 lb.**

### SPECS

**SPAN: 114 ft. 2 in.; HULL LENGTH: 67 ft. 8 in.; GROSS WEIGHT: 8,000 lb.; POWERPLANT: 4 Pratt and Whitney S5D1-G, 700 hp each; NORMAL FUEL CAPACITY: 1,240 gal.; CRUISING RANGE 1,200 miles.**

**LOCATION: Unknown if extant in U. S. Possibly still flying abroad.**

## BOEING 247-D
(1934)

**A 12-place, twin-engine, cantilevered, transport monoplane.**

**Roscoe Turner and Clyde Pangborn flew a 247-D in the MacRobertson Race in Oct., 1934. Entered as a stock transport against the racing designs of the other twelve entries, the 247-D's time for the 11,300 miles between Mildenhall, England, and Melbourne, Australia, was 92 hr. 55 min. 38 sec., placing it third in the field. It became the first transport to exceed three miles per minute.**

### SPECS

**SPAN: 74 ft.; LENGTH: 51 ft. 4 in.; EMPTY WEIGHT: 8,940 lb.; GROSS WEIGHT: 13,650 lb.; PAYLOAD: 2,582 lb. WING LOADING: 16.3 lb. per sq. ft. POWER LOADING: 12.4 lb. per hp; MAXIMUM SPEED: 220 mph; CRUISING SPEED: 189 mph at 12,000 ft.; POWERPLANT: 2 Pratt and Whitney "Wasps," 550 hp each; SERVICE CEILING: 25,400 ft.; RANGE: 800 miles.**

**LOCATION: The 247-D flown by Turner and Pangborn is now being used by CAA for experimental radio work, but is destined for the National Air Museum, Washington, D. C., on retirement. Others of this model are still in limited service.**

## POLAR STAR
(1935)

**An all-metal, ski-equipped, low-wing monoplane (Gamma) built by the Northrop Corp.**

**After two unsuccessful attempts, Lincoln Ellsworth and Herbert Hollick-Kenyon, pilot, took off from Dundee Island in the Weddell Sea Nov. 23, 1935, to fly 2,140 miles to Admiral Byrd's base at Little America. Weather and head winds caused several delays and a forced landing from lack of fuel only 16 miles from their goal, which they reached on foot.**

**Only damage to the *Polar Star* was a dented nose section and a few marks from a snow shovel that was used to dig it out after a blizzard.**

### SPECS

**SPAN: 48 ft.; LENGTH: 29 ft. 10 in.; HEIGHT: 10 ft. 9 in.; EMPTY WEIGHT: 3,614 lb.; POWERPLANT: Pratt and Whitney "Wasp," 500 hp.**

**LOCATION: National Air Museum, Smithsonian Institution, Washington, D. C. (Ellsworth presented the *Polar Star* to the Museum in 1936 provided it could be used when and if needed. It is kept in flying shape.)**

## VS-300
(1941)

**The VS-300, an experimental helicopter, was built by Vought-Sikorsky Aircraft.**

**This model, flown in 1939, was the first successful main lifting rotor helicopter in the world. The models that followed set many records, including the first officially recorded flight for this type in the Western Hemisphere, 1 hr., 5 min. 14.5 sec., Apr. 15, 1941 (VS-300-A).**

### SPECS

**MAIN ROTOR: diam., 28 ft., 225 rpm; AUXILIARY ROTOR: diam., 6 ft. 8 in., 1,700 rpm; POWERPLANT: Franklin 75 and 150 hp.**

**LOCATION: Edison Institute, Dearborn, Mich.**

### AVIATION WONDERS

**"The development of the airplane has been far faster than I ever dreamed. . . . In fact I fear that it is growing too fast for its own good. . . . I fear it is growing faster than its public."—Orville Wright, *Arkansas Gazette*, April 30, 1926.**

# DIRECTORY SECTION

(NOTE: The following list has been compiled principally from American Aviation Directory, published by American Aviation Publications, Inc., Wayne W. Parrish, Editor.)

## STATE AND NATIONAL GOVERNMENT ORGANIZATIONS AND COMMITTEES

### NATIONAL AGENCIES

| ORGANIZATION | ADDRESS | EXECUTIVE |
|---|---|---|
| Department of Agriculture | Agriculture Bldg. Washington 25, D. C. | Dr. P. N. Annand Chief, Bureau of Entomology & Plant Quarantine |
| Air Coordinating Committee | 6835 Commerce Bldg. Washington 25, D. C. | Joseph J. O'Connell, Jr. Chairman |
| U. S. Air Force | Pentagon Washington 25, D. C. | W. Stuart Symington Secretary of the Air Force |
| Air Navigation Development Board | Room 5126 Commerce Building Washington 25, D. C. | R. S. Damon Chairman |
| Bureau of the Budget | Old State Dept. Bldg. Washington 25, D. C. | Frank Pace, Jr. Director |
| Civil Aeronautics Administration | Commerce Building Washington 25, D. C. | D. W. Rentzel Administrator |
| Civil Aeronautics Board | Commerce Building Washington 25, D. C. | Joseph J. O'Connell, Jr. Chairman |
| Civil Air Patrol | Bolling Field Washington 20, D. C. | Maj. Gen. Lucas V. Beau National Commander |
| Coast and Geodetic Survey | Commerce Building Washington 25, D. C. | Rear Adm. Leo O. Colbert Director |
| U. S. Coast Guard | 13th & E Sts., N.W. Washington 25, D. C. | Admiral J. F. Farley Commandant |
| Department of Commerce | Commerce Building Washington 25, D. C. | C. V. Whitney Under Secretary of Commerce |
| Senate Appropriations Committee | Senate Office Building Washington, D. C. | Kenneth McKellar (D., Tenn.) Chairman* |
| Senate Armed Services Committee | Senate Office Building Washington, D. C. | Millard E. Tydings (D., Md.) Chairman* |
| Senate Expenditures in the Executive Departments Committee | Senate Office Building Washington, D. C. | John L. McClellan (D., Ark.) Chairman* |
| Senate Finance Committee | Senate Office Building Washington, D. C. | Walter F. George (D., Ga.) Chairman* |
| Senate Foreign Relations Committee | Senate Office Building Washington, D. C. | Tom Connally (D., Texas) Chairman* |
| Senate Interstate and Foreign Commerce Committee | Senate Office Building Washington, D. C. | Edwin C. Johnson (D., Colo.) Chairman* |
| Senate Post Office & Civil Service Committee | Senate Office Building Washington, D. C. | Olin D. Johnston (D., S. C.) Chairman* |

| | | |
|---|---|---|
| House Appropriations Committee | House Office Building<br>Washington, D. C. | Clarence Cannon (D., Mo.)<br>Chairman* |
| House Armed Services Committee | House Office Building<br>Washington, D. C. | Carl Vinson (D., Ga.)<br>Chairman* |
| House Expenditures in the Executive Departments Committee | House Office Building<br>Washington, D. C. | William L. Dawson (D., Ill.)<br>Chairman* |
| House Interstate and Foreign Commerce Committee | House Office Building<br>Washington, D. C. | Robert Crosser (D., Ohio)<br>Chairman* |
| House Post Office and Civil Service Committee | House Office Building<br>Washington, D. C. | Tom Murray (D., Tenn.)<br>Chairman* |

*See the end of this section for full membership.

| | | |
|---|---|---|
| Customs Bureau | 1512 H St., N.W.<br>Washington 25, D. C. | Frank Dow<br>Acting Commissioner |
| Federal Communications Commission | 6149 New Post Office Bldg.<br>Washington 25, D. C. | Wayne Coy<br>Chairman |
| Immigration & Naturalization Service | 19th & E. Capitol Sts.<br>Washington 25, D. C. | E. E. Salisbury<br>Operations Advisor |
| Interdepartmental Committee on Airports of Entry | 1512 H St., N.W.<br>Washington 25, D. C. | Frank Dow<br>Chairman |
| Library of Congress Aeronautics Division | Washington 25, D. C. | Richard S. F. Eells<br>Chief |
| U. S. Marine Corps | Navy Building<br>Washington 25, D. C. | Maj. Gen. William J. Wallace<br>(Asst. Commandant—Air) |
| National Advisory Committee for Aeronautics | 1724 F St., N.W.<br>Washington 25, D. C. | Jerome C. Hunsaker<br>Chairman |
| National Bureau of Standards | Connecticut Ave. &<br>Van Ness St.<br>Washington 25, D. C. | E. U. Condon<br>Director |
| National Military Establishment | The Pentagon<br>Washington 25, D. C. | Louis A. Johnson<br>Secretary of Defense |
| National Security Resources Board | 88 State Dept. Bldg.<br>17th & Penna. Ave.<br>Washington 25, D. C. | John R. Steelman<br>Acting Chairman |
| U. S. Navy | Navy Building<br>Washington 25, D. C. | Francis P. Matthews<br>Secretary of the Navy |
| Post Office Department<br>Air Postal Transport | P. O. Dept. Bldg.<br>Washington 25, D. C. | Jesse M. Donaldson<br>Postmaster General |
| Public Health Service | Federal Security Bldg.<br>3rd & C Sts., S. W.<br>Washington 25, D. C. | Dr. Gilbert L. Dunahoo<br>M. D. Hollis |
| Radio Technical Commission for Aeronautics | Room 1236, Annex 2,<br>State Dept. Bldg.<br>23rd & D. Sts., N.W.<br>Washington 25, D. C. | Dr. J. H. Dellinger<br>Chairman |
| Reconstruction Finance Corporation | 811 Vermont Ave., N.W.<br>Washington 25, D. C. | Harley Hise<br>Chairman |
| Smithsonian Institution | The Mall<br>Washington 25, D. C. | Dr. Alexander Wetmore<br>Chairman |
| Search & Rescue Agency | 1300 E St., N.W.<br>Washington 25, D. C. | Admiral J. F. Farley<br>Commandant |

| | | |
|---|---|---|
| State Department | 21st St. & Virginia Ave. N.W.<br>Washington 25, D. C. | Dean Acheson<br>Secretary of State |
| Weather Bureau | 24th & M Sts., N.W.<br>Washington 25, D. C. | Francis W. Reichelderfer<br>Chief of Bureau |

STATE AGENCIES

| | | |
|---|---|---|
| Alabama Department of Aeronautics | 102 Church St.<br>P. O. Box 751<br>Montgomery 4, Ala. | W. Hayden Brooks<br>Chairman |
| Arizona Corporation Commission | Phoenix, Ariz. | William T. Brooks<br>Chairman |
| Arkansas Aeronautics Commission | 101 Towson Ave.<br>Fort Smith, Ark. | Rutherford J. Ross<br>Chairman |
| California Aeronautics Commission | 817 Tenth St.<br>Sacramento 14, Cal. | Fred D. Fagg, Jr.<br>Chairman |
| Colorado Aeronautics Commission | 302 State Capitol<br>Denver 2, Colo. | Harry S. Petersen<br>Chairman |
| Connecticut Department of Aeronautics | P. O. Box 1649<br>Hartford 1, Conn. | Francis S. Murphy<br>Chairman |
| Delaware Aeronautics Commission | duPont Building<br>Wilmington, Del. | Hugh R. Sharp, Jr.<br>Chairman |
| Florida State Improvement Commission | P.O. Box 149<br>Tallahassee, Fla. | Fuller Warren<br>Chairman |
| Georgia Aviation Commission | (Inactive Status) | |
| Hawaii Aeronautics Commission | John Rogers Terminal<br>Honolulu Airport<br>P.O. Box 860<br>Honolulu 8, Hawaii | Roy R. Bright<br>Chairman |
| Idaho Department of Aeronautics | Room 200-A<br>State House<br>Boise, Idaho | Chester Moulton<br>Director of Aeronautics |
| Illinois Department of Aeronautics | Capital Airport<br>Springfield, Ill. | Joseph K. McLaughlin<br>Director |
| Indiana Aeronautics Commission | 306 Board of Trade Bldg.<br>Indianapolis, Ind. | C. F. Cornish<br>Director |
| Iowa Aeronautics Commission | State House<br>Des Moines, Iowa | Guy C. Richardson<br>Chairman |
| Kansas Industrial Development Commission | Topeka, Kansas | Deane E. Ackers<br>Chairman |
| Kentucky Department of Aeronautics | Old Capitol Annex<br>First Floor<br>Frankfort, Ky. | Charles H. Gartrell<br>Commissioner |
| Louisiana Dept. of Public Works, Aeronautics Div. | Baton Rouge 4, La. | Col. J. Lester White<br>Director of Public Works |
| Marine Aeronautics Commission | State Airport<br>Augusta, Me. | Harry E. Umphrey<br>Chairman |
| State Aviation Commission of Maryland | Munsey Bldg.<br>Baltimore 2, Md. | Philip Hayes<br>Chairman |
| Massachusetts Aeronautics Commission | Logan Airport<br>East Boston 28, Mass. | Crocker Snow<br>Director |

| | | |
|---|---|---|
| Michigan Aeronautics Commission | Capital City Airport<br>P.O. Box 358<br>Lansing 2, Mich. | Cass S. Hough<br>Chairman |
| Minnesota Department of Aeronautics | Holman Field<br>St. Paul 1, Minn. | L. L. Schroeder<br>Commissioner |
| Mississippi Aeronautics Commission | Army Air Base<br>P.O. Box 1727<br>Jackson, Miss. | F. G. Thomas<br>Chairman |
| Missouri Aviation Section State Division of Resources & Development | State Office Bldg.<br>Jefferson City, Mo. | Clyde W. Pace, Jr.<br>Director |
| Montana Aeronautics Commission | P.O. Box 1689<br>Helena, Mont. | William G. Ferguson<br>Chairman |
| Nebraska Department of Aeronautics | State House<br>Lincoln 9, Nebr. | James D. Ramsey<br>Director |
| Nevada Public Service Commission | Carson City, Nev. | J. G. Allard<br>Chairman |
| New Hampshire Aeronautics Commission | State Office Bldg.<br>Concord, N. H. | J. A. Roul Bischoff<br>Chairman |
| New Jersey Department of Aviation | Trenton 8, N. J. | R. L. Copsey<br>Director |
| New Mexico Aeronautics Commission | (Inactive status) | |
| New York Sate Department of Commerce<br>Bureau of Aviation | 112 State St.<br>Albany, N. Y. | Claude B. Friday<br>Acting Director |
| North Carolina Aviation Commission | Burgaw, N. C. | Roy Rowe<br>Chairman |
| North Dakota Aeronautics Commission | Bismarck, N. D. | Wesley E. Keller<br>Chairman |
| Ohio Aviation Board | 501 Wyandotte Bldg.<br>Columbus, O. | Warren G. Grimes<br>Chairman |
| Oklahoma Aviation Commission | State Capitol<br>P.O. Box 3055<br>Oklahoma City, Okla. | A. W. Hays<br>Chairman |
| Oregon State Board of Aeronautics | Salem, Oregon | Ben F. Ruffner<br>Chairman |
| Pennsylvania Aeronautics Commission | Harrisburg Airport<br>New Cumberland, Pa. | William L. Anderson<br>Executive Director |
| Puerto Rico Transportation Authority | P.O. Box 3508<br>San Juan, P. R. | Salvador V. Caro<br>General Mgr. |
| Rhode Island Department of Public Works, Division of Aeronautics | State Office Bldg.<br>Providence 3, R. I. | Philip S. Mancini<br>Director of Public Works |
| South Carolina Aeronautics Commission | Columbia, S. C. | Edgar C. Glenn., Jr.<br>Chairman |
| South Dakota Aeronautics Commission | Pierre, S. D. | L. V. Hanson<br>Chairman |
| Tennessee Bureau of Aeronautics | Berry Field<br>P.O. Box 568<br>Nashville 2 Tenn. | Herbert Fox<br>Director |
| Texas Aeronautics Commission | Austin, Tex. | Henry Ayres<br>Chairman |

| | | |
|---|---|---|
| **Utah State Aeronautics Commission** | **439 Capitol Bldg.<br>Salt Lake City, Utah** | **D. H. Whittenburg<br>Chairman** |
| **Vermont Aeronautics Commission** | **State House<br>Montpelier, Vt.** | **Lee C. Warner, Jr.<br>Chairman** |
| **Virginia State Corporation Commission** | **Mezzanine, State Museum<br>Finance Bldg.<br>Richmond 19, Va.** | **Col. Allan C. Perkinson<br>Director, Div. of Aeronautics** |
| **Washington State Aeronautics Commission** | **Suite 410<br>905 Second Ave. Bldg.<br>Seattle 4, Wash.** | **A. Elliott Merrill<br>Chairman** |
| **West Virginia State Aeronautics Commission** | **State Capitol<br>Charleston 5, W. Va.** | **T. Guy Reynolds, Jr.<br>Chairman** |
| **Wisconsin State Aeronautics Commission** | **404 Washington Bldg.<br>Madison 3, Wis.** | **Howard A. Morey<br>Chairman** |
| **Wyoming Aeronautics Commission** | **Room 31<br>State Capitol Bldg.<br>Cheyenne, Wy.** | **Walter F. Peters<br>Chairman** |

## SENATE APPROPRIATIONS COMMITTEE

**Kenneth McKellar (D., Tenn.)**
**Chairman**
**Carl Hayden (D., Ariz.)**
**Elmer Thomas (D., Okla.)**
**Richard B. Russell (D., Ga.)**
**Patrick A. McCarran (D., Nev.)**
**Joseph C. O'Mahoney (D., Wyo.)**
**Dennis Chavez (D., N. M.)**
**Burnet R. Maybank (D., S. C.)**
**Allen J. Ellender (D., La.)**
**Lister Hill (D., Ala.)**
**Harley M. Kilgore (D., W. Va.)**
**John L. McClellan (D., Ark.)**
**A. Willis Robertson (D., Va.)**
**Styles Bridges (R., N. H.)**
**Chan Gurney (R., S. D.)**
**Clyde M. Reed (R., Kans.)**
**Homer Ferguson (R., Mich.)**
**Kenneth S. Wherry (R., Neb.)**
**Guy Cordon (R., Ore.)**
**Leverett Saltonstall (R., Mass.)**
**Milton R. Young (R., N. D.)**

**Subcommittees on Aviation:**

***Armed Services:*** **Thomas, Chairman; Hayden, O'Mahoney, Chavez, McCarran, Maybank, Hill, McClellan, Robertson, Gurney, Bridges, Reed Ferguson, Wherry, Cordon, Saltonstall.**
***State — Justice — Commerce:*** **McCarran, Chairman; McKellar, Ellender, Hill, Kilgore, McClellan, Robertson, Saltonstall, Bridges, Wherry, Ferguson, Gurney.**
***Treasury—Post Office:*** **Maybank, Chairman; Hayden, Kilgore, McClellan, Robertson, Cordon, Reed, Bridges, Saltonstall.**

## SENATE ARMED SERVICES COMMITTEE

**Millard E. Tydings (D., Md.)**
**Chairman**
**Richard B. Russell (D., Ga.)**
**Harry Flood Byrd (D., Va.)**
**Virgil Chapman (D., Ky.)**
**Lyndon B. Johnson (D., Tex.)**
**Estes Kefauver (D., Wyo.)**
**Lester C. Hunt (D., Wyo.)**
**Styles Bridges (R., N. H.)**
**Chan Gurney (R., S. D.)**
**Leverett Saltonstall (R., Mass.)**
**Wayne Morse (R., Ore.)**
**Raymond E. Baldwin (R., S. D.)**
**William F. Knowland (R., Cal.)**

## SENATE FOREIGN RELATIONS COMMITTEE

**Tom Connally (D., Tex.)**
**Chairman**
**Walter F. George (D., Ga.)**
**Elbert D. Thomas (D., Utah)**
**Millard E. Tydings (D., Md.)**
**Claude Pepper (D., Fla.)**
**Theodore F. Green (D., R. I.)**
**Brien McMahon (D., Conn.)**
**J. W. Fulbright (D., Ark.)**
**Arthur H. Vandenberg (R., Mich.)**

## SENATE INTERSTATE AND FOREIGN COMMERCE

**Edwin C. Johnson (D., Colo.)**
**Chairman**
**Ernest W. McFarland (D., Ariz.)**
**Warren G. Magnuson (D., Wash.)**
**Francis J. Myers (D., Pa.)**
**Brien McMahon (D., Conn.)**
**Herbert R. O'Conor (D., Md.)**
**Lyndon B. Johnson (D., Tex.)**
**Estes Kefauver (D., Tenn.)**
**Charles W. Tobey (R., N. H.)**
**Clyde M. Reed (R., Kans.)**
**Owen Brewster (R., Me.)**
**Homer E. Capehart (R., Ind.)**
**John W. Bricker (R., Ohio)**

## SENATE FINANCE COMMITTEE

**Walter F. George (D., Ga.)**
**Chairman**
**Tom Connally (D., Tex.)**
**Harry Flood Byrd (D., Va.)**
**Edwin C. Johnson (D., Colo.)**
**Scott W. Lucas (D., Ill.)**
**Clyde R. Hoey (D., N. C.)**

Eugene D. Millikin (R., Colo.)
Robert A. Taft (R., Ohio)
Hugh Butler (R., Neb.)
Owen Brewster (R., Me.)
Edward Martin (R., Pa.)
John J. Williams (R., Del.)

### SENATE EXPENDITURES IN THE EXECUTIVE DEPARTMENTS COMMITTEE

John L. McClellan (D., Ark.)
Chairman
James O. Eastland (D., Miss.)
Clyde R. Hoey (D., N. C.)
Glen H. Taylor (D., Idaho)
Herbert R. O'Conor (D., Md.)
Russell B. Long (D., La.)
Hubert H. Humphrey (D., Minn.)
Joseph R. McCarthy (R., Wis.)
Karl E. Mundt (R., S. D.)
Margaret Chase Smith (R., Me.)
Andrew F. Schoeppel (R., Kans.)
Irving M. Ives (R., N. Y.)
Arthur H. Vandenberg (R., Mich.)

### SENATE POST OFFICE AND CIVIL SERVICE COMMITTEE

Olin D. Johnston (D., S. C.)
Chairman
Kenneth McKellar (D., Tenn.)
Herbert R. O'Conor (D., Md.)
J. Melville Broughton (D., N. C.)
Russell B. Long (D., La.)
Matthew M. Neely (D., W. Va.)
J. Allen Frear, Jr. (D., Del.)
William Langer (R., N. D.)
Ralph E. Flanders (R., Vt.)
Raymond E. Baldwin (R., Conn.)
Edward J. Thye (R., Minn.)
Zales N. Ecton (R., Mont.)
Robert C. Hendrickson (R., N. J.)

### HOUSE POST OFFICE AND CIVIL SERVICE COMMITTEE

Tom Murray (D., Tenn.)
Chairman
James H. Morrison (D., La.)
George P. Miller (D., Cal.)
James C. Davis (D., Ga.)
John Bell Williams (D., Miss.)
John A. Whitaker (D., Ky.)
Thurman C. Crook (D., Ind.)
Raymond W. Karst (D., Mo.)
Homer Thornberry (D., Tex.)
James V. Buckley (D., Ill.)
F. Ertek Carlyle (D., N. C.)
Eugene J. McCarthy (D., Minn.)
A. S. Herlong, Jr. (D., Fla.)
Chester C. Gorski (D., N. Y.)
George M. Rhodes (D., Pa.)
Edward H. Rees (R., Kans.)
Harold C. Hagen (R., Minn.)
Robert J. Corbett (R., Pa.)
Katharine St. George (R., N. Y.)
Antoni N. Sadlak (R., Conn.)
Edward H. Jenison (R., Ill.)
Usher L. Burdick (R., N. D.)
Gardner R. Withrow (R., Wis.)
H. R. Gross (R., Iowa)
James S. Golden (R., Ky.)

### HOUSE ARMED SERVICES COMMITTEE

Carl Vinson (D., Ga.)
Chairman
Overton Brooks (D., La.)
Paul J. Kilday (D., Tex.)
Carl T. Durham (D., N. C.)
Lansdale G. Sasscer (D., Md.)
James V. Heffernan (D., N. Y.)
L. Mendel Rivers (D., S. C.)
Philip J. Philbin (D., Mass.)
F. Edward Herbert (D., La.)
Arthur Winstead (D., Miss.)
Franck R. Havenner (D., Cal.)
Melvin Price (D., Ill.)
O. C. Fisher (D., Tex.)
Porter Hardy, Jr. (D., Va.)
William J. Green, Jr. (D., Pa.)
Clyde Doyle (D., Cal.)
Edward deGraffenried (D., Ala.)
John R. Walsh (D., Ind.)
L. Gary Clements (D., N. Y.)
E. L. Bartlett (D., Alaska)
A. Fernos-Isern (D., P. R.)
Dewey Short (R., Mo.)
Leslie C. Arends (R., Ill.)
W. Sterling Cole (R., N. Y.)
J. Parnell Thomas (R., N. J.)
George J. Bates (R., Mass.)
Paul W. Shafer (R., Mich.)
Charles H. Elston (R., Ohio)
Jack Z. Anderson (R., Cal.)
William W. Blackney (R., Mich.)
Leroy Johnson (R., Cal.)
Harry L. Towe (R., N. J.)
Leon H. Gavin (R., Pa.)
Watler Norblad (R., Ore.)
James E. Van Zandt (R., Pa.)
Joseph R. Farrington (R., Hawaii)

### HOUSE APPROPRIATIONS COMMITTEE

Clarence Cannon (D., Mo.)
Chairman
John H. Kerr (D., N. C.)
George H. Mahon (D., Tex.)
Harry R. Sheppard (D., Cal.)
Albert Thomas (D., Tex.)
Michael J. Kirwan (D., Ohio)
W. F. Norrell (D., Ark.)
Albert Gore (D., Tenn.)
Jamie L. Whitten (D., Miss.)
George W. Andrews (D., Ala.)
John J. Rooney (D., N. Y.)
J. Vaughan Gary (D., Va.)
Joe B. Bates (D., Ky.)
John E. Fogarty (D., R. I.)
Henry M. Jackson (D., Wash.)
Robert L. F. Sikes (D., Fla.)
Antonio M. Fernandez (D., N. M.)
William G. Stigler (D., Okla.)
E. H. Hedrick (D., W. Va.)
Prince H. Preston, Jr. (D., Ga.)
Otto E. Passman (D., La.)
Louis C. Rabaut (D., Mich.)
Daniel J. Flood (D., Pa.)
Christopher C. McGrath (D., N. Y.)
Sidney R. Yates (D., Ill.)
Foster Furcolo (D., Mass.)
Edward H. Kruse, Jr. (D., Ind.)
John Taber (R., N. Y.)
Richard B. Wigglesworth (R., Mass.)
Charles A. Plumley (R., Vt.)
Albert J. Engel (R., Mich.)

Karl Stefan (R., Neb.)
Francis H. Case (R., S. D.)
Frank B. Keefe (R., Wis.)
Ben F. Jensen (R., Iowa)
H. Carl Anderson (R., Minn.)
Walt Horan (R., Wash.)
Gordon Canfield (R., N. J.)
Ivor D. Fenton (R., Pa.)
Ralph E. Church (R., Ill.)
Lowell Stockman (R., Ore.)
John Phillips (R., Cal.)
Errett P. Scrivner (R., Kans.)
Frederick R. Coudert, Jr. (R., N. Y.)
Cliff Clevenger (R., Ohio)

### HOUSE EXPENDITURES IN THE EXECUTIVE DEPARTMENTS COMMITTEE

William L. Dawson (D., Ill.)
Chairman
Chet Holifield (D., Cal.)
Henderson Lanham (D., Ga.)
Porter Hardy, Jr. (D., Va.)
Frank M. Karsten (D., Mo.)
John W. McCormack (D., Mass.)
C. Bonner (D., N. C.)
George G. Sadowski (D., Mich.)
Walter B. Huber (D., Ohio)
John A. Blatnik (D., Minn.)
Harold D. Donohue (D., Mass.)
Earl T. Wagner (D., Ohio)
Robert L. Coffey, Jr. (D., Pa.)
William P. Bolton (D., Md.)
M. G. Burnside (D., W. Va.)
Rochard Bolling (D., Mo.)
Anthony F. Tauriello (D., N. Y.)
Clare E. Hoffman (R., Mich.)
Robert F. Rich (R., Pa.)
R. Walter Riehlman (R., N. Y.)
Ralph Harvey (R., Ind.)
Charles A. Halleck (R., Ind.)
Harold O. Lovre (R., S. D.)
William L. Pfeiffer (R., N. Y.)

### HOUSE INTERSTATE AND FOREIGN COMMERCE COMMITTEE

Robert Crosser (D., Ohio)
Chairman
Alfred L. Bulwinkle (D., N. C.)
Lindley Beckworth (D., Tex.)
J. Percy Priest (D., Tenn.)
Oren Harris (D., Ark.)
George G. Sadowski (D., Mich.)
Dwight L. Rogers (D., Fla.)
Eugene J. Keogh (D., N. Y.)
Arthur G. Klein (D., N. Y.)
Thomas B. Stanley (D., Va.)
John B. Sullivan (D., Mo.)
William T. Granahan (D., Pa.)
Andrew J. Biemiller (D., Wis.)
John A. McGuire (D., Conn.)
George H. Wilson (D., Okla.)
Neil J. Linehan (D., Ill.)
Thomas R. Underwood (D., Ky.)
Charles A. Wolverton (R., N. J.)
Carl Hinshaw (R., Cal.)
Leonard W. Hall (R., N. Y.)
Joseph P. O'Hara (R., Minn.)
Wilson D. Gillette (R., Pa.)
Robert Hale (R., Me.)
Harris Ellsworth (R., Ore.)
James I. Dolliver (R., Iowa)
John W. Heselton (R., Mass.)
Hugh D. Scott, Jr. (R., Pa.)
John B. Bennett (R., Mich.)

### SUBCOMMITTEE ON TRANSPORTATION

Beckworth, Chairman: Harris, Rogers, Klein, Sullivan, McGuire, Wolverton, Hinshaw, Hall, O'Hara.

## CERTIFICATED AIR CARRIERS

| | | |
|---|---|---|
| Air Commuting, Inc. | 23rd St. & East River<br>New York 10, N. Y. | Robert Ducas<br>President |
| All American Airways, Inc. | Washington Nat'l Airport<br>Washington, D. C. | Robert M. Love<br>President |
| American Airlines, Inc.<br>American Overseas Airlines, Inc. | 100 E. 42nd St.<br>New York 17,N.Y. | C. R. Smith<br>President |
| Arizona Airways, Inc. | 237 Adams Hotel Bldg.<br>Phoenix. Ariz. | H. O. Nelson<br>President |
| Braniff Airways, Inc. | Love Field<br>Dallas 9, Texas | T. E. Braniff<br>President |
| Capital Airlines, Inc. | Washington Nat'l Airport<br>Washington, D. C. | J. H. Carmichael<br>President |
| Caribbean-Atlantic Airlines, Inc. | P. O. Box 3214<br>San Juan, Puerto Rico | Dionisio Trigo<br>President |
| Catalina Air Transport | Catalina Airport<br>Avalon, Cal. | |
| Central Airlines, Inc. | 6109 Camp Bowie Blvd.<br>Fort Worth, Tex. | Keith Kahle<br>President |
| Challenger Airlines Co. | Stapleton Airfield<br>Denver 7, Colo. | Donald A. Duff<br>President |
| Chicago and Southern Airlines, Inc. | Memphis Municipal Airport<br>Memphis 2, Tenn. | Sidney A. Stewart<br>President |
| Colonial Airlines, Inc. | 630 Fifth Ave.<br>New York 20, N. Y. | Sigmund Janas<br>President |
| Continental Air Lines | Stapleton Airfield<br>Denver 7, Colo. | Robert F. Six<br>President |

| | | |
|---|---|---|
| Delta Air Lines, Inc. | Atlanta Municipal Airport<br>Atlanta, Ga. | C. E. Woolman<br>President |
| Eastern Air Lines, Inc. | 10 Rockefeller Plaza<br>New York 20, N. Y. | E. V. Rickenbacker<br>President |
| Empire Air Lines, Inc. | Gowen Field<br>Box 268, Boise, Idaho | Joe Lux<br>President |
| Flying Tiger Line, Inc. | Lockheed Air Terminal<br>Burbank, Cal. | Robert W. Prescott<br>President |
| Hawaiian Airlines Ltd. | Inter-Island Bldg.<br>P.O. Box 3287<br>Honolulu 1, T. H. | Stanley C. Kennedy<br>President |
| Helicopter Air Service, Inc. | 5036 W. 63rd St.<br>Chicago 38, Ill. | T. Hamil Reidy<br>President |
| Inland Air Lines, Inc. | P.O. Box 10,005<br>Airport Sta.<br>6060 Avion Drive<br>Los Angeles 45, Cal. | |
| Island Air Ferries, Inc. | MacArthur Airport<br>Bohemia, L. I., N. Y. | Frederick H. Smith<br>President |
| Los Angeles Airways, Inc. | 5901 W. Imperial Hwy.<br>Los Angeles 45, Cal. | Clarence M. Belinn<br>President |
| Mid-Continent Airlines, Inc. | Waltower Building<br>102 E. 9th St.<br>Kansas City 6, Mo. | J. W. Miller<br>President |
| Mid-West Airlines, Inc. | P. O. Box 59<br>Des Moines, Ia. | F. C. Anderson<br>President |
| Monarch Air Lines, Inc. | Stapleton Airfield<br>Denver 7, Colo. | H. S. Darr<br>President |
| National Air Lines, Inc. | 3240 N. W. 27th Ave.<br>Miami 37, Fla. | G. T. Baker<br>President |
| Northeast Airlines, Inc. | 239 Prescott St.<br>E. Boston 28, Mass. | George E. Gardner<br>President |
| Northwest Airlines, Inc. | 1885 University Ave.<br>St. Paul 1, Minn. | Croil Hunter<br>President |
| Pan American World Airways System | 135 E. 42nd St.<br>New York 17, N. Y. | J. T. Trippe<br>President |
| Pan American-Grace Airways, Inc. | 135 E. 42nd St.<br>New York 17, N. Y. | Andrew B. Shea<br>President |
| Parks Air Lines, Inc. | Parks Metropolitan Airport<br>E. St. Louis, Ill. | Oliver L. Parks<br>President |
| Piedmont Airlines | Smith Reynolds Airport<br>Winston-Salem, N. C. | T. H. Davis<br>President |
| Pioneer Air Lines, Inc. | P.O. Box 12188<br>Houston 12, Texas | Robert J. Smith<br>President |
| Robinson Airlines Corp. | 121 E. Seneca St.<br>Ithaca, N. Y. | Bertram J. Miner<br>Chairman of the Board |
| Slick Airways, Inc. | Municipal Airport<br>San Antonio 9, Tex. | Earl F. Slick<br>President |
| Southern Airways, Inc. | Municipal Airport<br>Atlanta, Ga. | Frank W. Hulse<br>President |
| Southwest Airways Co. | P.O. Box 268<br>So. San Francisco, Cal. | John H. Connelly<br>President |
| Transcontinental & Western Air, Inc. | 101 West 11th St.<br>Kansas City 6, Mo. | R. S. Daman<br>President |
| Trans-Pacific Airlines, Ltd. | P.O. Box 2113<br>Honolulu, T. H. | Ruddy F. Tongg<br>President |
| Trans-Texas Airways | Municipal Airport<br>Houston, Texas | R. E. McKaughan<br>President |
| Turner Airlines Corp. | Municipal Airport<br>Indianapolis, Ind. | Col. Roscoe Turner<br>President |
| United Air Lines, Inc. | 5959 S. Cicero Ave.<br>Clearing Sta.<br>Chicago 38, Ill. | W. A. Patterson<br>President |
| Uraba, Medellin & Central Airways, Inc. | 135 E. 42nd St.<br>New York, N. Y. | Erwin Balluder<br>President |
| West Coast Airlines, Inc. | P.O. Box 516<br>Georgetown Station<br>Seattle 8, Wash. | Nick Bez<br>President |
| Western Air Lines, Inc. | 6060 Avion Drive<br>P.O. Box 10,005<br>Los Angeles 45, Cal. | Terrell C. Drinkwater<br>President |
| Wisconsin Central Airlines, Inc. | Municipal Airport<br>Madison, Wis. | Francis Higgins<br>President |

## PARENT, HOLDING AND INVESTMENT COMPANIES

| | | |
|---|---|---|
| Aeronautical Securities, Inc. | 1 Wall St. New York 5, N. Y. | Harold E. Aul President |
| Air Express International Agency, Inc. | 467 Greenwich St. New York 13, N. Y. | Charles Gallo President |
| Atlas Corporation | 40 Wall St. New York 5, N. Y. | Gurdon W. Wattles President |
| Aveo Manufacturing Corp. | 32 Pine St. New York 5, N. Y. | Floyd B. Odlum President |
| Aviation Group Shares of Institutional Shares, Ltd. | 420 Lexington Ave. New York 17, N. Y. | Victor Emanuel President |
| Bendix Aviation Corp. | 19 Rector St. New York 6, N. Y. | Emlen S. Hare President |
| Century Investors, Inc. | Fisher Building Detroit 2, Mich. | M. P. Ferguson President |
| Curtiss-Wright Corp. | Main & Passaic Sts. Wood-Ridge, N. J. | Paul V. Shields President |
| Fairchild Engine & Airplane Corp. | Hagerstown, Md. | Richard S. Boutelle President |
| General Motors Corp. | General Motors Bldg. Detroit 2, Mich. | Charles E. Wilson President |
| The General Tire & Rubber Co. | 1708 Englewood Ave. Akron 9, Ohio | William F. O'Neil President |
| National Aviation Corp. | 111 Broadway New York 6, N. Y. | Frederick F. Robinson President |
| The Sperry Corp. | 30 Rockefeller Plaza New York 20, N. Y. | Thomas A. Morgan President |
| Square D Company | 6060 Rivard St. Detroit 11, Mich. | F. W. Magin President |
| United Aircraft Corp. | 400 Main St. East Hartford 8, Conn. | H. Mansfield Horner President |

## AIRCRAFT MANUFACTURERS

| | | |
|---|---|---|
| Aero Design & Engineering Corp. | Culver City Airport Culver City, Cal. | T. R. Smith President |
| Aeronca Aircraft Corp. | Municipal Airport Middletown, Ohio | John A. Lawler President |
| Anderson, Greenwood & Co. | Sam Houston Airport Houston, Texas | Ben M. Anderson President |
| Atlas Aircraft Co. | P.O. Box 56 Hemet, Cal. | H. Ross Peacock President |
| Baumann Aircraft Corp. | 7701 Woodley Ave. Van Nuys, Cal. | J. B. Baumann President |
| Beech Aircraft Corp. | E. Central Ave. Wichita 1, Kansas | Walter H. Beech President |
| Bell Aircraft Corp. | P.O. Box One Buffalo 5, N. Y. | Lawrence D. Bell President |
| Bellanca Aircraft Corp. | New Castle, Del. | G. M. Bellanca President |
| Boeing Airplane Co. | Box 3107 Seattle 14, Wash. | William M. Allen President |
| Briegleb Aircraft Co. | El Mirage Field Adelanto, Cal. | William G. Briegleb President |
| Call Aircraft Co. | Afton, Wyoming | Reuel Call General Manager |
| Central Aircraft Corp. | 501 Fifth Ave. New York 17, N. Y. | Horace A. Taess President |
| Cessna Aircraft Co. | 5800 Franklin Road Wichita 15, Kansas | Dwane L. Wallace President |
| Chance Vought Aircraft Div. United Aircraft Corp. | P.O. Box 5907 Dallas, Texas | F. O. Detweiler General Manager |

| | | |
|---|---|---|
| Chase Aircraft Co., Inc. | Trenton, N. J. | Michael Stroukoff<br>President |
| Consolidated Vultee Aircraft Corp. | San Diego 12, Cal. | La Motte T. Cohu<br>President |
| Curtiss-Wright Corp., Airplane Division | Columbus 16, Ohio | Paul Shields<br>Chairman |
| Douglas Aircraft Co., Inc. | 3000 Ocean Park Blvd.<br>Santa Monica, Cal. | Donald W. Douglas<br>President |
| Engineering & Research Corp. | P.O. Box 209<br>Hyattsville, Md. | L. A. Wells<br>President |
| Fairchild Aircraft Division | Hagerstown, Md. | Willard L. Landers<br>General Manager |
| Fairchild Pilotless Plane Division | Farmingdale, L. I., N. Y. | J. A. Slonim<br>General Manager |
| Funk Aircraft Co. | R. F. D. No. 5<br>Coffeyville, Kansas | N. F. Howard<br>Sales Manager |
| Goodyear Aircraft Corp. | 1210 Massillon Rd.<br>Akron 15, Ohio | P. W. Litchfield<br>President |
| Grumman Aircraft Engineering Corp. | Bethpage, L. I., N. Y. | Leon A. Swirbul<br>President |
| Hughes Aircraft Co. | Florence Ave. at Teale St.<br>Culver City, Cal. | Howard R. Hughes<br>President |
| Lanier Aircraft Corp. | Marlton-Medford Airport<br>Marlton, N. J. | Edward M. Lanier<br>President |
| Lockheed Aircraft Corp. | 2555 No. Hollywood Way<br>Burbank, Cal. | Robert E. Gross<br>President |
| The Glenn L. Martin Co. | Baltimore 3, Md. | Glenn L. Martin<br>Chairman of the Board |
| McDonnell Aircraft Corp. | Lambert-St. Louis Municipal Airport<br>Box 516<br>St. Louis 3, Mo. | J. S. McDonnell<br>President |
| Monocoupe Airplane & Engine Corp. | Box 266<br>Melbourne, Fla. | Robert G. Sessler<br>President |
| Mooney Aircraft, Inc. | Airport P.O. Box 3012<br>Wichita, Kansas | C. G. Yankey<br>President |
| Morrisey Aircraft Co. | 2065 Pine Ave.<br>Long Beach 6, Cal. | William J. Morrisey<br>President |
| North American Aviation, Inc. | Municipal Airport<br>Los Angeles 45, Cal. | J. L. Atwood<br>President |
| Northrop Aircraft, Inc. | Northrop Field<br>Hawthorne, Cal. | John K. Northrop<br>President |
| Piper Aircraft Corp. | Lock Haven. Pa. | W. T. Piper<br>President |
| Radioplane Co. | 7901 Woodley Ave.<br>Van Nuys, Cal. | Whitley C. Collins<br>President |
| Republic Aviation Corp. | Conklin St.<br>Farmingdale, L. I., N. Y. | Mundy I. Peale<br>President |
| Ryan Aeronautical Co. | Lindbergh Field<br>San Diego, Cal. | T. Claude Ryan<br>President |
| Schweizer Aircraft Corp. | County Airport<br>Elmira, N. Y. | Ernest Schweizer<br>President |
| Sentinel Aircraft, Inc. | Ann Arbor, Mich. | Ralph T. D. Montagu<br>President |
| Taylorcraft, Inc. | Conway-Pittsburgh Airport<br>Conway, Pa. | Ben J. Mauro<br>President |
| Texas Engineering & Mfg. Co., Inc. | Grand Prairie, Texas | Robert McCulloch<br>President |
| Tucker Industries, Inc. | 1900 E. 24th St.<br>Cleveland, Ohio | Harrison R. Tucker<br>President |
| Weatherly-Campbell Aircraft Co. | Highland Park Airport<br>Rt. 7<br>Dallas, Texas | Raymond C. Weatherly<br>William L. Campbell |

## ROTARY WING AIRCRAFT AND COMPONENT MANUFACTURERS

| | | |
|---|---|---|
| American Helicopter Co., Inc. | 3613 Aviation Blvd.<br>Manhattan Beach, Cal. | Corwin D. Denny<br>President |
| Bell Aircraft Corp.<br>Helicopter Division | P.O. Box 1<br>Buffalo 5, N. Y. | David G. Forman<br>Manager |
| Doman Helicopter Corp. | Municipal Airport<br>P.O. Box 603<br>Danbury, Conn. | Glidden S. Doman<br>President |
| Eastern Rotorcraft Co. | P.O. Box 171<br>Willow Grove, Pa. | J. P. Perry<br>J. R. Huber |
| Helicopter Engineering Research Corp. | Buttonwood Airport<br>Blue Bell, Pa. | D. K. Jovanovich<br>President |
| Kaman Aircraft Corp. | Bradley Field<br>Windsor Locks, Conn. | Charles H. Kaman<br>President |
| Kellett Aircraft Corp. | Central Airport<br>Camden, N. J. | W. Wallace Kellett<br>President |
| McDonnell Aircraft Corp.<br>Helicopter Division | Lambert-St. Louis Municipal Airport, Box 516<br>St. Louis 3, Mo. | J. S. McDonnell<br>President |
| Parsons Corp. Aircraft Div. | Traverse City, Mich. | Carl B. Parsons<br>President |
| Pennsylvania Aircraft Syndicate, Ltd. | Wilford Bldg.<br>Philadelphia 4, Pa. | E. Burke Wilford<br>President |
| Piasecki Helicopter Corp. | Woodland Ave. & P.R.R.<br>Morton, Pa. | F. N. Piasecki<br>President |
| Prewitt Aircraft Co. | Avondale & Turner Rd.<br>Wallingford, Pa. | R. H. Prewitt<br>President |
| Rotawings Division<br>Glenn L. Martin Co. | North Wales, Pa. | Agnew E. Larsen<br>Manager |
| Rotor-Craft Corp. | 1024 Airway Drive<br>Grand Central Airport<br>Glendale 1, Cal. | Gilbert W. Magill<br>President |
| Sikorsky Aircraft<br>Division of United Aircraft Corp. | South Ave.<br>Bridgeport 1, Conn. | B. L. Whelan<br>General Manager |
| United Helicopters, Inc. | 1350 Willow Road<br>Palo Alto, Cal. | Stanley Hiller, Jr.<br>President |

## AIRCRAFT POWER PLANT MANUFACTURERS

| | | |
|---|---|---|
| Aerojet Engineering Corp. | Azuza, Cal. | A. H. Rude<br>Vice President |
| Aircooled Motors, Inc. | Liverpool Rd.<br>Syracuse 8, N. Y. | C. F. B. Roth<br>President |
| Allis-Chalmers Manfacturing Co. | Box 512<br>Mlwaukee 1, Wis. | W. C. Johnson<br>Vice President |
| Allison Division<br>General Motors Corp. | Speedway<br>Indianapolis 6, Ind. | E. B. Newill<br>General Manager |
| Cameron Aero Engine Corp. | 324 Greenwich St.<br>Reading, Pa. | Everett S. Cameron<br>President |
| Continental Aviation and Engineering Corp. | Muskegon, Mich. | C. J. Reese<br>President |
| Continental Motors Corp. | Market St.<br>Muskegon 82, Mich. | C. J. Reese<br>President |
| Frederic Flader, Inc. | 583 Division St.<br>N. Tonawanda, N. Y. | Fredric Flader<br>President |
| General Electric Co.<br>Aircraft Gas Turbine Divisions | 920 Western Ave.<br>West Lynn, Mass. | C. A. Salmonsen<br>Manager |
| Hermann Engineering Co. | 1405 Air Way<br>Glendale 1, Cal. | K. L. Hermann<br>Chief Engineer |
| Jacobs Aircraft Engine Co. | Pottstown, Pa. | Albert R. Jacobs<br>President |
| Lycoming Division<br>AVCO Mfg. Corp. | Williamsport 38, Pa. | S. B. Withington<br>General Manager |
| Marquardt Aircraft Co. | 7801 Hayvenhurst Ave.<br>Van Nuys, Cal. | Roy E. Marquardt<br>President |
| McCulloch Motors Corp. | 6101 W. Century Blvd.<br>Los Angeles 45, Cal. | Robert P. McCulloch<br>President |

| | | |
|---|---|---|
| McDonnell Aircraft Corp. Propulsion Division | Lambert-St. Louis Municipal Airport Box 516 St. Louis 3, Mo. | J. S. McDonnell President |
| Pratt & Whitney Aircraft Division of United Aircraft Corp. | 400 S. Main St. East Hartford 8, Conn. | W. P. Gwinn General Manager |
| Ranger Aircraft Engines Division of Fairchild Engine and Airplane Corp. | Farmingdale, L. I., N. Y. | George F. Chapline Vice President |
| Reaction Motors, Inc. | P.O. Box 671 Dover, N. J. | Lovell Lawrence, Jr. President |
| The Turbodyne Corp. | Northrop Field Hawthorne, Cal. | T. H. Quayle President |
| Warner Aircraft Corp. | 20263 Hoover Ave. Detroit 5, Mich. | R. E. Cecil President |
| Westinghouse Electric Corp. Aviation Gas Turbine Div. | Lester Branch P.O. Philadelphia 13, Pa. | W. B. Anderson Manager |
| Wright Aeronautical Corp. Division of Curtiss-Wright Corp. | Wood-Ridge, N. J. | Theodore B. Focke Manager |

## PROPELLER MANUFACTURERS

| | | |
|---|---|---|
| Aeromatic Aircraft Propellers Koppers Co., Inc., Metal Products Div. | Bartlett Hayward Plant Baltimore 3, Md. | Walter F. Perkins Vice President |
| Aeroproducts Division General Motors Corp. | P.O. Box 1047 Municipal Airport Dayton 1, Ohio | M. M. Monroe General Manager |
| Banks-Maxwell Propeller Co. | R. F. D. 12 Ft. Worth, Texas | Macon Banks Eldon Maxwell |
| Curtiss-Wright Corp., Propeller Division | Caldwell, N. J. | Robert L. Earle General Manager |
| Fahlin Manufacturing Co. | 1121-23 Wilkes Blvd. Columbia, Mo. | Ole Fahlin President |
| Flottorp Mfg. Co. | Kent County Airport Grand Rapids 8, Mich. | R. C. Taylor President |
| Hamilton Standard Propellers, Division of United Aircraft Corp. | 362 South Main St. E. Hartford 8, Conn. | Erle Martin General Manager |
| Hartzell Propeller Co. | Piqua, Ohio | Robert N. Hartzell President |
| G. B. Lewis Company Propeller Division | Watertown, Wis. | G. G. Frater President |
| McCauley Corp. | 1840 Howell Ave. Dayton 7, Ohio | B. C. Taylor President |
| Sensenich Corp. | Lancaster, Pa. | Harry M. Sensenich President |
| Stone Propeller Co. | 701 E. Gilbert Wichita, Kansas | Stanley J. Moss President |
| Thomson Industries, Inc., Aircraft Specialties Div. | 1029 Plandome Rd. Manhasset, L. I., N. Y. | John B. Thomson President |
| U. S. Propellers, Inc. | 3270 E. Foothill Blvd. Pasadena 8, Cal. | Christopher Schwarzenbach President |

## AVIATION FUEL AND OIL COMPANIES

| | | |
|---|---|---|
| California Texas Oil Co., Ltd. | 551 5th Ave. New York, N. Y. | G. A. Flynn Manager |
| Cities Service Oil Co. (Del.) | Palmolive Bldg. 919 North Michigan Ave. Chicago 11, Ill. | C. A. Willis Manager |
| Cities Service Oil Co. (Pa.) | 70 Pine St. New York 5, N. Y. | B. S. Watson President |

| | | |
|---|---|---|
| **Esso Standard Oil Co.** | **15 W. 51st St.<br>New York 19, N. Y.** | **R. C. Oertel<br>Sales Manager** |
| **Ethyl Corp.** | **405 Lexington Ave.<br>New York 17, N. Y.** | **E. L. Shea<br>President** |
| **General Petroleum Corp.** | **108 W. 2nd St.<br>Los Angeles 12, Cal.** | **F. F. Vaughan<br>Sales Manager** |
| **Gulf Oil Corp. and Gulf Refining Co.** | **Gulf Building<br>Pittsburgh 19, Pa.** | **J. F. Walton, Jr.<br>Manager** |
| **Humble Oil & Refining Co.** | **Houston, Texas** | **R. M. Stephens<br>Sales Manager** |
| **Imperial Oil Limited** | **Imperial Oil Bldg.<br>Toronto 1, Canada** | **T. M. Reid<br>Sales Manager** |
| **The Penzoil Co.** | **Oil City, Pa.** | **W. S. Zehrung<br>President** |
| **Phillips Petroleum Co.** | **Bartlesville, Okla.** | **K. S. Adams<br>President** |
| **The Pure Oil Co.** | **35 E. Wacker Drive<br>Chicago 1, Ill.** | **L. S. Wescoat<br>President** |
| **Richfield Oil Corp. of New York** | **19 W. 50th St.<br>New York 20, N. Y.** | **Marc F. Braeckel<br>President** |
| **Shell Oil Co., Inc.** | **50 W. 50th St.<br>New York 20, N. Y.** | **J. G. Jordan<br>Vice President** |
| **Shell Union Oil Corp.** | **50 W. 50th St.<br>New York 20, N. Y.** | **James H. Doolittle<br>Vice President** |
| **Sinclair Refining Co.** | **630 Fifth Ave.<br>New York 20, N. Y.** | **E. L. Hughes<br>Vice President** |
| **Socony-Vacuum Oil Co., Inc.** | **26 Broadway<br>New York 4, N. Y.** | **W. L. Baker<br>Manager** |
| **Standard Oil Co. of California** | **Standard Oil Bldg.<br>San Francisco 20, Cal.** | **R. F. Bradley<br>Manager** |
| **Standard Oil Co. (Indiana)** | **910 S. Michigan Ave.<br>Chicago 80, Ill.** | **R. D. Sharp<br>Sales Manager** |
| **Standard Oil Co., Incorporated in Kentucky** | **Starks Bldg.<br>Louisville 2, Ky.** | **W. G. Violette<br>President** |
| **The Standard Oil Co. (Ohio)** | **Midland Bldg.<br>Cleveland 15, Ohio** | **E. J. Burkhardt<br>Sales Manager** |
| **Standard-Vacuum Oil Co.** | **26 Broadway<br>New York 4, N. Y.** | **Walter Palmer<br>Manager** |
| **Sun Oil Co.** | **1608 Walnut St.<br>Philadelphia, Pa.** | **P. V. Kane<br>Manager** |
| **The Texas Co.** | **135 E. 42nd St.<br>New York 17, N. Y.** | **H. T. Klein<br>President** |
| **Tide Water Associated Oil Co.** | **17 Battery Place<br>New York 4, N. Y.** | **Mark Morrison<br>Manager** |
| **Union Oil Co. of California** | **Union Oil Bldg.<br>617 W. 7th St.<br>Los Angeles 14, Cal.** | **A. C. Stewart<br>Vice President** |
| **Wolf's Head Oil Refining Co., Inc.** | **Fair Bldg.<br>Oil City, Pa.** | **A. W. Scott<br>President** |

## AVIATION PUBLICATIONS

| PUBLICATION | PUBLISHED BY | EDITOR |
|---|---|---|
| **Aero Digest**<br>**515 Madison Ave.**<br>**New York 22, N. Y.** | **Aeronautical Digest Publishing Corp.** | **Frank Tichenor** |
| **Air Facts**<br>**30 Rockefeller Plaza**<br>**New York 20, N. Y.** | **Air Facts, Inc.** | **Leighton Collins** |
| **Air Transportation**<br>**10 Bridge St.**<br>**New York 4, N. Y.** | **Import Publications, Inc.**<br>**John F. Budd** | **Richard Malkin**<br>**Managing Editor** |
| **Airlanes**<br>**340 W. 57th St.**<br>**New York 19, N. Y.** | **Airlanes Publishing Co.** | **June Benas** |

| | | |
|---|---|---|
| **American Aviation**<br>**1025 Vermont Ave., N.W.**<br>**Washington 5, D. C.** | **American Aviation Publications, Inc.** | **Wayne W. Parrish** |
| **American Aviation Daily**<br>**1025 Vermont Ave., N.W.**<br>**Washington 5, D. C.** | **American Aviation Publications, Inc.** | **Daniel Wentz**<br>**Managing Editor** |
| **American Aviation Directory**<br>**1025 Vermont Ave., N.W.**<br>**Washington 5, D. C.** | **American Aviation Publications, Inc.** | **Marion E. Grambow**<br>**Managing Editor** |
| **American Helicopter**<br>**32 E. 75th St.**<br>**New York 22, N. Y.** | | **Alexis Droutskoy** |
| **Aviation Operations**<br>**205 E. 42nd St.**<br>**New York 17, N. Y.** | **Conover-Mast Publications** | **Richard E. Stockwell** |
| **Aviation News Beacon**<br>**3716 West 54th St.**<br>**Los Angeles 43, Cal.** | **Howard S. Vandeman** | |
| **Aviation Week**<br>**330 W. 42nd St.**<br>**New York 18, N. Y.** | **McGraw-Hill Publishing Co.** | **Robert H. Wood** |
| **Aviation & Yachting**<br>**11201 Conners Ave.**<br>**Detroit 5, Mich.** | | **Walter X. Brennan** |
| **Contact**<br>**15 W. Clinton Ave.**<br>**Tenafly, N. J.** | **Air Power Publishing Co., Inc.** | |
| **Flying**<br>**185 N. Wabash Ave.**<br>**Chicago 1, Ill.** | **Ziff-Davis Publishing Co.** | **Curtis Fuller** |
| **Flying Models**<br>**215 4th Ave.**<br>**New York 3, N. Y.** | | **Walter H. Holze** |
| **Letter to Airmen**<br>**1226 National Press Bldg.**<br>**Washington 4, D. C.** | **Aero Digest** | **Kendall K. Hoyt** |
| **Model Airplane News**<br>**551 5th Ave.**<br>**New York 17, N. Y.** | **Air Age, Inc.** | **Howard G. McEntee** |
| **Official Airline Guide**<br>**139 N. Clark St.**<br>**Chicago 2, Ill.** | **American Aviation Publications, Inc.** | **C. N. Johnson**<br>**Production Editor** |
| **Personal Flying**<br>**Sturgeon Bay, Wis.** | | **Enar A. Ahlstrom** |
| **Plane Facts**<br>**1218 Third National Bldg.**<br>**Dayton 2, Ohio** | | |
| **Revista Area Latinomericana**<br>**515 Madison Ave.**<br>**New York 22, N. Y.** | **Frank A. Tichenor** | **Jose B. Canudas** |
| **Sell-A-Plane News**<br>**3472 W. 71st St.**<br>**Los Angeles 43, Cal.** | | **N. C. Holliday** |
| **Skyways**<br>**444 Madison Ave.**<br>**New York 22, N. Y.** | **Henry Publishing Co.** | **J. Fred Henry** |
| **Skyways Edicion En Espanol**<br>**444 Madison Ave.**<br>**New York 22, N. Y.** | | **Dr. Alfonso Guido Lavalle** |
| **Southern Flight**<br>**1901 McKinney Ave.**<br>**Dallas 1, Texas** | **Air Review Publishing Corp.** | **George E. Haddaway** |
| **Trade-A-Plane Service**<br>**Crossvilel, Tenn.** | | |
| **U. S. Air Services**<br>**Transportation Bldg.**<br>**Washington 6, D. C.** | **Air Service Publishing Co., Inc.** | **Earl N. Findley** |
| **Western Flying**<br>**4328 Sunset Blvd.**<br>**Los Angeles 27, Cal.** | **Occidental Publishing Co.** | **Reginald Burrows** |
| **Wind-Socky Bargains**<br>**Box 238**<br>**Marshalltown, Iowa** | **Wind-Socky Publishing Co.** | **Wallace R. Blake**<br>**Managing Editor** |

## SPECIALIZED AND ASSOCIATION PUBLICATIONS

| PUBLICATION | PUBLISHED BY | EDITOR |
|---|---|---|
| Aeronautical Engineering Catalog<br>2 E. 64th St.<br>New York 21, N. Y. | Institute of Aeronautical Sciences | Welman A. Shrader |
| Aeronautical Engineering Review<br>2 E. 64th St.<br>New York 21, N. Y. | Institute of Aeronautical Sciences | Welman A. Shrader |
| Air Force<br>1616 K St., N.W.<br>Washington 6, D. C. | Air Force Association | James H. Straubel |
| The Air Line Pilot<br>3145 W. 63rd St.<br>Chicago 29, Ill. | Air Line Pilots Association | David L. Behncke |
| Air Transport Safety<br>20 N. Wacker Dr.<br>Chicago 6, Ill. | National Safety Council | W. H. Rodda |
| Air University Quarterly Review<br>Maxwell Air Force Base, Ala. | Air University | Maj. Kenneth F. Gantz |
| Aircraft Engines of the World<br>225 Varick St.<br>New York 14, N. Y. | | Paul H. Wilkinson |
| Airport Reference<br>4328 Sunset Blvd.<br>Los Angeles 27, Cal. | Occidental Publishing Co. | Reginald Burrows |
| Airpost Journal<br>6 The Fairway<br>Upper Montclair, N. J. | American Air Mail Society | L. B. Gatchell |
| American Rocket Society Journal<br>29 W. 39th St.<br>New York, N. Y. | | Robertson Youngquist |
| Atomic & Gas Turbine Progress<br>2 W. 45th St.<br>New York 19, N. Y. | | Wilbur W. Young<br>Managing Editor |
| Aviation Law Reports<br>214 N. Michigan Ave.<br>Chicago 1, Ill. | Commerce Clearing House, Inc. | |
| Bulletin of the American Meteorological Society<br>5 Joy St.<br>Boston 8, Mass. | | R. G. Stone |
| Civil Aeronautics Journal<br>Office of Aviation Information<br>Washington 25, D. C. | | |
| Current Science & Aviation<br>400 S.Front St.<br>Columbus 15, Ohio | American Education Press, Inc. | Dr. George L. Bush<br>Ruth A. Wolfe |
| Esso Air World<br>15 W. 51st St.<br>New York 19, N. Y. | | |
| F.Y.I. For Your Information<br>1025 Connecticut Ace., N.W.<br>Washington 6, D. C. | National Aeronautic Association | Clara Jo Hopkins |
| Globe<br>545 5th Ave.<br>New York 17, N. Y. | Globe Publications, Inc. | Philip Andrews |
| Jane's All The World's Aircraft<br>117 W. 48th St.<br>New York 19, N. Y. | McGraw-Hill Publishing Co. | Leonard Bridgman |
| Journal of the Aeronautical Sciences<br>2 E. 64th St.<br>New York 21, N. Y. | Institute of Aeronautical Sciences | Hugh L. Dryden |
| Journal of Air Law and Commerce<br>357 E. Chicago Ave.<br>Chicago 11, Ill. | Northwestern University | Edward C. Sweeney |

| | | |
|---|---|---|
| Journal of Aviation Medicine<br>2642 University Ave.<br>St. Paul 4, Minn. | Aero Medical Association | Dr. Louis H. Bauer |
| Journal of Meteorology<br>5 Joy St.<br>Boston 8, Mas. | American Meteorological Society | Werner A. Baum |
| Missionary Aviation<br>P. O. Box 708<br>Los Angeles 53, Cal. | Missionary Aviation Fellowship | Charles J. Mellis, Jr . |
| Model Aviation<br>1025 Connecticut Ave., N.W.<br>Washington 6, D. C. | Academy of Model Aeronautics | |
| NATA Dispatch<br>1344 Connecticut Ave.<br>Washington 6, D. C. | National Aviation Trades Association | Harry Meixell |
| National Aeronautics & Flight Plan<br>1025 Connecuticut Ave., N.W.<br>Washington 6, D. C. | National Aeronautic Association | Clara Jo Hopkins |
| National Air Review<br>280 Madison Ave.<br>New York 16, N. Y. | The National Air Council | Charles D. Frazer |
| National Flying Farmer<br>Stillwater, Okla. | | R. E. Cunningham |
| Naval Aviation News<br>Navy Department<br>Washington 25, D. C. | | |
| Planes<br>Shoreham Bldg.<br>Washington 5, D. C. | Aircraft Industries Association of America | Clifford Guest |
| Rocket—Jet Flying<br>156 W. 105th St.<br>New York 25, N. Y. | Pen-Ink Publishing Co. | |
| Rockets<br>524 Forest Ave.<br>Glen Ellyn, Ill. | U. S. Rocket Society | R. L. Farnsworth |
| SAE Journal<br>29 W. 39th St.<br>New York 18, N. Y. | | Norman G. Shidle |
| Soaring<br>228 Boston Post Rd.<br>Weston 93, Mass. | Soaring Society of America, Inc. | Richard J. Comey |
| Technical Data Digest<br>Attn: Central Air Documents Office<br>Wright-Patterson Air Force Base<br>Dayton, Ohio | Hq., Air Materiel Command | |
| Thermal<br>453 S. Spring St.<br>Los Angeles 13, Cal. | Southern California Soaring Association | |
| World Aviation Annual<br>903 16th St., N.W.<br>Washington 6, D. C. | Aviation Research Institute | J. Parker Van Zandt |

## AVIATION ORGANIZATIONS, ASSOCIATIONS AND NON-PROFIT RESEARCH GROUPS

| ORGANIZATION | ADDRESS | EXECUTIVE |
|---|---|---|
| Academy of Model Aeronautics | 1025 Conn. Ave., N.W.<br>Washington 6, D. C. | C. O. Wright<br>President |
| Aero Club of Washington | 1212 18th St., N.W.<br>Washington 6, D. C. | William T. Raymond<br>President |
| Aero Medical Association | 214 S. State St.<br>Marion, Ohio | Dr. M. M. Kalez<br>President |
| Aeronautical Radio, Inc. | 1108 16th St., N.W.<br>Washington 6, D. C. | G. A. O'Reilly<br>President |
| The Aeronautical Research Foundation | Soldiers Field<br>Boston 63, Mass. | Lynn L. Bollinger<br>Executive Director |
| Aeronautical Training Society | 1025 Conn. Ave., N.W.<br>Washington 6, D. C. | Maxwell Balfour<br>President |

| | | |
|---|---|---|
| Air Cargo, Inc. | National Airport<br>Washington 1, D. C. | Emory S. Land<br>President |
| Air Carrier Mechanics Ass'n, International | 3148 W. 63rd St.<br>Chicago 29, Ill. | Karl J. Ulrich<br>President |
| Air Coach Association | Admin. Bldg.<br>Municipal Airport<br>Long Beach, Cal. | Stanley D. Weiss<br>President |
| Air Force Association | 1616 K. St., N. W.<br>Washington, D. C. | Robert S. Johnson<br>President |
| Air Freight Forwarder Association | 1015 Union Central Bldg.<br>Cincinnati 2, Ohio | John H. Stewart<br>President |
| Air Foundation | Union Commerce Bldg.<br>Cleveland 14, Ohio | Frederick C. Crawford<br>President |
| Air Line Communication Employees Association | 5 Beekman St.<br>New York 7, N. Y. | Mil Senior<br>Vice President |
| Air Line Dispatchers Association | Room 727<br>1st Nat'l Bank Bldg.<br>Denver 2, Colo. | M. C. Merrill<br>President |
| Air Line Navigators Council, TWU-CIO | 103 W. 43rd St.<br>New York 18, N. Y. | John D. Nicholas<br>Chairman |
| Air Line Pilots Association, International | 3145 W. 63rd St.<br>Chicago 29, Ill. | David L. Behncke<br>President |
| Air Line Stewards and Stewardesses Association, International | 3148 W. 63rd St.<br>Chicago 29, Ill. | Victor J. Herbert<br>President |
| Air Line Workers Department | 411 W. Milwaukee<br>Detroit 2, Mich. | John W. Livingston<br>Director |
| Air Lines Terminal | Park Ave. at 42nd St.<br>New York 17, N. Y. | C. H. Shuff<br>President |
| Air Reserve Association | 1424 K St., N.W.<br>Washington 5, D. C. | Brig. Gen. Chester E. McCarty<br>President |
| Air Traffic Conference of America | 1107 16th St., N.W.<br>Washington 6, D. C. | Harold Crary<br>President |
| Air Transport Association of America | 1107 16th St., N.W.<br>Washington 6, D. C. | Emory S. Land<br>President |
| Air Youth Division | 1025 Conn. Ave., N.W.<br>Washington 6, D. C. | Russell W. Nichols<br>Director |
| Air-Age Education Research | 100 East 42nd St.<br>New York 17, N. Y. | Kenneth E. Newland<br>Director |
| Airborne Instruments Laboratory, Inc. | 160 Old Country Rd.<br>Mineola, N. Y. | Hector R. Skifter<br>President |
| Aircraft Electrical Council | 155 E. 44th St.<br>New York 17, N. Y. | H. H. Watson<br>Chairman |
| Aircraft Industries Association of America, Inc. | 610 Shoreham Bldg.<br>Washington 5, D. C. | Adm. DeWitt C. Ramsey<br>President |
| Aircraft Owners & Pilots Association | Washington Bldg.<br>15th & N. Y. Ave., N.W.<br>Washington 5, D. C. | C. Townsend Ludington<br>President |
| The Airfreight Association, Inc. | 813 Arlington Bldg.<br>1025 Vermont Ave., N.W.<br>Washington 5, D. C. | Earl F. Slick<br>President |
| Airline Ground Transportation Association, Inc. | 41 Vanderbilt Ave.<br>New York 17, N. Y. | Bert F. Heaney<br>Secretary |
| Airlines Clearing House, Inc. | 173 W. Madison St.<br>Chicago 2, Ill. | Lloyd Eden<br>President |
| Airlines Medical Directors Association | 901 Lexington Ave.<br>New York 21, N. Y. | Dr. H. K. Edwards<br>President |
| Airlines Personnel Relations Conference | National Airport<br>Washington 1, D. C. | J. L. O'Brien<br>Executive Director |
| Airlines Terminal Corp. | Willow Run Airport<br>Ypsilanti, Mich. | Robert E. Miller<br>President |
| Airport Operators Council | 1625 K. St., N.W.<br>Washington 6, D. C. | B. M. Doolin<br>President |
| All American Air Maneuvers, Inc. | 415 Professional Bldg.<br>Miami, Fla. | Robert M. Crawford<br>President |
| American Association of Airport Executives | P.O. Box 356<br>Reading, Pa. | Don W. Martin<br>President |
| American Flight-Strips Association | 224 E. 38th St.<br>New York 16, N. Y. | Stedman Shunway Hanks<br>Trustee |
| The American Helicopter Society, Inc. | Newfield P.O. Box 4029<br>Bridgeport 7, Conn. | O. B. Chittick<br>Treasurer |
| American Meteorological Society | 5 Joy St.<br>Boston 8, Mass. | Howard T. Orville<br>President |

| | | |
|---|---|---|
| American Municipal Association | 1313 E. 60th St.<br>Chicago 37, Ill. | Mayor de Lesseps S. Morrison<br>President |
| American Road Builders' Association | Airport Division<br>1319 F. St., N.W.<br>Washington 4, D. C. | Jennings Randolph<br>President |
| American Petroleum Industries Committee | 50 W. 50th St.<br>New York 20, N. Y. | R. C. Oertel<br>Chairman |
| American Rocket Society, Inc. | Room 719<br>29 W. 39th St.<br>New York 18, N. Y. | William L. Gore<br>President |
| The American Society of Mechanical Engineers | 29 W. 39th St.<br>New York 18, N. Y. | E. S. Thompson<br>Chairman |
| American Society of Tool Engineers | 1666 Penobscot Bldg.<br>Detroit 26, Mich. | R. B. Douglas<br>President |
| Associated General Contractors of America, Inc. | 1227 Munsey Bldg.<br>Washington 4, D. C. | Carl E. Nelson<br>Chairman |
| Automotive & Aviation Parts Manufacturers, Inc. | 800 Michigan Bldg.<br>Detroit 26, Mich. | Malcolm P. Ferguson<br>President |
| Aviation Distributors & Manufacturers, Inc. | 505 Arch St.<br>Philadelphia, Pa. | Richard N. Bomberger<br>President |
| Aviation Writers Association | Franklin Institute<br>20th St. & Benjamin Franklin Parkway<br>Philadelphia 3, Pa. | Ansel E. Talbert<br>President |
| Caterpillar Club | Broad St. Bank Bldg.<br>Trenton, N. J. | Glenn Phelps<br>President |
| Chamber of Commerce of the U. S. | 1615 H St., N.W.<br>Washington 6, D. C. | Harold F. Hammond<br>Manager |
| Contract Air Carriers Association, Inc. | 1821 S.W. 24th St.<br>Miami, Fla. | Eugene B. Beese<br>Secretary |
| Cornell Aeronautical Laboratory, Inc. | 4455 Genesee St.<br>Buffalo 21, N. Y. | T. P. Wright<br>President |
| Corporation Aircraft Owners Assn. Inc. | 444 Madison Ave.<br>New York 22, N. Y. | William B. Belden<br>Chairman |
| Council of State Governments | 1313 E. 60th St.<br>Chicago 37, Ill. | Frank Bane<br>Executive Director |
| The Early Birds | c/o Col. Ernest Jones<br>Maxwell Field<br>Montgomery, Ala. | Brig. Gen. F. P. Lahm<br>President |
| Flight Safety Foundation, Inc. | Room 1320<br>515 Madison Ave.<br>New York 22, N. Y. | Jerome F. Lederer<br>President |
| The Franklin Institute Laboratories for Research & Development | 20th St. & Benjamin Franklin Parkway<br>Philadelphia 3, Pa. | Dr. Henry B. Allen<br>Director |
| Independent Aeronautical Dealers Assn., Inc. | 79 Wall St.<br>New York 5, N. Y. | Clarence Carruthers |
| Independent Air Carrier Conference of America | 401 Central Bldg.<br>805 G St., N.W.<br>Washington, D. C. | Amos Heacock<br>President |
| Independent Air Carriers Association | 308 4th Ave.<br>Seattle 4, Wash. | Roy C. Briten<br>President |
| Independent Air Carriers Association of Alaska | P.O. Box 15<br>Anchorage, Alaska | C. D. McGhan<br>President |
| Institute of the Aeronautical Sciences | 2 E. 64th St.<br>New York 21, N. Y. | W. A. M. Burden<br>President |
| Institute of Navigation | University of California<br>Los Angeles 24, Cal. | Rear Adm. G. G. McLintock<br>President |
| International Association of Machinists | Machinists' Bldg.<br>9th St. & Mt. Vernon Pl., N.W.<br>Washington 1, D. C. | A. J. Hayes<br>President |
| Landing Aids Experiment Station | Arcata, Cal. | Dr. Maurice A. Garbell<br>Director |
| Manufacturers Aircraft Association, Inc. | 30 Rockefeller Plaza<br>Suite 726<br>New York 20, N. Y. | William E. Valk<br>President |
| Model Industry Assn. | 30 W. Washington St.<br>Chicago 2, Ill. | Russell Weber<br>President |
| National Aeronautic Association | 1025 Conn. Ave., N.W.<br>Washington 6, D. C. | Louis E. Leverone<br>President |
| The National Air Council | 280 Madison Ave.<br>New York 16, N. Y. | F. Trubee Davison<br>President |

| | | |
|---|---|---|
| National Air Races | Union Commerce Bldg.<br>Cleveland 14, Ohio | Frederick C. Crawford<br>President |
| National Association of Flying Clubs | 821 National Press Bldg.<br>Washington, D. C. | Joseph Vivari<br>President |
| National Association of State Aviation Officials | Suite 302<br>1101 Vermont Ave., N.W.<br>Washington 5, D. C. | Edward F. Knapp<br>President |
| National Aviation Trade Association, Inc. | DuPont Circle Bldg.<br>1344 Conn. Ave., N.W.<br>Washington 6, D. C. | Norman Larson<br>President |
| National Fire Protection Association | 60 Batterymarch St.<br>Boston 10, Mass. | Col. Edwin E. Aldrin<br>Chairman |
| National Flying Farmers Association | Stillwater, Okla. | Charles Rose<br>President |
| National Machine Tool Builders' Association | 10525 Carnegie Ave.<br>Cleveland 6, Ohio | Lloyd D. McDonald<br>President |
| National Pilots' Association | Suite 216<br>235 Lincoln Rd.<br>Miami, Fla. | Richard J. Hettenbaugh<br>President |
| National Real Estate Fliers Association | 8 Harlow St.<br>Bangor, Maine | A. J. Wachowski<br>President |
| National Safety Council | 20 N. Wacker Dr.<br>Chicago 6, Ill. | Ned H. Dearborn<br>President |
| The Ninety Nines | 1025 Conn. Ave., N.W.<br>Washington 6, D. C. | Blanche Noyes<br>President |
| Non-Certificated Air Carrier Association | Viking Airlines<br>Lockheed Air Terminal<br>Burbank, Cal. | R. R. Hart<br>President |
| Order of Fifinella | 3629 Lavell Drive<br>Los Angeles 41, Cal. | Faith F. Buckner<br>President |
| Sky Coach System, Inc. | 401 Central Bldg.<br>805 G St., N.W.<br>Washington, D. C. | Shields B. Craft<br>President |
| The Soaring Society of America, Inc. | 228 Boston Post Rd.<br>Weston 93, Mass. | Erwin J. Reeves<br>President |
| Society of Aeronautical Weight Engineers | Hughes Aircraft Co.<br>Culver City, Cal. | James A. Crabtree<br>President |
| Society of Automotive Engineers, Inc. | 29 W. 39th St.<br>New York 18, N. Y. | S. W. Sparrow<br>President |
| Stanford Research Institute | Stanford, Cal. | J. E. Hobson<br>Executive Director |
| United Pilots and Mechanics Association | 1101 Vermont Ave., N.W.<br>Washington 5, D. C. | L. Alton Denslow<br>President |
| The Wings Club, Inc. | Hotel Biltmore<br>New York, N. Y. | Follett Bradley<br>President |
| Women Flyers of America, Inc. | 274 Madison Ave.<br>New York, N. Y. | Dorothy Dehr<br>President |
| Women's National Aeronautical Association of the United States, Inc. | 3722 Melba Place<br>St. Louis 20, Mo. | Mary T. Bell<br>President |

# OFFICIAL RECORDS

The editors are grateful to Charles (Charlie) Logsdon for his interest and work on this section. Mr. Logsdon has been with the National Aeronautic Association for twenty years, and is Director of the Contest Division. This branch of NAA supervises all the official record attempts in this country, and also passes on the safety features of any aerial competition that offers $500 or more in cash prizes.

## THE WHY AND HOW OF OFFICIAL AIRCRAFT RECORDS

The Federation Aeronautique Internationale, Paris, France, better known as the FAI, currently composed of the National Aero Clubs of thirty-two nations, is the governing body of the world for official aircraft records and sporting aviation contests. The FAI was organized in Paris in October, 1905, by representatives from Belgium, France, Germany, Great Britain, Italy, Spain, Switzerland, and the United States. Representing the FAI in the United States is the National Aeronautic Association, organized in 1922.

The rules for all official world and international aircraft records are proposed initially by the various national aero clubs who are members of FAI. Later they are evaluated by the International Sporting Aviation Commission of FAI and then submitted, for final approval, to the delegates of the many national aero clubs who attend each annual FAI conference. Developed over a period of forty-four years, the rules are markedly complete. All attempts to establish official aircraft records must meet identical FAI standards.

NAA also rules on the best national performances and on many records of strictly national interest, such as inter-city speed times of transport aircraft.

FAI-NAA rules have these goals: (1) an equal opportunity to every competitor, (2) competent, unbiased judging, and (3) scientifically accurate records.

The NAA Contest Board enforces FAI-NAA regulations in the United States.

**CHAIRMAN**

Roger W. Kahn
Grumman Aircraft Engineering Corp.
Bethpage, L. I., N. Y.

**VICE-CHAIRMAN AND GENERAL COUNSEL**

William P. McCracken
McCracken and O'Rourke Law Firm
Washington, D. C.

**MEMBERS**

Milton B. Ames
Aerodynamics Research Branch
NACA

William L. Anderson
Executive Director, Pennsylvania
Aeronautics Commission

Charles S. Logsdon
Secretary

R. S. Boutelle
President, Fairchild Engine and Airplane Corp.

Clarence O. Bell
Manager, Aviation Products Division
Goodyear Tire and Rubber Co.

A. W. LeVier
Chief Engineering Test Pilot
Lockheed Aircraft Corp.

R. E. Littell
NACA

R. W. Nichols
Executive Director, Academy of Model Aeronautics

R. H. Rice
V. P. and Chief Engineer
North American Aviation, Inc.

Col. Roscoe Turner

Ralph H. Upson
Department of Aeronautical Engineering
University of Minnesota

Comdr. T. D. Davis, USN
World straight line distance record holder

Col. Franklin K. Paul
Chief, Flight Test Division
Air Materiel Command

Dr. W. G. Brombacher and Dr. D. P. Johnson
National Bureau of Standards

Francis B. Compton
Chairman, Contest Committee
Soaring Society of America

Frederick C. Crawford
President, Thompson Products

Maj. General Harry G. Armstrong
Deputy Surgeon General, USAF

Betty Haas

Howard Rough
Assistant Administrator, CAA

R. M. Stanley
Director, Soaring Society of America

E. H. Heinemann
Chief Engineer, Douglas Aircraft Co.

J. W. Kinnucan
Chief Engineer, Continental Motors Corp.

Hall L. Hibbard
V. P. and Chief Engineer
Lockheed Aircraft Corp.

**EX-OFFICIO MEMBERS**

Louis E. Leverone
President, NAA

Ralph M. Phelps
Executive V. P., NAA

## *How to Establish an Official Aircraft Record*

To attempt an official aircraft record, your first step is to get permission from the NAA Contest Board, 1025 Connecticut Ave., N. W., Washington 6, D. C. The request may be in a letter or by filling out the Contest Board's standard Record Sanction Request form. You must specify the record to be attempted, the aircraft and engine, the pilot, and the date and place of takeoff and finish. An application should be submitted at least two weeks in advance. The NAA sanction fee (see Record Test Information below) is variable, depending on the record to be attempted, and the preparation necessary. This fee must be paid in advance, and is not returnable, although it is good for sixty days after the initial record attempt.

The second important step is to get an NAA directing official or FAI timer if closed circuit speed or maximum speed over a three kilometer straightaway course is to be attempted. The NAA Contest Board has a number of accredited officials throughout the United States (see Registered FAI Timers in U. S. below). Where world records or others requiring special instruments and knowledge are concerned, it has been found necessary to use specialists from Washington for the job.

NAA contest headquarters advises the record sponsor of the instruments (certified watches, barographs, and electric timing equipment) required for recording the flight. Only NAA-approved instruments can be used for recording official record attempts. The instruments that are needed can be rented at cost from the NAA Contest Board; a deposit is required.

Barographs are designed for easy installation. Each instrument has to have an official NAA seal and the clockwork mechanism started before take-off. At the end of the run, the clock is turned off and the instrument, with seals intact, forwarded to the National Bureau of Standards for calibration. The results show the pressure altitude of the aircraft during the entire flight. They also give a fairly accurate indication of the time aloft and a record of any intermediate landings.

Before an official stop-watch is used, it must pass an exhaustive test at an approved government laboratory, where it is subjected to heat and cold airbaths in six different positions. The more complex photo-electric timing apparatus owned by NAA, used in connection with the timing of straightaway speed dashes, is accurate to 1/100th of a second.

Straightaway short speed courses must be actually measured and the accuracy required is minus nothing, plus fifteen meters. No credit is given for extra distance flown. Closed circuit speed courses must be established from known geographic coordinates by determination of the arc of the great circle, taken at sea level, which unites the verticals of the points considered. Closed circuit speed courses may have as many sides as desired, but the start and finish times must be taken by an accredited timer at the same place using parallel sighting wires established in a plane perpendicular to and at right angles to one leg of the course. This line must be established by licensed engineers. Closed circuit speed courses may be longer than desired, but again no credit is given for extra distance flown.

As a general rule, octagonally shaped speed courses for short distances are best for high-speed aircraft; on the other hand two-way (out and return) courses, where the contestant passes to the outside of the turning point, are more desirable for long distances. Courses should be located to offer the pilot as much navigation help as possible.

Aircraft attempting world and international records for distance and closed circuit speed must carry at least one approved barograph, preferably two. For light aircraft altitude records, including helicopters, the barographs must be designed to connect to the static pressure system of the aircraft. For heavy aircraft altitude record attempts, with or without load, a photo panel to record pressure and outside air temperature indications simultaneously (on film) during both the ascent and descent, or other acceptable apparatus, such as radar, is essential; for maximum speed records over a measured three kilometer straightaway course, special photo-electric timing apparatus and observer aircraft, with barographs aboard, are required.

The final results of any official world or international record depend on instrument calibration results submitted to NAA by the Bureau of Standards. This usually takes about two weeks.

NAA barographs do not have to be used for national (U. S.) intercity speed records, since total elapsed time and distance covered are the only factors considered in the final computation. A number of these records have been established recently by airlines, including Eastern, Delta, National, Pan American and United.

The International Sporting Aviation Commission of FAI recently separated jets from reciprocating engine types and ruled that all closed speed records can be conducted at any altitude. Radar will be used if needed. Barographs will probably be retained to establish level-flight altitude of the aircraft from start to finish. These changes are effective Jan. 1, 1950.

CHARLES S. LOGSDON

### Record Fee Information

The official FAI-NAA fee covers flight preparation and recording including a complete report to FAI and the sponsor for his own records. The FAI record registration fees for world and international records have been established by the official delegates from each nation who attend the annual FAI Conferences. The NAA portion of this is about one-half. When a national (U. S.) record only is established, the NAA registration fee amounts to $90.

Instrument calibration fees shown below are levied by the National Bureau of Standards. Other charges cover only the maintenance of NAA instruments. Specific fees and charges incident to the many types of world, international, and national records recognized by FAI and NAA are:

## WORLD RECORD FEES

| | | |
|---|---|---|
| NAA sanction fee | | $300.00 |
| Barograph rental (2 dual traverse type) | | 60.00 |
| Barograph calibration (depending on record) | $40.00- | 150.00 |
| Course (speed or closed circuit) license fee | | 50.00 |
| Registration fee | | 2,250.00 |
| | | $2,700.00-$2,810.00 |

## INTERNATIONAL RECORD FEES

### Maximum Speed over a Three Kilometer Straightaway Course

| | |
|---|---|
| NAA sanction fee | $300.00 |
| Barograph rental (four for two observer aircraft) | 40.00 |
| Rental of electric printing chronograph, cameras and accessories | 150.00 |
| Barograph calibration fees | 70.00 |
| Speed course license fee (if course not established) | 50.00 |
| Registration, new international record | 175.00 |
| | $785.00 |

### Speed in a Closed Circuit

| | |
|---|---|
| NAA sanction fee | $150.00 |
| Barograph rental (two small) | 20.00 |
| Barograph calibration fee | 40.00 |
| Rental of three certified chronometers | 15.00 |
| Speed course license fee (if course not established) | 50.00 |
| Registration, new national and international record | 175.00 |
| | $450.00 |

### Distance in a Closed Circuit and Distance, Refueling in Flight

| | |
|---|---|
| NAA sanction fee | $150.00 |
| Barograph rental (two small instruments) | 20.00 |
| Barograph calibration | 20.00 |
| Registration, new national and international record | 175.00 |
| | $365.00 |

## Distance without Refueling (not in Closed Circuit)

| | |
|---|---|
| NAA sanction fee | $ 75.00 |
| Barograph rental (two small instruments) | 20.00 |
| Barograph calibration | 20.00 |
| Registration, new national and international record | 175.00 |
| | $290.00 |

## Altitude, with or without Load (Heavy Aircraft)

| | |
|---|---|
| NAA sanction fee | $150.00 |
| Sponsor provides instruments | |
| Instrument calibration | 150.00 |
| Registration, new national and international record | 175.00 |
| | $475.00 |

## Altitude (Light Aircraft)

| | |
|---|---|
| NAA sanction fee | $ 75.00 |
| Sponsor provides instruments | |
| Instrument calibration | 50.00 |
| Registration, new national and international record | 175.00 |
| | $300.00 |

## Transcontinental and Inter-City Records (all types)

| | |
|---|---|
| NAA sanction fee | $ 25.00 |
| NAA registration fee | 90.00 |
| | $115.00 |

### ACTIVE FAI TIMERS

Carl Adams, Miami Springs, Fla.
Peter Altman, Detroit, Mich.
Byron Armstrong, New Orleans, La.
Capt. R. S. Barnaby, USN (Ret.), Phila., Pa.
Allan Bonnalie, San Francisco, Cal.
Richard F. Bradley, San Francisco, Cal.
Dr. J. D. Brock, Alton, Mo.
W. G. Broughton, Schenectady, N. Y.
Willis G. Brown, Washington, D. C
L. B. Copley, Elmira, N. Y.
Luzern Custer, Dayton, O.
W. R. Enyart, Tarrytown, N. Y.
Frank A. Flynn, San Francisco, Cal.
Charles H. Gale, New York, N. Y.
Valentine Gephart, Seattle, Wash.
Dr. Ralph Greene, Jacksonville, Fla.
W. J. Hallahan, New York, N. Y.
Christos Harmantos, Washington, D. C.
J. P. V. Heinmuller, New York, N. Y.
H. B. Hendrickson, Washington, D. C.
W. H. Hitchman, Los Angeles, Cal.
F. K. Iszard, Elmira, N. Y.
J. H. Kangeter, Honolulu, Hawaii
H. W. Kirshbaum, Sunnyvale, Cal.
Harry H. Knepper, Detroit, Mich.
Karl O. Lange, Lexington, Ky.
A. L. Lawrence, E. Norton, Mass.
R. A. Leavell, Detroit, Mich.
C. S. Logsdon, Washington, D. C.
Dexter C. Martin, Columbia, S. C.
A. E. Merriam, Wichita, Kans.
Joseph Nikerent, Los Angeles, Cal.
R. C. Oertel, New York, N. Y.
J. B. Petersen, USNR, Washington, D. C.
Odis Porter, Indianapolis, Ind.
H. A. Richert, Detroit, Mich.
Capt. E. W. Rounds, USNR
Carl F. Schory, E. Hartford, Conn.
N. F. Scudder, Los Angeles, Cal.
Lewis Sevier, Miami, Fla.
B. Russell Shaw, St. Louis, Mo.
Russell J. Smith, Milwaukee, Wis.
Norman Snyder, Syracuse, N. Y.
Earl R. Southee, Washington, D. C.
Dudley M. Steele, Los Angeles, Cal.
R. J. Underwood, Detroit, Mich.
J. F. Victory, Washington, D. C.
Walter D. Ward, Mineola, L. I., N. Y.
G. W. Winter, New York, N. Y.
H. D. Wright, Altadena, Cal.
Lewis A. Yancey, New York, N. Y.
George Yates, Des Moines, Iowa
William C. Zint, New York, N. Y.

## OFFICIAL F.A.I. WORLD AIR RECORDS

MAXIMUM SPEED OVER A 1.864 MI. COURSE ........ 670.981 mph.
Maj. Richard L. Johnson, USAF, United States, Sept. 15, 1948.

DISTANCE IN A STRAIGHT LINE ........ 11,235.600 mi.
Comdr. Thomas D. Davies, USN.; Comdr. Eugene P. Rankin, USN.; Comdr. Walter S. Reid, USN.; Lt. Comdr. Ray A. Tabeling, USN.; United States, Sept. 29 - Oct. 1, 1946.

ALTITUDE ........ 72,394.795 ft.
Capt. Orvil Anderson and Capt. Albert Stevens, United States, Nov. 11, 1935.

DISTANCE, CLOSED CIRCUIT ........ 8,854,308 mi.
Lt. Col. O. F. Lassiter, pilot; Capt. W. J. Valentine, co-pilot; and crew; USAAF, United States, Aug. 1 - 3, 1947.

CIRCUIT OF THE WORLD ........ No official record.

DISTANCE IN A STRAIGHT LINE (with refueling in flight) ........ No official record.

# OFFICIAL F.A.I. INTERNATIONAL AND NATIONAL "CLASS" RECORDS

## AIRPLANES—(CLASS C)

DISTANCE, CLOSED CIRCUIT

International Record ........ 8,854.308 mi.

Lt. Col. O. F. Lassiter, pilot; Capt. W. J. Valentine, co-pilot; Capt. William D. Bailey, Capt. F. O. Hinckley, 1st Lt. A. J. Orillon, 1st Lt. R. L. Lewis, M/Sgt. J. J. Blancio, T/Sgt. J. R. Sanders, S/Sgt. J. Gauthier, and M/Sgt. R. B. Corey, crew: USAAF, United States, Boeing B-29 monoplane, 44-84061, 4 Wright 3350-57A engines of 2,200 hp each, MacDill Field, Tampa, Fla., Aug. 1 - 3, 1947.

National (U.S.) Record ........ Same as above.

DISTANCE IN A STRAIGHT LINE

International Record ........ 11,235.600 mi.

Comdr. Thomas D. Davies, USN.; Comdr. Eugene P. Rankin, USN.; Comdr. Walter S. Reid, USN.; and Lt. Comdr. Ray A. Tabeling, USN; United States, Lockheed P2V-1 monoplane, 2 Wright R-3500 engines of 2,300 hp each, from Pearce Field, Perth, Australia, to Port Columbus, Columbus, O., Sept. 29 - Oct. 1, 1946.

National (U.S.) Record ........ Same as above.

ALTITUDE

International Record ........ 59,445.359 ft.

John Cunningham, Great Britain, de Havilland 100 *Vampire* Mark I aircraft powered with a de Havilland Ghost 2/2 T.G. 278 jet engine, producing a thrust of 4,300 lb., at Hatfield, Hertfordshire, Mar. 23, 1948.

National (U.S.) Record ........ 47,910.009 ft.

Maj. F. F. Ross, pilot; Lt. D. M. Davis, co-pilot; Lt. L. B. Barrier, Lt. C. B Webster, F/O Pamphille Morrissette, Sgt. W. S. George, crew; USAAF, Boeing B-29 monoplane, 4 Wright R-3350-23 A, 2,000 hp engines, Harmon Field, Guam, M.I., May 15, 1946.

MAXIMUM SPEED

International Record ........ 670.981 mph.

Maj. Richard L. Johnson, USAF, United States, North American F-86 Swept-Back-Wing monoplane, General Electric J-47 jet engine, Muroc Air Force Base, Cal., Sept. 15, 1948.

National (U.S.) Record ........ Same as above.

SPEED FOR 62.137 MI. WITHOUT PAYLOAD

International Record ........ 605.230 mph.

John Douglas Derry, Great Britain, de Havilland D.H. 108 VW 120 Aircraft, de Havilland Goblin 4 jet engine, Hatfield, Hertfordshire, Apr. 12, 1948.

National (U.S.) Record ........ 494.973 mph.

Capt. R. A. Baird, USAAF, United States, P-80A jet propelled monoplane, Allison J-33 engine, Dayton, O., Apr. 19, 1946.

SPEED FOR 621.369 MI. WITHOUT PAYLOAD

International Record ........ 426.970 mph.

1st Lt. Henry A. Johnson, USAAF, United States, P-80 jet-propelled monoplane, Allison J-33 engine, Dayton, O., June 3, 1946.

National (U.S.) Record ........ Same as above.

SPEED FOR 1,242.739 MI. WITHOUT PAYLOAD

International Record ........ 447.470 mph.

Jacqueline Cochran, United States, North American P-51 monoplane, Packard built Rolls Royce Merlin Engine of 1,450 hp near Palm Springs, Cal., May 22, 1948.

National (U.S.) Record ........ Same as above.

SPEED FOR 3,106.849 MI. WITHOUT PAYLOAD

International Record ........ 338.392 mph.

Capt. J. E. Bauer, pilot; Capt. J. E. Cotton, co-pilot; M/Sgt. Angelo Queses, T/Sgt. Richard McDonald and Cpl. Raymon Koss, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright R-3350-23A engines of 2,200 hp each, Dayton, O., June 28, 1946.

National (U.S.) Record ........ Same as above.

SPEED FOR 6,213.698 MI. WITHOUT PAYLOAD
International Record ........ 273.195 mph.
Lt. Col. O. F. Lassiter, pilot; Capt. W. J. Valentine, co-pilot; Capt. William D. Bailey; Capt. F. O. Hinckley, 1st Lt. A. J. Orillon, 1st Lt. R. L. Lewis, M/Sgt. J. J. Blancio, T/Sgt. J. R. Sanders, S/Sgt. J. Gauthier, S/Sgt. R. B. Corey, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright R-3350-57A engines, 2,200 hp each, Wright Field, Dayton, O., July 29 - 30, 1947.
National (U.S.) Record ........ Same as above.

**WITH PAYLOAD OF 2,204.622 LB.**

ALTITUDE
International Record ........ 47,910.009 ft.
Maj. F. F. Ross, pilot; Lt. D. M. Davis, co-pilot; Lt. L. B. Barrier, Lt. C. B. Webster, F/O Pamphille Morrissette and Sgt. W. S. George, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,000 hp engines, Harmon Field, Guam, M.I., May 15, 1946.
National (U.S.) Record ........ Same as above.

SPEED FOR 621.369 MI.
International Record ........ 410.431 mph.
Lt. Col. T. P. Gerrity, pilot; Capt. W. K. Rickert, co-pilot; USAAF, United States, Douglas XA-26F monoplane, 2 Pratt and Whitney R-2800 2,200 hp engines and 1 GE I-16 jet-propelled engine, Dayton, O., June 20, 1946.
National (U.S.) Record ........ Same as above.

SPEED FOR 1,242.739 MI.
International Record ........ 365.649 mph.
Lt. E. M. Grabowski, pilot; Lt. J. J. Liset, co-pilot; M/Sgt. D. P. Kelly, Cpl. F. M. Polmotier, and Cpl. O. W. Lambert, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Dayton, O., May 17, 1946.
National (U.S.) Record ........ Same as above.

SPEED FOR 3,106.849 MI.
International Record ........ 338.392 mph.
Capt. J. E. Bauer, pilot; Capt. J. E. Cotton, co-pilot; M/Sgt. Angelo Queses, T/Sgt. Richard McDonald and Cpl. Raymon Koss, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright R-3350-23A engines of 2,200 hp each, Dayton, O., June 28, 1946.
National (U.S.) Record ........ Same as above.

**WITH PAYLOAD OF 4,409.244 LB.**

ALTITUDE
International Record ........ 46,522.217 ft.
Col. E. D. Reynolds, pilot; Capt. B. P. Robson, co-pilot; Lt. J. G. Barnes, Lt. Theodore Madden, Lt. K. H. Morehouse, S/Sgt. W. C. Flynn and Cpl. A. L. Lentowski, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,000 hp engines, Harmon Field, Guam, M.I., May 13, 1946.
National (U.S.) Record ........ Same as above.

SPEED FOR 621.369 MI.
International Record ........ 369.692 mph.
Lt. E. M. Grabowski, pilot; Lt. J. J. Liset, co-pilot; M/Sgt. D. P. Kelly, Cpl. F. M. Polmotier, and Cpl. O. W. Lambert, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Dayton, O., May 17, 1946.
National (U.S.) Record ........ Same as above.

SPEED FOR 1,242.739 MI.
International Record ........ 365.649 mph.
Lt. E. M. Grabowski, pilot; Lt. J. J. Liset, co-pilot; M/Sgt. D. P. Kelly, Cpl. F. M. Polmotier, and Cpl. O. W. Lambert, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Dayton, O., May 17, 1946.
National (U.S.) Record ........ Same as above.

SPEED FOR 3,106.849 MI.
International Record ........ 338.392 mph.
Capt. J. E. Bauer, pilot; Capt. J. F. Cotton, co-pilot; M/Sgt. Angelo Queses, T/Sgt. Richard McDonald and Cpl. Raymon Koss, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Dayton, O., June 28, 1946.
National (U.S.) Record ........ Same as above.

**WITH PAYLOAD OF 11,023 LB.**

ALTITUDE

International Record ........ 45,252.534 ft.

Lt. J. P. Tobinson, pilot; Lt. Lloyd A. Lee, co-pilot; Lt. D. B. Gleicher, Lt. A. W. Armistead, Lt. R. M. Beattie, Lt. F. J. Royce, F/O R. F. Johnson and Mario R. Genta, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,000 hp engines, Harmon Field, Guam, M.I., May 14, 1946.

National (U.S.) Record ........ Same as above.

SPEED FOR 621.369 MI.

International Record ........ 369.692 mph.

Lt. E. M. Grabowski, pilot; Lt. J. J. Liset, co-pilot; M/Sgt. D. P. Kelly, Cpl. F. M. Polmotier, and Cpl. O. W. Lambert, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Dayton, O., May 17, 1946.

National (U.S.) Record ........ Same as above.

SPEED FOR 1,242.739 MI.

International Record ........ 365.649 mph.

Lt. E. M. Grabowski, pilot; Lt. J. J. Liset, co-pilot; M/Sgt. D. P. Kelly, Cpl. F. M. Polmotier, and Cpl. O. W. Lambert, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Dayton, O., May 17, 1946.

National (U.S.) Record ........ Same as above.

SPEED FOR 3,106.849 MI.

International Record ........ 266.023 mph.

Lt. Col. R. G. Ruegg, pilot; Lt. Col. Carl P. Walter, co-pilot; 2nd Lt. J. E. Wetzel, M/Sgt. William Cunningham and M/Sgt. R. L. Hilton, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Dayton, O., June 21, 1946.

National (U.S.) Record ........ Same as above.

**WITH PAYLOAD OF 22,046 LB.**

ALTITUDE

International Record ........ 41,561.597 ft.

Capt. A. A. Pearson, pilot; Lt. V. L. Dalbey, co-pilot; Lt. R. S. Strasburg, Lt. I. E. Bork, Cpl. J. T. Collins and Cpl. Joseph Friedberg, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Harmon Field, Guam, M.I., May 8, 1946.

National (U.S.) Record ........ Same as above.

SPEED FOR 621.369 MI.

International Record ........ 357.731 mph.

Capt. J. D. Bartlett, pilot; Lt. William Murray, co-pilot; M/Sgt. C. M. Youngblood, Cpl. D. J. Shrader and Cpl. R. F. Wilden, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Dayton, O., May 19, 1946.

National (U.S.) Record ........ Same as above.

SPEED FOR 1,242.739 MI.

International Record ........ 357.035 mph.

Capt. J. D. Bartlett, pilot; Lt. William Murray, co-pilot; M/Sgt. C. M. Youngblood, Cpl. D. J. Shrader and Cpl. R. F. Wilden, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Dayton, O., May 19, 1946.

National (U.S.) Record ........ Same as above.

SPEED FOR 3,106.849 MI.

International Record ........ 266.023 mph.

Lt. Col. R. G. Ruegg, pilot; Lt. Col. Carl P. Walter, co-pilot; 2nd Lt. J. E. Wetzel, M/Sgt. William Cunningham and M/Sgt. R. L. Hilton, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Dayton, O., June 21, 1946.

National (U.S.) Record ........ Same as above.

**WITH PAYLOAD OF 33,069 LB.**

ALTITUDE

International Record ........ 39,520.918 ft.

Col. B. H. Warren, pilot; Maj. J. R. Dale, Jr., co-pilot; Lt. W. D. Collier, M/Sgt. Gordon S. Fish, S/Sgt. V. H. Worden and Sgt. Thomas H. Hall, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Harmon Field, Guam, M.I., May 11, 1946.

National (U.S.) Record ........ Same as above.

SPEED FOR 621.369 MI. ......... No official record.
SPEED FOR 1,242.739 MI. ......... No official record.
SPEED FOR 3,106.849 MI. ......... No official record.

GREATEST PAYLOAD CARRIED TO AN ALTITUDE OF 6,561.666 FT.
International Record ......... 33,435 lb.
Col. B. H. Warren, pilot; Maj. J. R. Dale, Jr., co-pilot; Lt. W. D. Collier, M/Sgt. Gordon S. Fish, S/Sgt. V. H. Worden and Sgt. Thomas H. Hall, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright 2,200 hp engines, Harmon Field, Guam, M.I., May 11, 1946.
National (U.S.) Record ......... Same as above.

**REFUELING IN FLIGHT**

AIRLINE DISTANCE WITH REFUELING ......... No official record.

## LIGHT AIRPLANES—(CLASS C)

**FIRST CATEGORY (AIRCRAFT WEIGHING LESS THAN 1,102.3 LB., IN FLYING ORDER)**

AIRLINE DISTANCE ......... No official record.
ALTITUDE ......... No official record.
SPEED FOR 62.137 MI. IN A CLOSED CIRCUIT ......... No official record.
SPEED FOR 621.369 MI. IN A CLOSED CIRCUIT ......... No official record.
SPEED FOR 1,242.739 MI. IN A CLOSED CIRCUIT ......... No official record.

**SECOND CATEGORY (ALL AIRCRAFT WITH A TOTAL WEIGHT, IN FLYING ORDER, BETWEEN 1,104.5 AND 2,204.6 LB.)**

AIRLINE DISTANCE ......... No official record.
ALTITUDE ......... No official record.
SPEED FOR 62.137 MI. ......... No official record.
SPEED FOR 621.369 MI. ......... No official record.
SPEED FOR 1,242.739 MI. ......... No official record.

**THIRD CATEGORY (ALL AIRCRAFT WITH A TOTAL WEIGHT, IN FLYING ORDER, BETWEEN 2,206.8 AND 3,850 LB.)**

AIRLINE DISTANCE
International Record ......... 4,957.240 mi.
William P. Odom, United States, Beech Bonanza Model 35 airplane, take-off weight 3,858 lb., Continental E-185-1 engine from Honolulu, Hawaii to Teterboro, N. J., Mar. 7 - 8 (G.M.T.), 1949.
National (U.S.) Record ......... Same as above.

ALTITUDE ......... No official record.
SPEED FOR 62.137 MI. ......... No official record.
SPEED FOR 621.369 MI. ......... No official record.
SPEED FOR 1,242.739 MI. ......... No official record.

**FOURTH CATEGORY (ALL AIRCRAFT WITH A TOTAL WEIGHT, IN FLYING ORDER, BETWEEN 3,860.3 AND 6,613.9 LB.)**

AIRLINE DISTANCE ......... No official record.
ALTITUDE ......... No official record.
SPEED FOR 62.137 MI. ......... No official record.
SPEED FOR 621.369 MI. ......... No official record.
SPEED FOR 1,242.739 MI. ......... No official record.

**FIFTH CATEGORY (ALL AIRCRAFT WITH A TOTAL WEIGHT. IN FLYING ORDER, BETWEEN 6,616 AND 9,920.8 LB.)**

AIRLINE DISTANCE ......... No official record.
ALTITUDE ......... No official record.
SPEED FOR 62.137 MI. ......... No official record.
SPEED FOR 621.369 MI. ......... No official record.
SPEED FOR 1,242.739 MI. ......... No official record.

## SEAPLANES—(CLASS C2)

DISTANCE, CLOSED CIRCUIT
International Record ......... 3,231.123 mi.
Mario Stoppani and Carlo Tonini, Italy, Cant Z I-LERO seaplane, 3 Alfa Romeo 126 RC.34 750 hp engines, May 27-28, 1937.
National (U.S.) Record ......... 1,569 mi.
Lts. B. J. Connell and H. C. Rodd, Pn-10, 2 Packard 600 hp each, San Diego, Cal., Aug. 15 - 16, 1927.

AIRLINE DISTANCE

International Record ........ 5,997.462 mi.
Capt. D. C. T. Bennett and First Officer L. Harvey, pilots; Great Britain, Short-Mayo *Mercury* seaplane, 4 Napier *Rapiers J.I.* 370 hp engines, from Dundee, Scotland to near Fort-Nolloth, S. Africa, Oct. 6-8, 1938.

National (U.S.) Record ........ 3,281.402 mi.
Lt. Comdr. Knefler McGinnis, USN, Lt. J. K. Averill, USN, NAP T. P. Wilkinson, USN, Pilots; C. S. Bolka, A. E. J. Dionne and E. V. Sizer, crew; Navy XP3Y-1 seaplane, 2 Pratt and Whitney 825 hp engines, from Cristobal Harbor, C. Z. to San Francisco Bay, Alameda, Cal., Oct. 14-15, 1935.

ALTITUDE

International Record ........ 44,429.04 ft.
Col. Nicola Di Mauro, Italy, Caproni 161 seaplane, (biplane), Piaggio XI RC 100 engine, at Vigna di Valle, Sept. 25, 1939.

National (U.S.) Record ........ 38,559.594 ft.
Lt. Appollo Soucek, USN, *Apache*, Pratt and Whitney 425 hp engine, supercharged, at Washington, D. C., June 4, 1929.

MAXIMUM SPEED

International Record ........ 440.681 mph.
Francesco Agello, Italy, M.C. 72 seaplane, Fiat A.S. 6 engine at Lake Garda, Italy, Oct. 23, 1934.

National (U.S.) Record ........ 245.713 mph.
Lt. James H. Doolittle, USAF, Curtiss R3C-2, Curtiss V-1400, 600 hp engine, Bay Shore, Baltimore, Md., Oct. 27, 1925.

SPEED FOR 62.137 MI. WITHOUT PAYLOAD

International Record ........ 391.072 mph.
Guglielmo Cassinelli, Italy, Macchi C. 72 seaplane, 2,400 hp Fiat AS 6 engine, Falconara-Pesaro permanent course, Oct. 8, 1933.

National (U.S.) Record ........ 241.679 mph.
Lt. G. T. Cuddihy, USN, Curtiss R3C-2, Curtiss V-1500, 700 hp at Norfolk, Va., Nov. 13, 1926.

SPEED FOR 621.369 MI. WITHOUT PAYLOAD

International Record ........ 250.676 mph.
M. Stoppani and G. Gorini, pilots; Ing. Luzzatto and E. Accomolli, passengers; Italy, Cant Z 509 seaplane, 3 Fiat A80 RC 41 1,000 hp engines, Mar. 30, 1938.

National (U.S.) Record ........ 165.040 mph.
Maj. Gen. Frank M. Andrews, pilot; J. G. Moran and H. O. Johnson, crew; Martin BO12-A seaplane, 2 Pratt and Whitney 700 hp *Hornet* engines, Aug. 24, 1935.

SPEED FOR 1,242.739 MI. WITHOUT PAYLOAD

International Record ........ 246.351 mph.
M. Stoppani and G. Gorini, pilots; Ing. Luzzatto and E. Accomolli, passengers; Italy, Cant Z 509 seaplane, 3 Fiat A80 RC 41 1,000 hp engines, Mar. 30, 1938.

National (U.S.) Record ........ 157.319 mph.
Edwin Musick, Boris Sergievsky and Charles A. Lindbergh, Sikorsky S-42 seaplane, 4 Pratt and Whitney 670 hp *Hornet* engines, Aug. 1, 1934.

SPEED FOR 3,106.849 MI. WITHOUT PAYLOAD

International Record ........ 191.534 mph.
Mario Stoppani and Carlo Tonini, Italy, Cant Z I-LERO seaplane, 3 Alfa Romeo 126 RC.34 750 hp engines, May 27-28, 1937.

National (U.S.) Record ........ No official record.

SPEED FOR 6,213.698 MI. WITHOUT PAYLOAD ........ No official record.

**WITH PAYLOAD OF 2,204.622 LB.**

ALTITUDE

International Record ........ 34,084.577 ft.
Nicola di Mauro and Mario Stoppani, Italy, Cant Z. 506 B. seaplane, 3 Alfa Romeo RC.55 700 hp engines, at Monfalcone, Nov. 12, 1937.

National (U.S.) Record ........ 26,929.080 ft.
Boris Sergievsky, Sikorsky S-48 seaplane, 2 Pratt and Whitney *Hornet*, 575 hp each, at Bridgeport, Conn., July 21, 1930.

SPEED FOR 621.369 MI.
International Record ........ 250.676 mph.
M. Stoppani and G. Gorini, pilots; Ing. Luzzatto and E. Accumolli, passengers; Italy, Cant Z 509 seaplane, 3 Fiat A80 RC 41 1,000 hp engines, Mar. 30, 1938.
National (U.S.) Record ........ 165.040 mph.
Maj. Gen. F. M. Andrews, pilot; J. G. Moran and H. C. Johnson, crew; Martin B-12-A seaplane, 2 Pratt and Whitney 700 hp *Hornet*. engines, Aug. 24, 1935.

SPEED FOR 1,242.739 MI.
International Record ........ 246.351 mph.
M. Stoppani and G. Gorini, pilots; Ing. Luzzatto and E. Accomolli, passengers; Italy Cant Z 509 seaplane, 3 Fiat A80 RC 41, 1,000 hp engines, Mar. 30, 1938.
National (U.S.) Record ........ 157.319 mph.
Edwin Musick, Boris Sergievsky and Charles A. Lindbergh, Sikorsky S-42 seaplane, 4 Pratt and Whitney 670 hp *Hornet* engines, Aug. 1, 1934.

SPEED FOR 3,106.849 MI.
International Record ........ 191.534 mph.
Mario Stoppani and Niccola di Mauro, Italy, Cant Z 506-B seaplane, 3 Alfa Romeo 126 RC.34 750 hp engines, May 27-28, 1937.
National (U.S.) Record ........ No official record.

**WITH PAYLOAD OF 4,409.244 LB.**

ALTITUDE
International Record ........ 29,366.737 ft.
Mario Stoppani and Nicola di Mauro, Italy, Cant Z 506-B seaplane, 3 Alfa Romeo 700 hp engines, at Monfalcone, Nov. 3, 1937.
National (U.S.) Record ........ 19,709.259 ft.
Boris Sergievsky S-38 seaplane, 2 Pratt and Whitney 424 hp *Wasp*, engines, at Stratford, Conn., Aug. 11, 1930.

SPEED FOR 621.369 MI.
International Record ........ 250.676 mph.
M. Stoppani and G. Gorini, pilots; Ing. Luzzatto and E. Accomolli, passengers; Italy, Cant Z 509 seaplane, 3 Fiat A80 RC 41 1,000 hp engines, Mar. 30, 1938.
National (U.S.) Record ........ 157.580 mph.
Edwin Musick, Boris Sergievsky and Charles A. Lindbergh, Sikorsky S-42 seaplane, 4 Pratt and Whitney 670 hp *Hornet* engines, Aug. 1, 1934.

SPEED FOR 1,242.739 MI.
International Record ........ 246.351 mph.
M. Stoppani and G. Gorini, pilots; Ing. Luzzatto and E. Accomolli, passengers; Italy, Cant Z 509 seaplane, 3 Fiat A80 RC 41 1,000 hp engines, Mar. 30, 1938.
National (U.S.) Record ........ 157.319 mph.
Edwin Musick, Boris Sergievsky and Charles A. Lindbergh, Sikorsky S-42 seaplane, 4 Pratt and Whitney 670 hp *Hornet* engines, Aug. 1, 1934.

SPEED FOR 3,106.849 MI. ........ No official record.

**WITH PAYLOAD OF 11,023.11 LB.**

ALTITUDE
International Record ........ 24,310.973 ft.
Mario Stoppani and Nicola di Mauro, pilots; Forlivesi, mechanic; Italy, Cant Z 506-B seaplane, 3 Alfa Romeo 700 hp engines, at Monfalcone, Nov. 7, 1947.
National (U.S.) Record ........ 20,406.472 ft.
Boris Sergievsky and Raymond B. Quick, Sikorsky S-42 seaplane, 4 Pratt and Whitney 670 hp *Hornet* engines, Bridgeport, Conn., May 17, 1934.

SPEED FOR 621.369 MI.
International Record ........ 156.516 mph.
Mario Stoppani and Ing. Antonio Maiorana, pilots; A. Spinelli, S. Forlivesi and R. T. Suriano, crew; Italy, Cant Z, 508 seaplane, 3 Isotta-Fraschini Asso 11 R.C. 836 hp engines, Grado-Faro Ancona-Faro di Rimini temporary course, May 1, 1937.
National (U.S.) Record ........ No official record.

SPEED FOR 1,242.739 MI.
International Record ........ 154.356 mph.
Mario Stoppani and Ing. Antonio Maiorana, pilots; A. Spinelli, S. Forlivesi and R. T. Suriano, crew; Italy, Cant Z, 508 seaplane, 3 Isotta-Fraschini Asso 11 RC 836 hp engines, Grado-Faro Ancona-Faro di Rimini temporary course, May 1, 1937.
National (U.S.) Record ........ No official record.

SPEED FOR 3,106.849 MI. ........ No official record.

**WITH PAYLOAD OF 22,046.22 LB.**

ALTITUDE
International Record ........ 15,954.691 ft.
Mario Stoppani, pilot; G. Divari and A. Spinetti, passengers; Italy, Cant Z 508 seaplane, 3 Isotta Fraschini *Asso* 11 R.C. 836 hp engines, Monfalcone, Apr. 13, 1937.
National (U.S.) Record ........ No official record.

SPEED FOR 621.369 MI.
International Record ........ 131.110 mph.
Guillaumet, Leclaire, Comet, Le Duff, Le Morvan and Chapaton, France, Latecoere 521 seaplane, *Lt. de Vaisseau Paris*, 6 Hispano-Suiza 650 hp engines, Lucon-Aureilhan base, Dec. 27, 1937.
National (U.S.) Record ........ No official record.

SPEED FOR 1,242.739 MI. ........ No official record.
SPEED FOR 3,106.849 MI. ........ No official record.

**WITH PAYLOAD OF 33,069.33 LB.**

ALTITUDE
International Record ........ 13,509.162 ft.
Guillaumet, Leclaire, Comet, Le Duff, Le Morvan and Chapaton, France, Latecoere 521 seaplane, *Lt. de Vaisseau Paris*, 6 Hispano-Suiza 650 hp engines, at Biscarosse, Dec. 30, 1927.
National (U.S.) Record ........ No official record.

SPEED FOR 621.369 MI.
International Record ........ 117.899 mph.
Guillaumet, Leclaire, Comet, Le Duff, Le Morvan and Chapaton, France, Latecoere 521 seaplane, *Lt. de Vaisseau Paris*, 6 Hispano-Suiza 650 hp engines, Lucon-Aureilhan course, Dec. 29, 1937.
National (U.S.) Record ........ No official record.

SPEED FOR 1,242.739 MI. ........ No official record.
SPEED FOR 3,106.849 MI. ........ No official record.

GREATEST PAYLOAD CARRIED TO AN ALTITUDE OF 6,561.660 FT.
International Record ........ 39,771 lb.
Guillaumet, Leclaire, Comet, Le Duff, Le Morvan and Chapaton, France, Latecoere 521 seaplane, *Lt. de Vaisseau Paris*, 6 Hispano-Suiza 650 hp engines, at Biscarosse, Dec. 30, 1937.
National (U.S.) Record ........ 16,608 lb.
Boris Sergievsky, Sikorsky S-42 seaplane, 4 Pratt and Whitney *Hornet* 650 hp engines, Bridgeport, Conn., Apr. 26, 1934.

## LIGHT SEAPLANES—(CLASS C2)

**FIRST CATEGORY (LIGHT SEAPLANES WEIGHING LESS THAN 1,322.7 LBS.)**

ALTITUDE ........ No official record.
AIRLINE DISTANCE ........ No official record.
SPEED FOR 62.137 MI. IN A CLOSED CIRCUIT ........ No official record.
SPEED FOR 621.369 MI. IN A CLOSED CIRCUIT ........ No official record.
SPEED FOR 1,242.739 MI. IN A CLOSED CIRCUIT ........ No official record.

**SECOND CATEGORY (LIGHT SEAPLANES WITH A TOTAL WEIGHT, IN FLYING ORDER, BETWEEN 1,324.9 AND 2,645.4 LB.)**

ALTITUDE ........ No official record.
AIRLINE DISTANCE ........ No official record.
SPEED FOR 62.137 MI. IN A CLOSED CIRCUIT ........ No official record.
SPEED FOR 621.369 MI. IN A CLOSED CIRCUIT ........ No official record.
SPEED FOR 1,242.739 MI. IN A CLOSED CIRCUIT ........ No official record.

**THIRD CATEGORY (LIGHT SEAPLANES WITH A TOTAL WEIGHT, IN FLYING ORDER, BETWEEN 2,647.7 AND 4,629.7 LB.)**

| | |
|---|---|
| AIRLINE DISTANCE | No official record. |
| ALTITUDE | No official record. |
| SPEED FOR 62.137 MI. | No official record. |
| SPEED FOR 621.369 MI. | No official record. |
| SPEED FOR 1,242.739 MI. | No official record. |

**FOURTH CATEGORY (LIGHT SEAPLANES WITH A TOTAL WEIGHT, IN FLYING ORDER, BETWEEN 4,631.9 AND 7,495.7 LB.)**

| | |
|---|---|
| AIRLINE DISTANCE | No official record. |
| ALTITUDE | No official record. |
| SPEED FOR 62.137 MI. | No official record. |
| SPEED FOR 621.369 MI. | No official record. |
| SPEED FOR 1,242.739 MI. | No official record. |

**FIFTH CATEGORY (LIGHT SEAPLANES WITH A TOTAL WEIGHT, IN FLYING ORDER, BETWEEN 7,497.9 AND 11,023 LB.)**

| | |
|---|---|
| AIRLINE DISTANCE | No official record. |
| ALTITUDE | No official record. |
| SPEED FOR 62.137 MI. | No official record. |
| SPEED FOR 621.369 MI. | No official record. |
| SPEED FOR 1,242.739 MI. | No official record. |

## AMPHIBIANS—(CLASS C3)

AIRLINE DISTANCE

International Record — 1,429.685 mi.

Maj. Gen. F. M. Andrews, pilot; Maj. John Whiteley, co-pilot; and crew, United States, Douglas YOA-5 amphibian, 2 Wright *Cyclone* 800 hp engines, from San Juan, Puerto Rico, to Langley Field, Va., June 29, 1936.

National (U.S.) Record — Same as above.

ALTITUDE

International Record — 24,950.712 ft.

Boris Sergievsky, United States, Sikorsky S-43 amphibian, 2 Pratt and Whitney 750 hp *Hornet* engines, Stratford, Conn., Apr. 14, 1936.

National (U.S.) Record — Same as above.

MAXIMUM SPEED

International Record — 230.413 mph.

Maj. Alexander P. de Seversky, United States, Seversky Amphibian, Wright *Cyclone* 710 hp engine, Detroit, Mich., Sept. 15, 1935.

National (U.S.) Record — Same as above.

SPEED FOR 62.137 MI. WITHOUT PAYLOAD

International Record — 209.451 mph.

Maj. A. P. de Seversky, United States, Seversky Amphibian, Wright *Cyclone* 1,000 hp engine, at Miami, Fla., Dec. 19, 1936.

National (U.S.) Record — Same as above.

SPEED FOR 621.369 MI. WITHOUT PAYLOAD

International Record — 186.076 mph.

Capt. W. P. Sloan and Capt. B. L. Boatner, USA AC, pilots; United States, Grumman YOA-9 amphibian, 2 Pratt and Whitney engines, 400 hp each, Dayton, O., July 31, 1939.

National (U.S.) Record — Same as above.

SPEED FOR 1,242.739 MI. WITHOUT PAYLOAD

International Record — 154.701 mph.

Giuseppe Burci and Enrico Rossaldi, pilots; Gino Velati, passenger; Italy, Macchi C-94 I.-NEPI amphibian, 2 Wright *Cyclone* 750 hp engines, Rovine Ansedonia-Faro Fiumicino Antignano temporary course, May 6, 1937.

National (U.S.) Record — No official record.

| | |
|---|---|
| SPEED FOR 3,106.849 MI. WITHOUT PAYLOAD | No official record. |
| SPEED FOR 6,213.689 MI. WITHOUT PAYLOAD | No official record. |

**WITH PAYLOAD OF 2,204,622 LB.**

ALTITUDE
International Record ........ 23,405.465 ft.
Ivan Soukhomline, USSR, *Tsagui 44 D* Amphibian, 4 M-87 840 hp engines, Katcha, near Sebastopol, June 17, 1940.
National (U.S.) Record ........ 19,625.925 ft.
Boris Sergievsky, Sikorsky S-43, 2 Pratt and Whitney 750 hp *Hornet* engines, Stratford, Conn., Apr. 25, 1936.

SPEED FOR 621.369 MI.
International Record ........ 172.409 mph.
Ivan Soukhomline, USSR, *Tsagui 44 D* Amphibian, 4 M-85, 750 hp engines, Katcha-Kersoness-Taganrog course, Sept. 28, 1940.
National (U.S.) Record ........ No official record.

SPEED FOR 1,242.739 MI. ........ No official record.
SPEED FOR 3,106.849 MI. ........ No official record.

**WITH PAYLOAD OF 4,409.244 LB.)**

ALTITUDE
International Record ........ 20,616.756 ft.
Ivan Soukhomline, USSR, *Tsagui 44 D* Amphibian, 4 M-87 840 hp engines, Katcha, near Sebastopol, June 19, 1940.
National (U.S.) Record ........ 19,625 ft.
Boris Sergievsky, United States, Sikorsky S-43 Amphibian, 2 Pratt and Whitney, 750 hp engines, Stratford, Conn., Apr 25, 1936.

SPEED FOR 621.369 MI.
International Record ........ 149.694 mph.
Ivan Soukhomline, USSR, *Tsagui 44 D* Amphibian, 4 M-85 750 hp engines, Katcha-Kersoness-Taganrog course, Oct. 7, 1940.
National (U.S.) Record ........ No official record.

SPEED FOR 1,242.739 MI. ........ No official record.
SPEED FOR 3,106.849 MI. ........ No official record.

**WITH PAYLOAD OF 11,023.11 LB.**

ALTITUDE
International Record ........ 17,122.669 ft.
Ivan Soukhomline, USSR, *Tsagui 44 D* Amphibian, 4 M-87 840 hp engines, Katcha, near Sebastopol, June 19, 1940.
National (U.S.) Record ........ No official record.

SPEED FOR 621.369 MI. ........ No official record.
SPEED FOR 1,242.739 MI. ........ No official record
SPEED FOR 3,106.849 MI. ........ No official record.

**WITH PAYLOAD OF 22,046.22 LB.**

ALTITUDE ........ No official record.
SPEED FOR 621.369 MI. ........ No official record.
SPEED FOR 1,242.739 MI. ........ No official record.
SPEED FOR 3,106.849 MI. ........ No official record.
GREATEST PAYLOAD CARRIED TO AN ALTITUDE OF 6,561.660 FT.
International Record ........ 11,023 lb.
Ivan Soukhomline, USSR, *Tsagui 44 D* Amphibian, 4 M-87 840 hp engines, at Katcha, near Sebastopol, June 19, 1940.

## AUTOGIROS—(CLASS E)

AIRLINE DISTANCE ........ No official record.
BROKEN LINE DISTANCE ........ No official record.
ALTITUDE ........ No official record.
MAXIMUM SPEED ........ No official record.
SPEED FOR 62.137 MI. WITHOUT PAYLOAD ........ No official record.
SPEED FOR 621.369 MI. WITHOUT PAYLOAD ........ No official record.
SPEED FOR 1,242.739 MI. WITHOUT PAYLOAD ........ No official record.
SPEED FOR 3,106.849 MI. WITHOUT PAYLOAD ........ No official record.
SPEED FOR 6,213.698 MI. WITHOUT PAYLOAD ........ No official record.

## AIRSHIPS—(CLASS B)

AIRLINE DISTANCE
International Record ........ 3,967.137 mi.
Dr. Hugo Eckener, Germany, L. Z. 127, *Graf Zeppelin* 5 Maybach 450-550 hp engines, from Lakehurst, N. J., to Friedrichshafen, Germany, Oct. 29, 30, 31, and Nov. 1, 1928.
National (U.S.) Record ........ No official record.

## GLIDERS—(CLASS D)

**(Single-Place)**

DISTANCE IN A STRAIGHT LINE

International Record .......... 465.532 mi.
O. Klepokova, USSR, *Rot-Front 7* glider, from Moscow to Otradnoie, region of Stalingrad, July 6, 1939.

National (U.S.) Record .......... 325.121 mi.
John Robinson, *Zanonia* Sailplane, NX-18134, from Wichita Falls, Tex. to near Barstow, Tex., July 19, 1947.

DISTANCE TO A PREDETERMINED POINT WITH RETURN TO POINT OF DEPARTURE

International Record .......... 229.189 mi.
Paul B. MacCready, Jr., United States, *Screamin Weiner* sailplane from Wichita Falls, Tex. to Anson, Tex. and return, July 16, 1947.

National (U.S.) Record .......... Same as above.

DISTANCE TO A PREDETERMINED DESTINATION

International Record .......... 374.287 mi.
P. Savtzov, USSR, *Rot-Front 7* glider, from Toula to Mikhailovka, July 31, 1939.

National (U.S.) Record .......... No official record.

DURATION WITH RETURN TO POINT OF DEPARTURE

International Record .......... 40 hr. 51 min.
Guy Marchand, France, *Nord* 2,000 glider, number 52, Gliding Center at Romanin les Alphilles, March 16-18, 1949.

National (U.S.) Record .......... 21 hr. 34 min.
Lt. William Cocke, Jr., Cocke *Nighthawk* glider, Honolulu, Hawaii, Dec. 17-18, 1931.

ALTITUDE GAINED

International Record .......... 26,410.708 ft.
Lt. Per Axel Person, Sweden, *Weihe* FV-8301 glider, at Orebro, July 12, 1947.

National (U.S.) Record .......... 24,200.000 ft.
John Robinson, Ross-Stephens 1 *Zanonia* sailplane, launching at Bishop, Cal., landing at Muroc Air Force Base, Cal., Jan. 1, 1949

ALTITUDE ABOVE SEA LEVEL

International Record .......... 33,500 ft.
John Robinson, United States, Ross-Stephens 1 *Zanonia* sailplane, launching at Bishop, Cal., landing at Muroc Air Force Base, Cal., Jan. 1, 1949.

National (U.S.) Record .......... Same as above.

SPEED FOR 62.137 MI. OVER A TRIANGLE COURSE

International Record .......... 43.247 mph.
Siegbert Maurer, Switzerland, *Moswey III* glider, Muottas Muraigl-Weissfluhjoch-Piz Curver-Muottas Muraigl course, July 22, 1948.

National (U.S.) Record .......... No official record.

**(Multi-Place)**

DISTANCE IN A STRAIGHT LINE

International Record .......... 358.093 mi.
J. Kartachev, pilot; P. Savtzov, passenger; USSR, Stakhanovetz glider, from Moscow-Izmailovo to Ochnia, July 17, 1938.

National (U.S.) Record .......... 309.678 mi.
Richard H. Johnson, pilot; R. A. Sparling, passenger; Schweizer TG-2 glider, NC-479903, from Prescott, Ariz. municipal Airport to the Ackerman Ranch approximately 11 miles west of Governador, N. M., Sept. 8, 1946.

DISTANCE TO A PREDETERMINED POINT WITH RETURN TO POINT OF DEPARTURE

International Record .......... 258.533 mi.
J. Kartachev and V. Petrotchenkova, USSR, Stakanovetz glider, from Toula to Kuklovo and return, Oct. 7, 1940.

National (U.S.) Record .......... 309.678 mi.

DISTANCE TO A PREDETERMINED DESTINATION

International Record .......... 307.591 mi.
J. Kartachev and V. Petrotchenkova, USSR, Stankanovetz glider, from Toula to Kharkov, June 19, 1940.

National (U.S.) Record .......... No official record.

DURATION WITH RETURN TO POINT OF DEPARTURE
International Record ........ 50 hr. 26 min.
August Bodecker and Karl H. Zander, Germany, *Kranich* glider, at Rossitten, Dec. 9-11, 1938.
National (U.S.) Record ........ No official record.

ALTITUDE GAINED
International Record ........ 22,244.027 ft.
Guy Rousselet and Leon Faivre, France, *Kranich* 2-place glider, No. 30, at St. Auban on Durance, Sept. 21, 1948.
National (U.S.) Record ........ 14,800 ft.
William G. Briegleb, pilot; Thayer A. Smith, passenger; *Briegleb BG8* glider, NC 33,636, at El Mirage Field, Adelanto, Cal., Sept. 10, 1948.

ALTITUDE ABOVE SEA LEVEL ........ No official record.
SPEED FOR 62.137 MI. OVER A TRIANGULAR COURSE ........ No official record.

## BALLOONS (CLASS A)

### FIRST CATEGORY—(21,189 CU. FT. OR LESS)

DURATION
International Record ........ 46 hr. 10 min.
Serge Sinoveev, USSR, VR 80 Balloon, 21,082.458 cu. ft., take-off near Dolgoproudnaia, Mar. 30, 1941.
National (U.S.) Record ........ No official record.

DISTANCE
International Record ........ 499.69 mi.
Georges Cormier, France, July 1, 1922.
National (U.S.) Record ........ No official record.

ALTITUDE
International Record ........ 23,285.712 ft.
Boris Nevernov, USSR, VR-80 Balloon, 13,984.344 cu. ft., at Dolgoproudnaia, Aug. 31, 1940.
National (U.S.) Record ........ No official record.

### SECOND CATEGORY—(21,224 - 31,783 CU. FT.)

DURATION
International Record ........ 61 hr. 30 min.
F. Bourlouzki and A. Aliochine, USSR, from Moscow to Charaboulski, Apr. 3-6, 1939.
National (U.S.) Record ........ 19 hr. 00 min.
W. C. Naylor and K. W. Warren, *Skylark*, Little Rock, Ark., to Crawford, Tenn., Apr. 29-30, 1926.

DISTANCE
International Record ........ 1,056.950 mi.
F. Bourlouzki and A. Aliochine, USSR, from Moscow to Charaboulski, region of Koustanai, Apr. 3-6, 1939.
National (U.S.) Record ........ 410.104 mi.
W. C. Naylor and K. W. Warren, *Skylark*, Little Rock, Ark., to Crawford, Tenn., Apr. 29-30, 1926.

ALTITUDE
International Record ........ 27,718.117 ft.
Alexei Rostine, USSR, VR-70 Balloon of 29,451.876 cu. ft. at Dolgoproudnaia, Oct. 4, 1940.
National (U.S.) Record ........ No official record.

### THIRD CATEGORY—(31,818 - 42,376.8 CU. FT.)

DURATION
International Record ........ 61 hr. 30 min.
F. Bourlouzki and A. Aliochine, USSR, from Moscow to Charaboulski, Apr. 3-6, 1939.
National (U.S.) Record ........ 26 hr. 48 min.
E. J. Hill and A. G. Schlosser, Ford Airport to Montale, Va., July 4-5, 1927.

DISTANCE
International Record ........ 1,056.950 mi.
F. Bourlouzki and A. Aliochine, USSR, from Moscow to Charaboulski, region of Koustanai, Apr. 3-6, 1939.
National (U.S.) Record ........ 571.877 mi.
S. A. U. Rasmussen, Ford Airport to Hookerton, N. C., July 4-5, 1927.

ALTITUDE

International Record ........ 27,718.117 ft.

Alexei Rostine, USSR, VR-70 Balloon, 29,451.876 cu. ft., at Dolgoproudnaia, Oct. 4, 1940.

National (U.S.) Record ........ No official record.

**FOURTH CATEGORY—(42,411.8 - 56,502.4 CU. FT.)**

DURATION

International Record ........ 69 hr. 20 min.

Boris Nevernov and Semion Gaiguerov, USSR, VR-73 Balloon, 50,357.764 cu. ft., from Dolgoproudnaia to Novosibirsk, Mar. 13-16, 1941.

National (U.S.) Record ........ 26 hr. 46 min.

E. J. Hill and A. G. Schlosser, Ford Airport to Montvale, Va., July 4-5, 1927.

DISTANCE

International Record ........ 1,719.215 mi.

Boris Nevernov and Semion Gaiguerov, USSR, VR-73 Balloon, 50,357.764 cu. ft., from Dolgoproudnaia to Novosibirsk, Mar. 13-16, 1941.

National (U.S.) Record ........ 571.877 mi.

S. A. U. Rasmussen, Ford Airport to Hookerton, N. C., July 4-5, 1927.

ALTITUDE

International Record ........ 27,718.117 ft.

Alexei Rostine, USSR, VR-70 Balloon, 29,451.876 cu. ft., at Dolgoproudnaia, Oct. 4, 1940.

National (U.S.) Record ........ No official record.

**FIFTH CATEGORY—(56,537.7 - 77,690.8 CU. FT.)**

DURATION

International Record ........ 69 hr. 20 min.

Boris Nevernov and Semion Gaiguerov, USSR, VR-73 Balloon, 50,357.764 cu. ft., from Dolgoproudnaia to Novosibirsk, Mar. 13-16, 1941.

National (U.S.) Record ........ 51 hr. 00 min.

T. G. W. Settle and C. H. Kendall, Gordon-Bennett Balloon Race, Chicago, Ill., Sept. 2-4, 1933.

DISTANCE

International Record ........ 1,719.215 mi.

Boris Nevernov and Semion Gaiguerov, USSR, VR-73 Balloon, 50,357.764 cu. ft., from Dolgoproudnaia to Novosibirsk, Mar. 13-16, 1941.

National (U.S.) Record ........ 963.123 mi.

T. G. W. Settle and Wilfred Bushnell, from Basle, Switzerland to Daugieliski, Poland, Sept. 25-27, 1932.

ALTITUDE

International Record ........ 30,754.529 ft.

Josef Emmer, Austria, *OE-Marek Emmer II* Balloon, Vienna-Lac de Nuesiedl, Sept. 25-27, 1937.

National (U.S.) Record ........ No official record.

**SIXTH CATEGORY—(77,706 - 105,942 CU. FT.)**

DURATION

International Record ........ 69 hr. 20 min.

Boris Nevernov and Semion Gaiguerov, USSR, VR-73 Balloon, 50,357.764 cu. ft., from Dolgoproudnaia to Novosibirsk, Mar. 13-16, 1941.

National (U.S.) Record ........ 51 hr. 00 min.

T. G. W. Settle and C. H. Kendall, Gordon-Bennett Balloon Race, Chicago, Ill., Sept. 2-4, 1933.

DISTANCE

International Record ........ 1,719.215 mi.

Boris Nevernov and Semion Gaiguerov, USSR, VR-73 Balloon, 50,357.764 cu. ft., from Dolgoproudnaia to Novosibirsk, Mar. 13-16, 1941.

National (U.S.) Record ........ 963.123 mi.

T. G. W. Settle and Wilfred Bushnell, from Basle, Switzerland to Daugieliski, Poland, Sept. 25-27, 1932.

ALTITUDE

International Record ........ 30,754.529 ft.

Josef Emmer, Austria, *OE-Marek Emmer II* Balloon, Vienna-Lac de Nuesiedl, Sept. 25-27, 1937.

National (U.S.) Record ........ 28,508.413 ft.

Capt. Hawthorne C. Gray, Scott Field, Belleville, Ill., Mar. 9, 1927.

SEVENTH CATEGORY—(105,977 - 141,256 CU. FT.)

DURATION
International Record ........ 69 hr. 20 min.
Boris Nevernov and Semion Gaiguerov, USSR, VR-73 Balloon, 50,357.764 cu. ft., from Dolgoproudnaia to Novosibirsk, Mar. 13-16, 1941.
National (U.S.) Record ........ 51 hr. 00 min.
T. G. W. Settle and C. H. Kendall, Gordon-Bennett Balloon Race, Chicago, Ill., Sept. 2-4, 1933.

DISTANCE
International Record ........ 1,719,215 mi.
Boris Nevernov and Semion Gaiguerov, USSR, VR-73 Balloon, 50,357.764 cu. ft., from Dolgoproudnaia to Novosibirsk, Mar. 13-16, 1941.
National (U.S.) Record ........ 963.123 mi.
T. G. W. Settle and Wilfred Bushnell, from Basle, Switzerland to Daugieliski, Poland, Sept. 25-27, 1932.

ALTITUDE
International Record ........ 32,811.132 ft.
Z. J. Burzynski, Poland, at Legjonowo, Mar. 29, 1936.
National (U.S.) Record ........ 28,508.413 ft.
Capt. Hawthorne C. Gray, at Scott Field, Belleville, Ill., Sept. 2-4, 1933.

EIGHTH CATEGORY—(141,291.3 CU. FT. OR OVER)

DURATION
International Record ........ 87 hr. 00 min.
H. Kaulen, Germany, Dec. 13-17, 1913.
National (U.S.) Record ........ 51 hr. 00 min.
Lt. Comdr. T. G. W. Settle and Lt. Charles H. Kendall, Gordon-Bennett Balloon Race, Chicago, Ill., Sept. 2-4, 1933.

DISTANCE
International Record ........ 1,896.856 mi
Berliner, Germany, Feb. 8-10, 1914.
National (U.S.) Record ........ 1,172.898 mi.
A. R. Hawley, St. Louis, Mo. to Lake Tschotogama, Canada, Oct. 17-19, 1910.

ALTITUDE
International Record ........ 72,394.795 ft.
Capt. Orvil Anderson and Capt. Albert Stevens, United States, *Explorer II*, take-off approximately 11 miles southwest of Rapid City, S. D., landing on school reserve land approximately 12 miles south of White Lake, S. D., Nov. 11, 1935.
National (U.S.) Record ........ Same as above.

## HELICOPTERS (CLASS G)

DURATION, CLOSED CIRCUIT
International Record ........ 9 hr. 57 min.
Maj. D. H. Jenson and Maj. W. C. Dodds; USAAF; U.S.; Sikorsky R-5A Helicopter, Pratt and Whitney 450 hp engine, Dayton, O., Nov. 14, 1946.
National (U.S.) Record ........ Same as above.

DISTANCE, AIRLINE
International Record ........ 703.6 mi.
Maj. F. T. Caschman, pilot; Maj. W. E. Zins, co-pilot; USAAF; U.S.; Sikorsky R-5 Helicopter, Pratt and Whitney 450 hp engine, from Dayton, O., to Logan Field, Boston, Mass., May 22, 1946.
National (U.S.) Record ........ Same as above.

DISTANCE, CLOSED CIRCUIT
International Record ........ 621.369 mi.
Maj. D. H. Jenson and Maj. W. C. Dodds; USAAF; U.S.; Sikorsky R-5A Helicopter, Pratt and Whitney 450 hp engine, Dayton, O., Nov. 14, 1946.
National (U.S.) Record ........ Same as above.

ALTITUDE
Capt. H. D. Gaddis, USA, United States, Sikorsky S-52-1 Helicopter, Franklin O-425-1, 245 hp, Bridgeport, Conn., May 21, 1949.
National (U.S.) Record ........ Same as above.

MAXIMUM SPEED
International Record ........ 129.552 mph.
Harold E. Thompson, United States, Sikorsky S-52-1 Helicopter, Franklin O-425-1 engine, 245 hp, Cleveland, O., Apr. 27, 1949.
National (U.S.) Record ........ Same as above.

SPEED FOR 62.137 MI. IN A CLOSED CIRCUIT
International Record ........ 122.749 mph.
Harold E. Thompson, United States, Sikorsky S-52-1 Helicopter, Franklin O-425-1 engine, 245 hp, Milford, Conn., May 6, 1949.
National (U.S.) Record ........ Same as above.

SPEED FOR 621.369 MI. IN A CLOSED CIRCUIT
International Record ........ 66.642 mph.
Maj. D. H. Jenson and Maj. W. C. Dodds, USAAF, United States, Sikorsky R-5A Helicopter, Pratt and Whitney 450 hp engine, Dayton, O., Nov. 14, 1946.
National (U.S.) Record ........ Same as above.

## FEMININE RECORDS

### AIRPLANES—(CLASS C)

AIRLINE DISTANCE
International Record ........ 3,671.432 mi.
V. Grisodoubova and P. Ossipenko, pilots; M. Raskova, Navigatrix; USSR; Soukhoi *Rodina* airplane, 2 M-96 800 hp engines, Sept. 24-25, 1938.
National (U.S.) Record ........ 2,447.728 mi.
Amelia Earhart, Lockheed Vega monoplane, Pratt and Whitney *Wasp* 450 hp engine, from Los Angeles, Cal., to Newark, N. J., Aug. 24-25, 1932.

ALTITUDE
International Record ........ 46,948.725 ft.
Mrs. Maryse Hilsz, France, Potez 506 biplane, Gnome and Rhone 900 hp engine, at Villacoublay, June 23, 1936.
National (U.S.) Record ........ 30,052.430 ft.
Jacqueline Cochran, Beechcraft biplane, NX-18562, Pratt and Whitney 600 hp engine, Palm Springs, Cal., Mar. 24, 1939.

SPEED, MAXIMUM
International Record ........ 412.002 mph.
Jacqueline Cochran, United States, North American P-51 monoplane, Packard built Rolls Royce Merlin 1,450 hp engine; Thermal, Cal., Dec. 17, 1947.
National (U.S.) Record ........ Same as above.

SPEED FOR 62.137 MI. WITHOUT PAYLOAD
International Record ........ 469.549 mph.
Jacqueline Cochran, United States, North American P-51 monoplane, Packard Rolls Royce Merlin Engine 1,450 hp, Coachella Valley, Col., Dec. 10, 1947.
National (U.S.) Record ........ Same as above.

SPEED FOR 621.369 MI. WITHOUT PAYLOAD
International Record ........ 431.094 mph.
Jacqueline Cochran, United States, North American P-51 monoplane, Packard built Rolls Royce Merlin 1,450 hp engine; start and finish near Palm Springs, Cal., May 24, 1948.
National (U.S.) Record ........ Same as above.

SPEED FOR 1,242.739 MI. WITHOUT PAYLOAD
International Record ........ 447.470 mph.
Jacqueline Cochran, United States, North American P-51 monoplane, Packard built Rolls Royce Merlin 1,450 hp engine; start and finish near Palm Springs, Cal., May 22, 1946.
National (U.S.) Record ........ Same as above.

SPEED FOR 3,106.847 MI. WITHOUT PAYLOAD ........ No official record.
SPEED FOR 6,213.695 MI. WITHOUT PAYLOAD ........ No official record.

## SEAPLANES—(CLASS C2)

DISTANCE IN A CLOSED CIRCUIT
International Record ........ 1,086.908 mi.
Lt. P. Ossipenko and Lt. V. Lomako, USSR, MP-1 monoplane seaplane, *AM-34* 750 hp engine, May 24, 1938.
National (U.S.) Record ........ No official record.

DISTANCE, AIRLINE
International Record ........ 1,392.801 mi.
Poline Ossipenko and Vera Lomako, pilots; Marina M. Raskova, navigatrix; USSR, MP-1 seaplane, *AM-34* 750 hp engine, from Sebastopol to Lake Kholmskoie, July 2, 1938.
National (U.S.) Record ........ No official record.

ALTITUDE
International Record ........ 29,081.304 ft.
Poline Ossipenko, USSR *Canot Volant* monoplane seaplane, *AM-34* 750 hp engine, at Sebastopol, May 25, 1937.
National (U.S.) Record ........ 13,461.259 ft.
Mrs. Marion Eddy Conrad, Savoia-Marchetti seaplane, Kinner 125 hp engine, Port Washington, L. I., New York, Oct. 20, 1930.

MAXIMUM SPEED ........ No official record.

SPEED FOR 62.137 MI. WITHOUT PAYLOAD
International Record ........ 79.138 mph.
Miss Crystal Mowry and Miss Edith McCann, United States, Kitty Hawk seaplane, Kinner 125 hp engine, Miami, Fla., Dec. 9, 1936.
National (U.S.) Record ........ Same as above.

SPEED FOR 621.369 MI. WITHOUT PAYLOAD ........ No official record.
SPEED FOR 1,242.739 MI. WITHOUT PAYLOAD ........ No official record.
SPEED FOR 3,106.847 MI. WITHOUT PAYLOAD ........ No official record.
SPEED FOR 6,213.695 MI. WITHOUT PAYLOAD ........ No official record.

## GLIDERS—(CLASS D)

**(Single-Place)**

DURATION WITH RETURN TO POINT OF DEPARTURE
International Record ........ 35 hr. 3 min.
Miss Marcelle Choisnet, France, Arsenal Air-100 Glider, No. 5 Romanin les Alpilles, Nov. 17-19, 1948.
National (U.S.) Record ........ 7 hr. 28 min.
Helen M. Montgomery, Stevens-Franklin glider, Crystal Downs Beach, 5 miles North of Frankfort, Mich., Sept. 4, 1938.

DISTANCE IN A STRAIGHT LINE
International Record ........ 465.532 mi
O. Klepikova, USSR, *Rot-Front* 7 glider from Moscow to Otradnoie, region of Stalingrad, July 6, 1939.
National (U.S.) Record ........ No official record.

ALTITUDE GAINED
International Record ........ 22,080.006 ft.
Mrs. J. Mathe, France, *Meise* sailplane No. 12, St. Auban, June 4, 1948.
National (U.S.) Record ........ 14,496 ft.
Mrs. Betty Loufek, Laister-Kaufman 10-A, NC 44,781 glider, at Bishop, Cal., Apr. 15, 1948.

DISTANCE TO A PREDETERMINED DESTINATION
International Record ........ 213.141 mi.
E. Prokhorova, USSR, *Rot-Front* 7 glider from Toula to Oboiane, June 19, 1940.
National (U.S.) Record ........ No official record.

DISTANCE WITH RETURN TO POINT OF DEPARTURE
International Record ........ 66.132 mi.
Miss Choisnet, France, Weihe 266 glider from Beynes-Thiverval, to Etampes, July 25, 1946.
National (U.S.) Record ........ No official record.

## GLIDERS—(CLASS D)

**(Multi-Place)**

DURATION WITH RETURN TO POINT OF DEPARTURE
International Record .......... 16 hr. 3 min. 43 sec.
Mrs. Melk and Therese Buquet, France, Castel 242 glider, *La Montagne Noire*, Mar. 25, 1947.
National (U.S.) Record .......... No official record.

DISTANCE IN A STRAIGHT LINE
International Record .......... 275.711 mi.
O. Klepikova and V. Bardina, USSR, Stakanovetz glider, from Toula to Konotop, June 19, 1940.
National (U.S.) Record .......... No official record

ALTITUDE GAINED
International Record .......... 9,458.642 ft.
Mrs. Mathe and Mrs. Gaudry, France, Kranich sailplane No. 32, at St. Auban, Jan. 21, 1948.
National (U.S.) Record .......... No official record.

DISTANCE TO A PREDETERMINED DESTINATION
International Record .......... 138.959 mi.
L. Valikosseltzeva, pilot: A. Gorokhova, passenger, USSR, *Stakanovetz* biplane glider, from Toula to Lipetzk, July 23, 1939.
National (U.S.) Record .......... No official record.

DISTANCE WITH RETURN TO POINT OF DEPARTURE .......... No official record

## BALLOONS—(CLASS A)

**FIRST CATEGORY (21,188.4 CU. FT. OR LESS)**

DURATION
International Record .......... 22 hr. 40 min.
A. Kondratyeva, USSR, SSSR BP-31 Balloon, Moscow to Loukino Polie, May 14-15, 1939.
National (U.S.) Record .......... No official record.

DISTANCE
International Record .......... 298.954 mi.
A. Kondratyeva, USSR, SSSR BP-31 Balloon, from Moscow to Loukino Polie, May 14-15, 1939.
National (U.S.) Record .......... No official record.

ALTITUDE .......... No official record.

**FOURTH CATEGORY (10,629.514 - 56,502.4 CU FT.)**

DURATION
International Record .......... 36 hr. 21 min. 36 sec.
Miss L. Ivanova and Miss S. Tonkova, USSR, take-off near the Central Aerology Observatory at Dolgoproudnaia, landing at Barachevo, Apr. 22-24, 1948.
National (U.S.) Record .......... No official record.

DISTANCE .......... No official record.
ALTITUDE .......... No official record.

**FIFTH CATGORY (56,537.714 - 77,690.8 CU. FT.)**

DURATION
International Record .......... 34 hr. 21 min. 36 sec.
Miss L. Ivanova and Miss S. Tonkova, USSR, take-off near the Central Aerology Observatory at Dolgoproudnaia, landing at Barachevo, Apr. 22-24, 1948.
National (U.S.) Record .......... No official record.

DISTANCE .......... No official record.
ALTITUDE .......... No official record.

**SIXTH CATEGORY (77,726.114 - 105,942 CU. FT.)**

DURATION
International Record .......... 34 hr. 21 min. 36 sec.
Miss L. Ivanova and Miss S. Tonkova, USSR, take-off near the Central Aerology Observatory at Dolgoproudnaia, landing at Barachevo, Apr. 22-24, 1948.
National (U.S.) Record .......... No official record.

DISTANCE .......... No official record.
ALTITUDE .......... No official record.

#### SEVENTH CATEGORY (105,977.314 - 141,256 CU. FT.)

DURATION
International Record ........ 34 hr. 21 min. 36 sec.
Miss L. Ivanova and Miss S. Tonkova, USSR, take-off near the Central Aerology Observatory at Dolgoproudnaia, landing at Barachevo, Apr. 22-24, 1948.
National (U.S.) Record ........ No official record.
DISTANCE ........ No official record.
ALTITUDE ........ No official record.

#### EIGHTH CATEGORY (141,291.314 CU. FT. OR OVER)

DURATION
International Record ........ 34 hr. 21 min. 36 sec.
Miss L. Ivanova and Miss S. Tonkova, USSR, take-off near the Central Aerology Observatory at Dolgoproudnaia, landing at Barachevo, Apr. 22-24, 1948.
National (U.S.) Record ........ No official record.
DISTANCE ........ No official record.
ALTITUDE ........ No official record.

## HELICOPTERS—(CLASS G)

DURATION, CLOSED CIRCUIT ........ No official record.

DISTANCE AIRLINE
International Record ........ 67.713 mi.
Miss Hanna Reitsch, Germany, FW. 61. V2, D-EKRA helicopter, from Stendal airport to Tempelhof airport, Oct. 25, 1937.
National (U.S.) Record ........ No official record.

DISTANCE, CLOSED CIRCUIT ........ No official record.
ALTITUDE ........ No official record.
SPEED FOR 12.43 MI. ........ No official record.

# F.A.I. COURSE RECORDS

#### FIRST CATEGORY—SOLO

LOS ANGELES TO NEW YORK
International Record ........ 580.935 mph.
Col. W. H. Councill, USAAF, United States, P-80 jet propelled monoplane, GE I-40 engine, from Long Beach Municipal Airport to La Guardia Airport, Jan. 26, 1946. Distance: 2,453.807 mi. Elapsed time: 4 hr. 13 min. 26 sec.
National (U.S.) Record ........ Same as above.

WASHINGTON, D. C. TO HAVANA, CUBA
International Record ........ 314.070 mph.
Woodrow W. Edmondson, United States, North American P-51 monoplane, Packard Rolls Royce 1,450 hp engine, from Washington National Airport to Rancho Boyeros Airport, Nov. 25, 1947. Elapsed Time; 3 hr. 37 min. 28.6 sec.
National (U.S.) Record ........ Same as above.

HAVANA, CUBA TO WASHINGTON, D. C.
International Record ........ 350.328 mph.
Woodrow W. Edmondson, United States, North American P-51 monoplane, Packard Rolls Royce 1,450 hp engine, from Rancho Boyeros Airport to Washington National Airport, Nov. 27, 1947. Elapsed Time: 3 hr. 15 min. 13 sec.
National (U.S.) Record ........ Same as above.

LONDON, ENGLAND TO CAPETOWN, AFRICA
International Record ........ 152.159 mph.
A. Henshaw, Great Britain, Percival *Mew Gull* airplane, D. H. Gipsy VI-2 motor, 205 hp, Feb. 5-6, 1939. Elapsed Time: 39 hr. 25 min.
National (U.S.) Record ........ No official record.

CAPETOWN, AFRICA TO LONDON, ENGLAND
International Record ........ 151.456 mph.
A. Henshaw, Great Britain, Percival *Mew Gull* airplane, D. H. Gipsy VI-2 motor, 205 hp, Feb. 7-9, 1939. Elapsed Time: 39 hr. 36 min.
National (U.S.) Record ........ No official record.

LONDON, ENGLAND TO ROME, ITALY
International Record .......... 313.419 mph.
Mr. John Derry, Great Britain, de Havilland Vampire, de Havilland Goblin Mark II engine, from Hatfield Airport to Ciampino Airport, Nov. 4, 1948. Duration of Flight: 2 hr. 50 min. 40 sec.
National (U.S.) Record .......... No official record.

PARIS, FRANCE TO SAIGON, FRENCH INDO-CHINA
International Record .......... 67.926 mph.
Miss Maryse Hilsz, France, Caudron Simoun C. 635 airplane, Renault engine, from Le Bourget Airport to Tan Son Nhut Airport, Dec. 19-23, 1937. Elapsed Time: 96 hr. 36 min. 15 sec.
National (U.S.) Record .......... No official record.

PARIS, FRANCE TO HANOI, FRENCH INDO-CHINA
International Record .......... 111.976 mph.
Andre Japy, France, Caudron *Simoun* airplane, Renault 6Q01, number 71 motor, from Le Bourget, Paris to Gia Lam Airport, Hanoi. Elapsed Time: 50 hr. 59 min. 49 sec.
National (U.S.) Record .......... No official record.

**SECOND CATEGORY—WITH CREW OR PASSENGERS**

LOS ANGELES, CAL. TO NEW YORK, N. Y.
International Record .......... 450.385 mph.
Col. C. S. Irvine, pilot; Lt. Col. G. R. Stanley, co-pilot; Lt. Col. F. J. Shannon, Maj. K. L. Royer, Capt. W. J. Bennett, Capt. R. A. Saltzman, M/Sgt. D. F. West, T/Sgt. J. F. Groughton, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright R-3350-23A engines, from Burbank, Cal. to Floyd Bennett Field, Brooklyn, Dec. 11, 1945. Distance 2,457 mi. Elapsed Time: 5 hr. 27 min. 19.2 sec.
National (U.S.) Record .......... Same as above.

NEW YORK, N. Y. TO LOS ANGELES, CAL.
International Record .......... 328.598 mph.
Capt. Boyd L. Grubaugh, pilot; Capt. J. L. England, co-pilot; M/Sgt. R. R. Pierron, M/Sgt. D. H. Atkins, M/Sgt. T. L. Wolfe, T/Sgt. D. B. Smith, crew; USAAF, United States, Boeing B-29 monoplane, 4 Wright R-3350-23A engines, from La Guardia Airport to Burbank, Cal., Aug. 1, 1946. Distance: 2,453.805 mi. Elapsed Time: 7 hr. 28 min. 03 sec.
National (U.S.) Record .......... Same as above.

NEW YORK CITY, U.S.A. TO LONDON, ENGLAND
International Record .......... 169.227 mph.
Henry T. Merrill and John S. Lambe, pilots, United States, Lockheed Electra monoplane, Pratt and Whitney SHI engine, May 9-10, 1937. Elapsed Time: 20 hr. 29 min. 45 sec.
National (U.S.) Record .......... Same as above

LONDON, ENGLAND TO MELBOURNE, AUSTRALIA
International Record .......... 159.038 mph.
C. W. A. Scott and T. Campbell Black, Great Britain, de Havilland *Comet* monoplane, 2 D. H. Gipsy VI engines, Oct. 20-23, 1934. Elapsed Time: 71 hr. 00 min. 18 sec.
National (U.S.) Record .......... 121.267 mph.
Roscoe Turner and Clyde Pangborn, Boeing 247-D monoplane, 2 Pratt and Whitney Supercharged 550 hp engines, Oct. 20-24, 1934.

LONDON, ENGLAND TO SYDNEY, AUSTRALIA
International Record .......... 130.309 mph.
F/O A. E. Clouston and Victor Ricketts, Great Britain, de Havilland Comet monoplane, 2 D. H. Gipsy VI engines. Mar. 15-19, 1938. Elapsed Time: 80 hr. 56 min.
National (U.S.) Record .......... No official record.

SYDNEY, AUSTRALIA TO LONDON, ENGLAND
International Record .......... 81.261 mph.
F/O A. E. Clouston and Victor Ricketts, Great Britain, de Havilland *Comet* monoplane, 2 D. H. Gipsy VI engines, Mar. 21-26, 1938. Elapsed Time: 130 hr. 3 min.

LONDON, ENGLAND TO WELLINGTON, NEW ZEALAND
International Record ........ 194.657 mph.
Air Commodore N. H. d'Aeth, Squadron Leader J. S. Aldridge, Flight Lt. D. D. Hurditch, and crew; Great Britain, Modified Avro Lancaster *Aries*, 4 Rolls Royce Merlin engines of 1,200 hp each, Aug. 21-24, 1946. Elapsed Time: 59 hr. 50 min.
National (U.S.) Record ........ No official record.

WELLINGTON, NEW ZEALAND TO LONDON, ENGLAND
International Record ........ 83.454 mph.
A. F. Clouston and Victor Ricketts, Great Britain; D. H. *Comet* airplane, 2 D. H. Gypsy VI en—gines, Mar. 20-26, 1938. Elapsed Time: 140 hr. 12 min.
National (U.S.) Record ........ No official record.

LONDON, ENGLAND TO CAPETOWN, AFRICA
International Record ........ 279.244 mph.
Sq. Ldr. H. E. Martin, pilot, Sq. Ldr. E. B. Simone, navigator, de Havilland *Mosquito* R. G. 238, type PR 34, 2 Rolls Royce Merlin 114 A engines, Apr. 30 - May 1, 1947. Elapsed Time: 21 hr. 31 min. 30 sec.
National (U.S.) Record ........ No official record.

CAPETOWN, AFRICA TO LONDON, ENGLAND
International Record ........ 104.550 mph.
A. E. Clouston, pilot; Mrs. Kirby Green, passenger; Great Britain, D. H. *Comet* airplane, 2 D. H. *Gipsy VI* engines, Nov. 18-20, 1937. Elapsed Time: 57 hr. 23 min.
National (U.S.) Record ........ No official record.

LONDON, ENGLAND TO KARACHI, INDIA
International Record ........ 205.145 mph.
Air Commodore N. H. d'Aeth, Squadron Leader J. S. Aldridge, Flight Lt. D. D. Hurditch, and crew; Great Britain, Modified Avro Lancaster *Aries*, 4 Rolls Royce Merlin engines, 1,200 hp each, Aug. 21-22, 1946. Elapsed Time: 19 hr. 14 min.
National (U.S.) Record ........ No official record.

LONDON, ENGLAND TO DARWIN, AUSTRALIA
International Record ........ 189.523 mph.
Lt. D. D. Hurditch, and crew; Great Britain, Modified Avro Lancaster Air Commodore N. H. d'Aeth, Squadron Leader J. S. Aldridge, Flight *Aries*, 4 Rolls Royce Merlin engines, 1,200 hp each, Aug. 21-22, 1946. Elapsed Time: 45 hr. 35 min.
National (U.S.) Record ........ No official record.

PARIS, FRANCE TO TANANARIVO, MADAGASCAR
International Record ........ 94.391 mph.
Genin and Robert, France, Caudron *Simoun* airplane, Renault 180 hp engine, from Le Bourget airport to Ivato airport, Dec. 18-21, 1935. Elapsed Time: 57 hr. 35 min. 21 sec.
National (U.S.) Record ........ No official record.

PARIS, FRANCE TO HANOI, FRENCH INDO-CHINA
International Record ........ 98.842 mph.
Marcel Doret and Micheletti, France, Caudron *Simoun* 635 airplane, Renault 220 hp engine, from Le Bourget, Paris, to Gia Lam, Hanoi, May 22-24, 1937. Elapsed Time; 57 hr. 46 min. 24 sec.
National (U.S.) Record ........ Same as above.

TOKYO, JAPAN TO LONDON, ENGLAND
International Record ........ 101.193 mph.
Masaaki Linuma and Kenji Tsukaloshi, Japan, Kamikase monoplane, type *Karigane*, Mitsubishi *Nakajima* 550 hp engine, Apr. 6-9, 1937. Elapsed Time: 94 hr. 17 min. 56 sec.

ROME, ITALY TO RIO DE JANEIRO, BRAZIL
International Record ........ 137.923 mph.
Attileo Biseo, Magg. Amedeo Paradisi, S. Ten. Giovanni Vitalini Sacconi, pilots; Ubaldo Ardu, mechanic; Giovanni Cubeddu, radio operator; Italy, S.79 I-Bise airplane, 3 Alfa Romeo 126 RC.34 750 hp engines, Jan. 24-25, 1938. Elapsed Time: 41 hr. 32 min.
National (U.S.) Record ........ Same as above.

ROME, ITALY TO ADDIS ABABA, ETHIOPA

International Record .......... 242.938 mph.

M. Lualdi, G. Mazzotti and E. Valente, pilots; S. Pinna, radio telegrapher and G. Guerrini, mechanic; Italy; Fiat BR. 20 L airplane, 2 Fiat *Asso* 80 1,000 hp motors, Mar. 6-7, 1939. Elapsed Time: 11 hr. 25 min.

National (U.S.) Record .......... No official record.

BERLIN, GERMANY TO NEW YORK CITY, N. Y., U.S.A.

International Record .......... 158.759 mph.

Alfred Henke and Rudolf Freiherr von Moreau, pilots; Paul Dierberg, radiomecanicien and Walter Kober, radiotelegraphiste; Germany, Focke-Wulf FW 200 *Condor* airplane, 4 BMW 132 L motors, 750 hp each, Aug. 10-11, 1938. Elapsed Time: 24 hr. 56 min. 12 sec.

National (U.S.) Record .......... No official record.

NEW YORK, N. Y., U.S.A., TO BERLIN, GERMANY

International Record .......... 199.409 mph.

Alfred Henke and Rudolf Freiherr von Moreau, pilots; Paul Dierberg, radiomecanicien, and Walter Kober, radiotelegraphiste; Germany; Focke-Wulf FW 200 *Condor* airplane, 4 BMW 132 L motors, 750 hp each, Aug. 13-14, 1938. Elapsed Time: 19 hr. 55 min. 1 sec.

National (U.S.) Record .......... No official record.

BERLIN, GERMANY TO TOKYO, JAPAN

International Record .......... 119.494 mph.

Alfred Henke and H. R. Freiherr von Moreau, pilots; P. Dierberg, radiomecanicien; W. Kober, radiotelegraphiste, and G. Kohne, mechanic; Germany, Focke-Wulf FW 200 *Condor* airplane; 4 BMW 132 L motors, 750 hp each, from Tempelhof to Tachikawa, Nov. 28-30, 1938. Elapsed Time: 46 hr. 18 min. 19 sec.

National (U.S.) Record .......... No official record.

BERLIN, GERMANY TO HANOI, FRENCH INDO-CHINA

International Record .......... 151 mph.

Alfred Henke and H. R. Freiherr von Moreau, pilots; P. Dierberg, radiomecanicien; W. Kober, radiotelegraphiste, and G. Kohne, mechanic; Germany, Focke-Wulf FW 200 *Condor* airplane; 4 BMW 132 L motors, 750 hp each, from Tempelhof to Gia Lam, Nov. 28-30, 1938. Elapsed Time: 34 hr. 17 min. 27 sec.

National (U.S.) Record .......... No official record.

## OFFICIAL NATIONAL TRANSCONTINENTAL AND INTER-CITY RECORDS

WEST TO EAST TRANSCONTINENTAL (JET PROPELLED)

Col. W. H. Councill, USAAF, P-80 jet-propelled monoplane, GE I-40 engine, from Municipal Airport, Long Beach, Cal. to La Guardia Airport, L. I., N. Y., Jan. 26, 1946. Distance; 2,453.807 mi. Elapsed Time: 4 hr. 13 min. 26 sec. Average Speed: 580.935 mph.

WEST TO EAST TRANSCONTINENTAL (MULTI-ENGINE MILITARY AIRCRAFT)

Col. C. S. Irvine, pilot; Lt. Col. G. R. Stanley, co-pilot; Lt. Col. F. J. Shannon, Maj. K. L. Royer, Capt. W. J. Bennett, Capt. R. A. Saltzman, M/Sgt. D. E. West, T/Sgt. J. F. Broughton, crew; USAAF; Boeing B-29 monoplane, 4 Wright R-3350-23A engines; from Burbank, Cal. to Floyd Bennett Field, Brooklyn, Dec. 11, 1945. Distance: 2,457 mi. Elapsed Time: 5 hr. 27 min. 19.2 sec. Average Speed: 450.385 mph.

WEST TO EAST TRANSCONTINENTAL (SINGLE RECIPROCATING ENGINE-SOLO)

Joe DeBona, North American F-51 monoplane, N 5528 N. Packard Merlin 1,650 engine, from Lockheed Air Terminal, Burbank, Cal. to La Guardia Airport, Jackson Heights, L. I., N. Y., Mar. 29, 1949. Distance: 2,453.805 mi. Elapsed Time: 5 hr. 00 min. 05 sec. Average Speed: 490.625 mph.

WEST TO EAST TRANSCONTINENTAL (COMMERCIAL TRANSPORT AIRCRAFT)

Capt. Fred E. Davis, pilot; Capt. H. Lloyd Jordan, co-pilot; and Flight Engineer, E. L. Graham; Eastern Air Lines' Lockheed Constellation, 4 Wright R-3350 2,500 hp engines, from Lockheed Air Terminal, Burbank, Cal. to La Guardia Airport, Jackson Heights, L. I., N. Y., Feb. 5, 1949. Elapsed Time: 6 hr. 17 min. 39.4 sec. Distance: 2,453.805 statute mi. Average Speed: 389.847 mph.

EAST TO WEST TRANSCONTINENTAL (SINGLE RECIPROCATING ENGINE-SOLO)

A. Paul Mantz, North American P-51 monoplane, NX-1202, Packard Merlin 1,650 engine, 1,450 hp, from La Guardia Airport, Jackson Heights, L. I., N. Y., to Lockheed Air Terminal, Burbank, Cal., Sept. 3, 1947. Distance: 2,453.805 mi. Elapsed Time: 7 hr. 00 min. 4 sec. Average Speed: 350.488 mph.

EAST TO WEST TRANSCONTINENTAL (MULTI-ENGINE MILITARY AIRCRAFT)
Capt. Boyd L. Grubaugh, pilot; Capt. J. L. England, co-pilot; and M/Sgt. R. R. Pierron, M/Sgt. D. H. Atkins, M/Sgt. T. L. Wolfe, T/Sgt. D. B. Smith, crew; USAAF, Boeing B-29 monoplane, 4 Wright R-3350-23A engines, from La Guardia Airport, L. I., N. Y., to Lockheed Air Terminal, Burbank, Cal., Aug. 1, 1946. Distance: 2,453.805 mi. Elapsed Time: 7 hr. 28 min. 3 sec. Average Speed: 328.598 mph.

LOS ANGELES, CAL. TO WASHINGTON, D. C.
Lt. Col. H. F. Warden, pilot; Capt. G. W. Edwards, co-pilot; Douglas XB-42 monoplane, 2 Allison V-1710-129 engines, 1,820 hp each, from Long Beach Municipal Airport to Bolling Field, Anacostia, D. C., Dec. 8, 1945. Elapsed Time: 5 hr. 17 min. 34 sec. Distance: 2,295 mi. Average Speed: 433.610 mph.

LOS ANGELES, CAL. TO MIAMI, FLA. (TRANSPORT AIRCRAFT)
Frank J. Bennett, pilot; John D. Scott, co-pilot; J. Jerram, flight engineer; and six passengers; Eastern Airlines' Lockheed Constellation, NC-104A, 4 Wright 2,100 hp engines, from Lockheed Air Terminal, Burbank, Cal. to 36th Street Airport, May 28-29, 1947. Elapsed Time: 6 hr. 24 min. 8 sec. Distance: 2,337.590 statute mi. Average Speed: 365.236 mph.

LOS ANGELES, CAL. TO JACKSONVILLE, FLA. (TRANSPORT AIRCRAFT)
Charles H. Dolson and Frank O. Boyer, pilots, thirty-seven passengers, including two stewardesses, Delta Airlines' Douglas DC-6, 4 Pratt and Whitney R-2800-CA-15 1,800 hp engines, from Clover Field, Santa Monica to Thomas Cole Imeson Airport, Oct. 4, 1948. Elapsed Time: 6 hr. 43 min. 10 sec. Distance: 2,154.448 statute mi. Average Speed: 320.600 mph.

LOS ANGELES, CAL. TO TAMPA, FLA. (TRANSPORT AIRCRAFT)
G. T. Baker, pilot; J. Bailey, co-pilot; and 17 passengers; Northwest Airlines' Douglas DC-6, NC-90891, 4 Pratt and Whitney 2,100 hp engines, from Clover Field, Santa Monica to Drew Field, June 3, 1947. Elapsed Time: 6 hr. 5 min. 10 sec. Distance: 2,157 mi. Average Speed: 354.413 mph.

LOS ANGELES, CAL. TO ATLANTA, GA.
Capt. Charles Dolson and William H. Davis, Jr., Delta Airlines Douglas DC-6, 4 Pratt and Whitney R-2800-CA-15 1,800 hp engines, from Clover Field, Santa Monica to Atlanta Municipal Airport. Oct. 23, 1948. Elapsed Time: 6 hr. 11 min. 42 sec. Distance: 1,944.01 mi. Average Speed; 313.803 mph.

LOS ANGELES, CAL. TO CHARLESTON, S. C., (TRANSPORT AIRCRAFT)
Capt. T. P. Ball and Capt. John Van Buren, pilots, six passengers; Delta Airlines' Douglas DC-6, 4 Pratt and Whitney R-2800-CA-15 1,800 hp engines, from Clover Field, Santa Monica to Charleston Municipal Airport, Nov. 6, 1948. Elapsed Time: 6 hr. 24 min. 32 sec. Distance: 2,203 mi. Average Speed: 344.192 mph.

LOS ANGELES, CAL. TO MEXICO CITY, D. F.
Francisco Sarabia, Gee Bee monoplane, X-BAKE, Pratt and Whitney *Hornet* 950 hp motor from Union Air Terminal, Burbank to Central Airport, Mexico City, Dec. 2, 1938. Elapsed Time: 6 hr. 26 min. Distance: 1,561 mi. Average Speed: 242.642 mph.

LOS ANGELES, CAL. TO MEXICO CITY, D. F. (TRANSPORT AIRCRAFT)
Leland S. Andrews, Vultee V-1-A monoplane, Wright *Cyclone* 735 hp engines, Mar. 6, 1935. Elapsed Time: 8 hr. 6 min. 15 sec. Distance: 1,563 mi. Average Speed: 192.864 mph.

MEXICO CITY, D. F. TO LOS ANGELES, CAL.
A. L. Rodriques, North American P-51 monoplane, NX-33699, Rolls Royce Merlin, 68 engine, from Mexico City (Balbuena) Airport to Clover Field, Santa Monica, Dec. 17, 1946. Elapsed Time: 4 hr. 24 min. 30 sec. Distance: 1,557.5 mi. Average Speed; 353.308 mph.

LOS ANGELES, CAL. TO DENVER, COLO.
Miss Dianna C. Cyrus, Douglas A-26, 2 Pratt and Whitney R-2800 engines of 2,000 hp each, from Lockheed Air Terminal, Burbank to Stapleton Airport, June 20, 1947. Elapsed Time: 2 hr. 18 min. 58 sec. Distance: 836 mi. Average Speed: 360.949 mph.

SAN FRANCISCO, CAL. TO LOS ANGELES, CAL.
Paul Mantz, North American F-51 monoplane NX 1204, Packard Merlin 1,650 engine, from San Francisco Airport to Lockheed Air Terminal, Mar. 29, 1949. Elapsed Time: 49 min. 2 sec. Distance: 327 statute mi. Average Speed: 400.135 mph.

SAN FRANCISCO, CAL. TO SALT LAKE CITY, UTAH
Frank W. Fuller, Jr., Seversky monoplane, NX-70-Y, Pratt and Whitney Twin Row Wasp 1,200 hp engine, from San Francisco Airport to Salt Lake Municipal Airport, Apr. 20, 1939. Elapsed Time: 2 hr. 9 min. 44 sec. Distance: 598.5 mi. Average Speed: 276.799 mph.

SAN FRANCISCO, CAL. TO SEATTLE, WASH.
Frank W. Fuller, Jr., Seversky monoplane, NR-70-Y, Pratt and Whitney Twin Row Wasp 1,100 hp engine, from San Francisco Airport to Boeing Field, May 25, 1938. Elapsed Time; 2 hr. 31 min. 41 sec. Distance: 684.5 mi. Average Speed: 270.261 mph.

SAN FRANCISCO, CAL. TO SAN DIEGO, CAL.
Earl Ortman, Marcoux-Bromberg Special, Pratt and Whitney *Wasp Jr.*, 1,195 hp engine, from Oakland Airport to Lindbergh Field, June 1, 1938. Elapsed Time: 1 hr. 48 min. 1 sec. Distance: 447 mi. Average Speed 248.295 mph.

SAN FRANCISCO, CAL. TO PORTLAND, ORE.
Frank W. Fuller, Jr., Seversky monoplane, NX-70-Y, Pratt and Whitney Twin Row Wasp engine, from San Francisco Airport to Pearson Field, Jan. 16, 1938. Elapsed Time: 2 hr. 13 min. 53 sec. Distance: 553 mi. Average Speed: 247.828 mph.

SAN FRANCISCO, CAL. TO PHOENIX, ARIZ.
Frank W. Fuller, Jr., Seversky monoplane, NR-70-Y, Pratt and Whitney Twin Row Wasp engine, from San Francisco Airport to Sky Harbor Airport, Jan. 16, 1939. Elapsed Time: 2 hr. 11 min. 58 sec. Distance: 650.5 mi. Average Speed: 295.757 mph.

SAN FRANCISCO, CAL. TO BOISE, IDAHO
Frank W. Fuller, Jr., Seversky monoplane NR-70-Y, Pratt and Whitney Twin Row Wasp 1,200 hp engine, from San Francisco Airport to Boise Municipal Airport, May 4, 1939. Elapsed Time: 1 hr. 47 min. 26 sec. Distance: 525.5 mi. Average Speed: 293.484 mph.

SAN FRANCISCO, CAL. TO DENVER, COLO.
Frank W. Fuller, Jr., Seversky monoplane, NX-70-Y, Pratt and Whitney Twin Row Wasp 1,200 hp engine, from San Francisco Airport to Denver Municipal Airport, June 7, 1939. Elapsed Time: 3 hr. 22 min. 26.8 sec. Distance; 954 mi . Average Speed: 282.741 mph.

SAN FRANCISCO, CAL. TO WASHINGTON, D. C. (TRANSPORT AIRCRAFT)
Capt. Scott Flower, pilot; 1st officer R. E. McDonald; co-pilot; crew of seven and nine passengers; Pan American Airways Boeing B-377 *Stratocruiser*, 4 Pratt and Whitney *Wasp Major* 4,360 engines, from San Francisco Airport to Washington National Airport, Mar. 3, 1949. Elapsed Time: 6 hr. 22 min. 25.4 sec. Distance: 2,436.917 statute mi. Average Speed: 382.338 mph.

NEW YORK, N. Y. TO ATLANTA, GA. (TRANSPORT AIRCRAFT)
H. T. Merrill and Clifford Zieger, pilots; Eastern Airlines' Lockheed Constellation, NC-108A, 4 Wright 3,350 engines, 2,500 hp each, from La Guardia Airport to Atlanta Municipal Airport, Aug. 5, 1947. Elapsed Time: 2 hr. 18 min. 6 sec. Distance: 759.707 mi. Average Speed: 330.068 mph.

ATLANTA, GA. TO NEW YORK, N. Y. (TRANSPORT AIRCRAFT)
H. T. Merrill and Clifford Zieger, pilots; Eastern Airlines' Lockheed Constellation, NC-108A, 4 Wright 3350 engines, 2,500 hp each, from Atlanta Municipal Airport to La Guardia Airport, Aug. 5, 1947. Elapsed Time: 2 hr. 36 min. 20 sec. Distance; 759.707 mi. Average Speed: 291.572 mph.

NEW YORK, N. Y. TO HAVANA, CUBA
Col. A. P. de Seversky, Modified Seversky P-35 monoplane, powered with a Pratt and Whitney 1830-9 850 hp engine, from Floyd Bennett Field to Camp Columbia, Havana, Dec. 3, 1937. Elapsed Time: 5 hr. 3 min. 5.4 sec. Distance: 1,307 mi. Average Speed: 258.735 mph.

NEW YORK, N. Y. TO HOUSTON, TEX.
Henry T. Merrill, pilot, J. D. Scott, co-pilot; Eastern Airlines' Lockheed Constellation, NC-102A, 4 Wright 2,100 hp engines from La Guardia Airport, Jackson Heights, L. I. to Houston Municipal, June 6, 1947. Elapsed Time: 4 hr. 39 min. 3 sec. Distance: 1,425.5 mi. Average Speed: 306.504 mph.

HOUSTON, TEX. TO NEW YORK, N. Y. (TRANSPORT AIRCRAFT)
Henry T. Merrill, pilot, J. D. Scott, co-pilot; Eastern Airlines' Lockheed Constellation, NC-102A, 4 Wright 2,100 hp engines, from Houston Municipal to La Guardia Airport, June 6, 1947. Elapsed Time: 4 hr. 41 min. 35 sec. Distance: 1,425.5 mi. Average Speed: 303.746 mph.

NEW YORK, N. Y. TO MIAMI, FLA. (TRANSPORT AIRCRAFT)
E. R. Brown, pilot; E. H. Parker, co-pilot; Eastern Airlines' Lockheed Constellation, 4 Wright engines, 2,100 hp each, from La Guardia Airport to 36th Street Airport, May 28, 1947. Elapsed Time: 3 hr. 58 min. 41.2 sec. Distance: 1,096.427 mi. Average Speed: 275.615 mph

MIAMI, FLA. TO NEW YORK, N. Y. (TRANSPORT AIRCRAFT)
E. R. Brown, pilot; E. H. Parker, co-pilot; Eastern Airlines' Lockheed Constellation, NC-102-A, 4 Wright engines, 1,200 hp each, from 36th Street Airport to La Guardia Airport, May 28, 1947. Elapsed Time: 3 hr. 29 min. 11.4 sec. Distance: 1,096.427 mi. Average Speed: 314.477 mph.

NEW YORK, N. Y. TO NEW ORLEANS, LA. (TRANSPORT AIRCRAFT)
H. T. Merrill and E. R. Brown, pilots; Eastern Airlines' Lockheed Constellation, NC-108A, 4 Wright 3350 engines, 2,500 hp each, from La Guardia Airport, L. I., to Moisant International Airport, July 23, 1947. Elapsed Time: 3 hr. 52 min. 29.8 sec. Distance: 1,182.466 mi. Average Speed: 305.157 mph.

NEW ORLEANS, LA. TO NEW YORK, N. Y. (TRANSPORT AIRCRAFT)
H. T. Merrill and E. R. Brown, pilots; Eastern Airlines' Lockheed Constellation, NC-108A, 4 Wright 3350 engines, 2,500 hp each, from Moisant International Airport to La Guardia Airport, L. I., July 23, 1947. Elapsed Time: 3 hr. 35 min. 10.8 sec. Distance: 1,182.466 mi. Average Speed: 329.714 mph.

NEW YORK, N. Y. TO WASHINGTON, D. C.
Capt. Martin L. Smith, USAF, P-80 jet-propelled monoplane, GE J-33-11 engine, from La Guardia Airport, Jackson Heights, L. I. to Washington National Airport, Apr. 21, 1946. Elapsed Time: 29 min. 15 sec. Distance 214 mi. Average Speed: 438.974 mph.

MEXICO CITY, D. F. TO NEW YORK, N. Y.
Francisco Sarabia, Gee Bee monoplane, *X-BAKE*, Pratt and Whitney *Hornet* 980 hp engine, from the Military Airport, Mexico City to Floyd Bennett Field, May 24, 1939. Elapsed Time: 10 hr. 47 min. 46.8 sec. Distance: 2,087.5 mi. Average Speed: 193.353 mph.

HONOLULU, HAWAII TO NEW YORK, N. Y.
Lt. Col. Robert E. Thacker, pilot; 1st Lt. John M. Ard, co-pilot; North American P-82 monoplane, 2 Rolls Royce V-1650 engines, 2,250 hp each, from Hickam Field, Honolulu to La Guardia Airport, Jackson Heights, L. I., Feb. 28, 1947. Elapsed Time: 14 hr. 31 min. 50 sec. Distance: 4,968.852 mi. Average Speed; 341.959 mph.

CHICAGO, ILL. TO ATLANTA, GA. (TRANSPORT AIRCRAFT)
H. T. Merrill and S. A. Bell, pilots; Eastern Airlines' Lockheed Constellation, NC-108A. 4 Wright 3350 engines, 2,500 hp each, from Chicago Municipal Airport, to Atlanta Municipal Airport, Aug. 5, 1947. Elapsed Time: 1 hr. 48 min. 20 sec. Distance: 590.281 mi. Average Speed: 326.925 mph.

ATLANTA, GA. TO CHICAGO, ILL. (TRANSPORT AIRCRAFT)
H. T. Merrill and S. A. Bell, pilots; Eastern Airlines' Lockheed Constellation, NC-108A. 4 Wright 3350 engines, 2,500 hp each, from Atlanta Municipal Airport to Chicago Municipal Airport, Aug. 5, 1947. Elapsed Time: 2 hr. 1 min. 55 sec. Distance: 590.281 mi. Average Speed: 290.501 mph.

CHICAGO, ILL. TO LOS ANGELES, CAL.
Howard R. Hughes, Northrop Gamma monoplane, NR-13761, Wright *Cyclone* engine, from Chicago Municipal Airport to Grand Central Air Terminal, Glendale, Cal., May 14, 1936. Elapsed Time: 8 hr. 10 min. 29.8 sec. Distance: 1,734.5 mi. Average Speed; 212.172 mph.

CHICAGO, ILL. TO MIAMI, FLA. (TRANSPORT AIRCRAFT)
Capt. R. S. Nelson, pilot; I. M. Hoffman, co-pilot; two stewardesses and 55 passengers, Delta Airlines Douglas DC-6, N 1905 M, 4 Pratt and Whitney R-2800 engines, from Chicago Municipal Airport to Miami International Airport, Mar. 11, 1949. Elapsed Time: 3 hr. 21 min. 53 sec. Distance: 1,183.368 statute mi. Average Speed: 351.699 mph.

MIAMI, FLA. TO CHICAGO, ILL. (TRANSPORT AIRCRAFT)
Henry T. Merrill and P. L. Foster, pilots; Eastern Airlines' Lockheed Constellation, NC-105A, 4 Wright 3350 engines, hp 2,500 each, from 36th Street Airport to Chicago Municipal Airport, July 16, 1947. Elapsed Time: 3 hr. 56 min. 22 sec. Distance: 1,183.368 mi. Average Speed: 300.390 mph.

CHICAGO, ILL. TO WASHINGTON, D. C. (TRANSPORT AIRCRAFT)
Jack Frye, TWA, Northrop Gamma 2-D monoplane, NR-13758, Wright *Cyclone* 710 hp engine. from Chicago Municipal Airport to Washington-Hoover Airport, S. Washington, Feb. 18, 1936. Elapsed Time: 2 hr. 22 min. Distance: 599 mi. Average Speed: 253.098 mph.

VANCOUVER, B. C., CANADA TO AGUA CALIENTE, MEXICO
Frank W. Fuller, Jr., Seversky monoplane, NX-70-Y, Pratt and Whitney Twin Row Wasp 1,100 hp engine, from Vancouver Airport to Agua Caliente Airport, Nov. 4, 1937. Elapsed Time: 4 hr. 54 min.

VANCOUVER, B. C., CANADA TO OAKLAND, CAL.
Frank W. Fuller, Jr., Seversky monoplane, NX-70-Y, Pratt and Whitney Twin Row Wasp 1,100 engine, from Vancouver Airport to Oakland Airport, May 28, 1938. Elapsed Time: 3 hr. 8 min. 43 sec. Distance: 792.5 mi. Average Speed: 251.965 mph.

MARCH FIELD, CAL. TO MITCHEL FIELD, N. Y.
Lt. Ben S. Kelsey, USAF, Lockheed XP-38 airplane, 2 Allison liquid cooled 1,000 hp engines. Feb. 11, 1939. Elapsed Time: 7 hr. 45 min. 36 sec. Distance: 2,425 mi. Average Speed: 312.5 mph.

WICHITA, KAN. TO LOS ANGELES, CAL.
Paul Mantz, Lockheed *Orion* NR-12222, from Wichita Airport to Union Air Terminal, July 4, 1938. Elapsed Time: 7 hr. 11 min. 5 sec. Distance: 1,201 mi. Average Speed: 167.160 mph.

DETROIT, MICH. TO AKRON, O.
Louise Thaden, Beechcraft biplane, NC-15835, from Detroit City Airport to Akron Municipal Airport, Jan. 21, 1937. Elapsed Time: 40 min. 43 sec. Distance: 123.5 mi. Average Speed: 181.989 mph.

DETROIT, MICH. TO MIAMI, FLA. (TRANSPORT AIRCRAFT)
H. T. Merrill and F. Bennett, pilots; Eastern Airlines' Lockheed Constellation, NC-113A, 4 Wright 3350 engines, 2,500 hp each, from Willow Run Airport to 36th Street Airport, Aug 7, 1947. Elapsed Time: 3 hr. 36 min. 29 sec. Distance: 1,150.455 mi. Average Speed: 318.857 mph.

TAMPA, FLA. TO MIAMI, FLA. (TRANSPORT AIRCRAFT)
G. T. Baker, pilot; J. Bailey, co-pilot; and passengers; National Airlines' Douglas DC-6, NC-90891, 4 Pratt and Whitney 2,100 hp engines, from Drew Field to 36th Street Airport, June 3, 1947. Elapsed Time: 39 min .13 sec. Distance: 204.429 mi. Average Speed: 312,769 mph.

## OFFICIAL FEMININE NATIONAL TRANSCONTINENTAL AND INTER-CITY RECORDS

WEST TO EAST TRANSCONTINENTAL RECORD
Jacqueline Cochran, modified Seversky pursuit monoplane, Pratt and Whitney Twin Row Wasp engine, from Burbank, Cal. to Brooklyn, N. Y., Sept. 3, 1938. Elapsed Time: 10 hr. 27 min. 55 sec. Average Speed: 234.776 mph.

EAST TO WEST TRANSCONTINENTAL RECORD
Louise Thaden and Blanche Noyes, Beechcraft, Wright 420 hp engine, from Floyd Bennett Field, Brooklyn, N. Y. to Los Angeles Municipal Airport, Cal., Apr. 19-20, 1935. Elapsed Time: 13 hr. 33 min.

MEXICO CITY TO WASHINGTON, D. C.
Amelia Earhart, Lockheed Vega monoplane, Pratt and Whitney Wasp 550 hp engine from Central Airport, Mexico City to Washington-Hoover Airport, S. Washington, Virginia, May 8, 1935. Elapsed Time: 13 hr. 1 min. 51 sec.

MEXICO CITY TO NEW YORK, N. Y.
Amelia Earhart, Lockheed Vega monoplane, Pratt and Whitney Wasp 550 hp engine from Central Airport, Mexico City to Newark Airport, Newark, N. J., May 8, 1935. Elapsed Time: 14 hr. 19 min.

# SUMMARY STATISTICS

**The following statistics are as nearly up-to-date as was practicable at the time the Year Book went to press. Wherever possible, last-minutes, 1949 figures were included in the main text of the book, and may be found under appropriate chapter headings.**

The Editors

## AVERAGE WEEKLY HOURS IN THE AIRCRAFT, ENGINE, PROPELLER, AND PARTS INDUSTRY

**(Source: Bureau of Labor Statistics)**

| Year and Month | Aircraft and Parts | Aircraft | Aircraft Engines and Parts | Aircraft Propellers and Parts | Other Aircraft Parts and Equipment |
|---|---|---|---|---|---|
| 1947 | 39.9 | 39.7 | 39.9 | 41.5 | 40.1 |
| 1948 | 41.0 | 41.1 | 40.9 | 39.7 | 41.0 |
| 1949 | | | | | |
| January | 40.5 | 40.1 | 41.8 | 40.7 | 40.7 |
| February | 41.2 | 41.2 | 41.2 | 40.7 | 41.4 |
| March | 40.7 | 40.9 | 40.3 | 40.8 | 40.3 |
| April | 39.4 | 39.8 | 40.2 | 40.1 | 35.0 |
| May | 40.5 | 40.4 | 40.3 | 41.6 | 40.7 |
| June | 40.5 | 40.3 | 41.0 | 41.5 | 40.2 |
| July | 39.9 | 39.7 | 39.7 | 42.2 | 40.3 |
| August | 38.1a | 37.3 | 39.4 | 40.9 | 40.6a |
| September | 40.5 | 40.4 | 41.0 | 41.4 | 40.7 |

## AVERAGE WEEKLY EARNINGS

| Year and Month | Aircraft and Parts | Aircraft | Aircraft Engines and Parts | Aircraft Propellers and Parts | Other Aircraft Parts and Equipment |
|---|---|---|---|---|---|
| 1947 | $54.98 | $53.99 | $56.30 | $59.68 | $56.50 |
| 1948 | 61.20 | 60.21 | 63.40 | 62.13 | 63.59 |
| 1949 | | | | | |
| January | 63.18 | 61.55 | 67.13 | 66.34 | 65.73 |
| February | 64.52 | 63.82 | 65.96 | 65.97 | 66.36 |
| March | 63.41 | 63.07 | 64.00 | 65.81 | 64.04 |
| April | 60.99 | 60.97 | 64.04 | 64.36 | 54.50 |
| May | 62.98 | 62.26 | 64.08 | 68.14 | 63.53 |
| June | 62.94 | 61.90 | 65.52 | 67.89 | 63.52 |
| July | 62.08a | 60.78 | 63.80 | 69.88 | 65.37 |
| August | 58.75a | 56.70 | 61.66 | 66.42 | 65.93 |
| September | 63.46 | 62.26 | 65.72 | 68.60 | 66.87 |

## AVERAGE HOURLY EARNINGS

| Year and Month | Aircraft and Parts | Aircraft | Aircraft Engines and Parts | Aircraft Propellers and Parts | Other Aircraft Parts and Equipment |
|---|---|---|---|---|---|
| 1947 | $1.378 | $1.360 | $1.411 | $1.438 | $1.409 |
| 1948 | 1.493 | 1.465 | 1.550 | 1.565 | 1.551 |
| 1949 | | | | | |
| January | 1.560 | 1.535 | 1.606 | 1.630 | 1.615 |
| February | 1.566 | 1.549 | 1.601 | 1.621 | 1.603 |
| March | 1.558 | 1.542 | 1.588 | 1.613 | 1.589 |
| April | 1.548 | 1.532 | 1.593 | 1.605 | 1.557 |
| May | 1.555 | 1.541 | 1.590 | 1.638 | 1.561 |
| June | 1.554 | 1.536 | 1.598 | 1.636 | 1.580 |
| July | 1.556a | 1.531 | 1.607 | 1.656 | 1.622 |
| August | 1.542a | 1.520 | 1.565 | 1.624 | 1.624a |
| September | 1.567 | 1.541 | 1.603 | 1.657 | 1.643 |

a—Revised.

## U. S. CIVIL AIRCRAFT

### By States

**(Source: CAA Statistical Handbook)**

| State | Number of civil aircraft[1] Jan. 1, 1948 | Jan. 1, 1949 | State | Number of civil aircraft[1] Jan. 1, 1948 | Jan. 1, 1949 |
|---|---|---|---|---|---|
| TOTAL | 94,821 | 95,997 | Montana | 845 | 1,027 |
| | | | Nebraska | 1,534 | 1,761 |
| Alabama | 998 | 996 | Nevada | 422 | 418 |
| Arizona | 1,164 | 1,241 | New Hampshire | 304 | 308 |
| Arkansas | 1,078 | 1,172 | New Jersey | 1,650 | 1,672 |
| California | 10,221 | 10,741 | New Mexico | 785 | 763 |
| Colorado | 1,313 | 1,349 | New York | 4,797 | 4,661 |
| Connecticut | 755 | 706 | North Carolina | 1,817 | 1,790 |
| Delaware | 247 | 232 | North Dakota | 851 | 1,077 |
| District of Columbia | 933 | 706 | Ohio | 4,789 | 4,414 |
| Florida | 2,907 | 2,787 | Oklahoma | 2,368 | 2,453 |
| Georgia | 1,538 | 1,419 | Oregon | 1,619 | 1,795 |
| Idaho | 718 | 841 | Pennsylvania | 4,393 | 4,248 |
| Illinois | 4,503 | 4,659 | Rhode Island | 199 | 204 |
| Indiana | 2,718 | 2,775 | South Carolina | 836 | 758 |
| Iowa | 2,190 | 2,388 | South Dakota | 746 | 914 |
| Kansas | 2,719 | 3,119 | Tennessee | 1,306 | 1,228 |
| Kentucky | 835 | 869 | Texas | 8,347 | 7,856 |
| Louisiana | 984 | 1,051 | Utah | 542 | 534 |
| Maine | 605 | 636 | Vermont | 187 | 212 |
| Maryland | 1,184 | 1,023 | Virginia | 1,437 | 1,459 |
| Massachusetts | 1,454 | 1,425 | Washington | 2,043 | 2,231 |
| Michigan | 4,695 | 4,450 | West Virginia | 660 | 670 |
| Minnesota | 2,073 | 2,139 | Wisconsin | 2,013 | 2,202 |
| Mississippi | 720 | 714 | Wyoming | 428 | 506 |
| Missouri | 2,404 | 2,315 | Outside U. S. A. | 947 | 1,083 |

[1]Includes gliders

## CIVIL AIRCRAFT PRODUCTION

### Number of Units

**(Source: CAA Statistical Handbook)**

| Month | 1945 | 1946 | 1947 | 1948 | 1949 |
|---|---|---|---|---|---|
| January | 2 | 1,227 | 2,166 | 462 | 160 |
| February | 4 | 1,252 | 1,914 | 461 | 257 |
| March | 5 | 2,019 | 1,785 | 578 | 399 |
| April | 9 | 2,327 | 2,039 | 766 | 452 |
| May | 5 | 3,073 | 1,646 | 812 | 474 |
| June | 6 | 3,431 | 1,193 | 959 | 439 |
| July | 10 | 3,388 | 998 | 920 | ...... |
| August | 39 | 4,698 | 929 | 700 | ...... |
| September | 129 | 4,090 | 1,028 | 590 | ...... |
| October | 401 | 4,500 | 802 | 502 | ...... |
| November | 640 | 3,033 | 615 | 317 | ...... |
| December | 797 | 1,963 | 502 | 235 | ...... |
| TOTAL | 2,047 | 35,001 | 15,617 | 7,302 | ...... |

## TOTAL EMPLOYMENT IN PRIME CONTRACTING AIRPLANE ENGINE AND PROPELLER PLANTS[1]

By Years and Months

**(Source: CAA Statistical Handbook)**

| 1946 | Total | Airframe | Engine | Propellers |
|---|---|---|---|---|
| January | ........ | 146,602 | ........ | ........ |
| February | ........ | 147,901 | ........ | ........ |
| March | ........ | 150,962 | ........ | ........ |
| April | ........ | 150,940 | ........ | ........ |
| May | ........ | 155,471 | ........ | ........ |
| June | ........ | 155,436 | ........ | ........ |
| July | ........ | 161,559 | ........ | ........ |
| August | ........ | 167,148 | ........ | ........ |
| September | ........ | 168,597 | ........ | ........ |
| October | ........ | 169,970 | ........ | ........ |
| November | ........ | 166,089 | ........ | ........ |
| December | ........ | 163,259 | 33,203 | ........ |
| **1947** | | | | |
| January | ........ | 163,521 | 33,348 | ........ |
| February | ........ | 161,612 | 34,642 | ........ |
| March | ........ | 159,824 | 36,436 | ........ |
| April | ........ | 161,130 | 35,739 | ........ |
| May | ........ | 152,318 | 34,289 | ........ |
| June | ........ | 145,251 | 33,980 | ........ |
| July | ........ | 144,280 | 33,140 | ........ |
| August | ........ | 144,383 | 33,048 | ........ |
| September | ........ | 143,302 | 32,139 | ........ |
| October | ........ | 145,338 | 32,954 | ........ |
| November | ........ | 146,817 | 33,117 | ........ |
| December | ........ | 147,131 | 33,131 | ........ |
| **1948** | | | | |
| January | 189,151 | 148,062 | 32,953 | 8,136 |
| February | 189,528 | 148,692 | 32,934 | 7,902 |
| March | 189,240 | 148,402 | 33,141 | 7,697 |
| April | 191,970 | 150,768 | 33,441 | 7,761 |
| May | 179,018 | 137,107 | 34,043 | 7,868 |
| June | 183,659 | 141,050 | 34,741 | 7,868 |
| July | 187,991 | 145,273 | 34,833 | 7,885 |
| August | 192,316 | 149,482 | 34,967 | 7,867 |
| September | 196,737 | 152,429 | 36,385 | 7,923 |
| October | 206,197 | 160,852 | 37,357 | 7,988 |
| November | 211,136 | 165,152 | 37,994 | 7,990 |
| December | 213,168 | 166,687 | 38,427 | 8,054 |
| **1949** | | | | |
| January | 214,599 | 166,506 | 39,846 | 8,247 |
| February | 215,708 | 167,282 | 40,221 | 8,205 |
| March | 218,290 | 169,210 | 40,761 | 8,319 |
| April | 219,185 | 169,310 | 41,500 | 8,375 |
| May | 218,449 | 168,287 | 41,656 | 8,506 |
| June | 217,404 | 167,441 | 41,180 | 8,783 |

[1]As of week ending nearest middle of month.

# UNITED STATES AIRCRAFT EXPORTS

## Number and Value

**(Source: CAA Statistical Handbook)**

| Year[1] | Aircraft exported[2] Number | Value | Value of all aeronautical exports[3] |
|---|---|---|---|
| 1913 | 29 | $81,750 | $107,552 |
| 1914 | 34 | 188,924 | 226,149 |
| 1915 | 152 | 958,019 | 1,541,446 |
| 1916 | 269 | 2,158,395 | 7,002,005 |
| 1917 | 135 | 1,001,542 | 4,135,445 |
| 1918 | 20 | 206,120 | 9,084,097 |
| 1919 | 85 | 777,900 | 13,166,907 |
| 1920 | 65 | 598,274 | 1,152,649 |
| 1921 | 48 | 314,940 | 472,548 |
| 1922 | 37 | 156,630 | 494,930 |
| 1923 | 48 | 309,051 | 433,558 |
| 1924 | 59 | 412,738 | 798,273 |
| 1925 | 80 | 511,282 | 783,659 |
| 1926 | 50 | 303,149 | 1,027,210 |
| 1927 | 63 | 848,568 | 1,903,560 |
| 1928 | 162 | 1,759,653 | 3,664,723 |
| 1929 | 348 | 5,484,600 | 9,125,345 |
| 1930 | 321 | 4,819,669 | 8,818,110 |
| 1931 | 140 | 1,812,809 | 4,867,687 |
| 1932 | 280 | 4,358,967 | 7,946,533 |
| 1933 | 406 | 5,391,493 | 9,180,328 |
| 1934 | 490 | 8,195,484 | 17,662,938 |
| 1935 | 333 | 6,598,515 | 14,290,843 |
| 1936 | 527 | 11,601,893 | 23,143,203 |
| 1937 | 628 | 21,076,170 | 39,404,469 |
| 1938 | 875 | 37,977,324 | 68,227,689 |
| 1939 | 1,220 | 67,112,736 | 117,807,212 |
| 1940 | 3,522 | 196,260,556 | 311,871,473 |
| 1941 | 6,011 | 422,763,907 | 626,929,352 |
| 1942 | 10,448 | 879,994,628 | 1,357,345,366 |
| 1943 | 13,865 | 1,215,848,135 | 2,142,611,494 |
| 1944 | 16,544 | 1,589,800,893 | 2,825,927,362 |
| 1945 | 7,599 | 663,128,543 | 1,148,851,587 |
| 1946 | 2,302 | 65,257,749 | 115,320,235 |
| 1947 | 3,125 | 74,476,912 | 172,189,502 |
| 1948 | 2,259 | 66,354,000 | 153,629,000 |

[1] 1913-18, fiscal years; 1919-48, calendar years. Data for the second half of 1918 is included with calendar year 1919.

[2] Exclusive of gliders and barrage balloons.

[3] Total value of aircraft, engines, parts, etc. 1913-21 include values of aircraft and aircraft parts. Prior to 1922, engine values were not reported separately, but were probably included with either "other" internal combustion engines or with "parts" of aircraft. Values for parachutes and their parts have been included only since 1932.

# AIRPORTS AND LANDING FIELDS

1926-1948

**(Source: CAA Statistical Handbook)**

| Calendar Year | Total | Commercial | Municipal | CAA intermediate | All others |
|---|---|---|---|---|---|
| 1926 | (1) | (1) | (1) | 92 | (1) |
| 1927 | 1,036 | 263 | 240 | 134 | [2]399 |
| 1928 | 1,364 | 365 | 368 | 210 | [2]421 |
| 1929 | 1,550 | 495 | 453 | 285 | [2]317 |
| 1930 | 1,782 | 564 | 550 | 354 | [2]314 |
| 1931 | 2,093 | 829 | 780 | 404 | 80 |
| 1932 | 2,117 | 869 | 777 | 352 | 119 |
| 1933 | 2,188 | 938 | 827 | 265 | 158 |
| 1934 | 2,297 | 872 | 980 | 259 | 186 |
| 1935 | 2,368 | 822 | 1,041 | 291 | 214 |
| 1936 | 2,342 | 774 | 1,037 | 296 | 235 |
| 1937 | 2,299 | 727 | 1,053 | 283 | 236 |
| 1938 | 2,374 | 760 | 1,092 | 267 | 255 |
| 1939 | 2,280 | 801 | 963 | 266 | 250 |
| 1940 | 2,331 | 860 | 1,031 | 289 | 151 |
| 1941 | 2,484 | 930 | 1,086 | 283 | 185 |
| 1942 | 2,809 | 1,069 | 1,129 | 273 | 338 |
| 1943 | 2,769 | 801 | 914 | 240 | 814 |
| 1944 | 3,427 | 1,027 | 1,067 | 229 | 1,104 |
| 1945 | 4,026 | 1,509 | 1,220 | 216 | 1,081 |
| 1946 | 4,490 | 1,930 | 1,424 | 201 | 935 |
| 1947 | 5,759 | 2,849 | 1,818 | 178 | 914 |
| 1948 | 6,414 | 2,989 | 2,050 | 161 | 1,214 |

[1]Not available.

[2]Include auxiliary marked fields, later classified as to ownership, commercial or municipal.

**ALLOCATIONS AND APPROPRIATIONS FOR AERONAUTICS, U. S. ARMY**

| | | |
|---|---|---|
| 1899 | Langley experiments. | $25,000 |
| 1900 | Langley experiments. | 25,000 |
| 1908 | Baldwin dirigible, revoked and later applied toward payment for Wright plane. | 25,000 |
| 1909 | Herring & Scott airplanes. Later for Wright plane. | 21,000 |
| 1910 | Wright plane. | 9,000 |
| 1912 | Signal Service of Army. | 125,000 |
| 1913 | Signal Service of Army. | 100,000 |
| 1914 | Signal Service of Army. | 125,000 |
| 1915 | Signal Service of Army. | 50,000 |
| | | $505,000 |

## AVERAGE SPEED

(Miles Per Hour)

**Domestic Scheduled Aircarriers**
**(Source: CAA Statistical Handbook)**

| Year | Average speed (miles per hour) |
|---|---|
| 1944 | 155.6 |
| 1945 | 155.4 |
| 1946 | 160.2 |
| 1947 | 168.2 |
| 1948 | 171.9 |

# CIVIL AIRPLANE OUTPUT

## By Power and Types

**(Source: CAA Statistical Handbook)**

**1936-1945[1]**

| | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1945 |
|---|---|---|---|---|---|---|---|
| Total | 1,637 | 2,289 | 1,823 | 3,715 | 6,785 | 6,844 | 2,047 |
| | | | By number of engines | | | | |
| Single-engine | 1,526 | 2,171 | 1,770 | 3,613 | 6,562 | 6,629 | 1,946 |
| Multi-engine | 111 | 118 | 53 | 102 | 167 | 165 | 101 |
| Unclassified | 0 | 0 | 0 | 0 | 56 | 50 | 0 |
| | | | By horsepower | | | | |
| 50 hp. and under | 772 | 1,393 | 1,350 | 1,686 | 490 | 7 | 0 |
| 51-70 hp. | 109 | 44 | 23 | 1,349 | 4,529 | 4,303 | 1,828 |
| 71-100 hp. | 122 | 183 | 61 | 311 | 935 | 1,805 | 105 |
| 101-165 hp. | 171 | 193 | 149 | 120 | 211 | 206 | 18 |
| 166-225 hp. | 75 | 47 | 16 | 9 | 318 | 309 | 0 |
| 226-300 hp. | 214 | 199 | 122 | 86 | 37 | 15 | 0 |
| 301-600 hp. | 109 | 142 | 54 | 76 | 72 | 31 | 28 |
| 601-1,800 hp | 65 | 88 | 48 | 78 | 137 | 118 | 63 |
| 1,800 hp. and over | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| Unclassified | .... | 0 | 0 | 0 | 56 | 50 | 0 |
| | | | By types | | | | |
| Landplanes: | | | | | | | |
| 1-2-place | .... | 1,668 | 1,487 | 3,118 | 5,527 | 6,060 | 1,929 |
| 3-5-place | .... | 460 | 258 | 465 | 1,031 | 573 | 17 |
| 6-20-place | .... | 48 | 25 | 21 | 8 | 3 | 63 |
| 21-place and over | .... | 57 | 17 | 55 | 132 | 112 | 10 |
| Seaplanes | .... | 41 | 26 | 51 | 18 | 16 | 0 |
| Amphibians | .... | 15 | 10 | 5 | 3 | 30 | 28 |
| Unclassified | 0 | 0 | 0 | 0 | 66 | 50 | 0 |

**1946-1948[1]**

| | 1946 | 1947 | 1948 |
|---|---|---|---|
| Total Civil | 35,001 | 15,617 | 7,302 |
| Personal | 34,568 | 15,339 | 7,039 |
| Transport | 433 | 278 | 263 |
| By Place: | | | |
| 2-place | 30,766 | 7,273 | 3,302 |
| 3- to 5-place | 3,802 | 8,066 | 3,737 |
| Over 5-place | 433 | 278 | 263 |
| By Horsepower:[2] | | | |
| 1-74 | 20,659 | 2,372 | 2,990 |
| 75-99 | 9,122 | 4,690 | |
| 100-399 | 4,736 | 8,246 | 4,026 |
| 400-3,999 | 345 | 129 | 286 |
| 4,000 and over | 139 | 180 | |

[1]Exports excluded 1936-41; no civil production during 1942-44; exports included 1945-48.
[2]Total rated horsepower of all engines.

## U. S. AIRCRAFT PRODUCTION
### 1909-1948
**(Source: CAA Statistical Handbook)**

| Year | Total | For U.S. Military | Others |
|---|---|---|---|
| 1909 | 1 | 1 | 0 |
| 1910 | [1] | [1] | [1] |
| 1911 | 11 | 11 | [1] |
| 1912 | 45 | 16 | 29 |
| 1913 | 43 | 14 | 29 |
| 1914 | 49 | 15 | 34 |
| 1915 | 178 | 26 | 152 |
| 1916 | 411 | 142 | 269 |
| 1917 | 2,148 | 2,013 | 135 |
| 1918 | 14,020 | 13,991 | 29 |
| 1919 | 780 | 682 | 98 |
| 1920 | 328 | 256 | 72 |
| 1921 | 437 | 389 | 48 |
| 1922 | 263 | 226 | 37 |
| 1923 | 743 | 687 | 56 |
| 1924 | 377 | 317 | 60 |
| 1925 | 789 | 445 | 344 |
| 1926 | 1,186 | 478 | 708 |
| 1927 | 1,995 | 609 | 1,386 |
| 1928 | 4,346 | 847 | 3,499 |
| 1929 | 6,193 | 779 | 5,414 |
| 1930 | 3,437 | 836 | 2,601 |
| 1931 | 2,800 | 853 | 1,947 |
| 1932 | 1,396 | 500 | 896 |
| 1933 | 1,324 | 331 | 993 |
| 1934 | 1,615 | 393 | 1,222 |
| 1935 | 1,710 | 336 | 1,374 |
| 1936 | 3,010 | 858 | 2,152 |
| 1937 | 3,773 | 858 | 2,915 |
| 1938 | 3,623 | 925 | 2,698 |
| 1939 | 5,856 | 921 | 4,935 |
| 1940 | 12,804 | [3]6,019 | 6,785 |
| 1941 | [2]26,277 | [3]19,433 | 6,844 |
| 1942 | [2]47,836 | [3]47,836 | [4] |
| 1943 | [2]85,898 | [3]85,898 | [4] |
| 1944 | [2]96,318 | [3]96,318 | [4] |
| 1945 | [2]49,761 | [3]47,714 | 2,047 |
| 1946 | 36,670 | 1,669 | 35,001 |
| 1947 | 17,717 | 2,100 | 15,617 |
| 1948 | [5] | [5] | 7,302 |

[1]Unknown
[2]Includes U.S.-financed aircraft made in Canada
[3]Includes Lend-Lease military aircraft
[4]Military production only
[5]Figures not available

## Airline Statistics

### AIRLINE REVENUE PASSENGER MILES

Domestic by Months

**(Source: Air Transport Association)**

(in millions)

| | 1941* | 1942* | 1943* | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|---|---|---|
| January | 69,048 | 104,574 | 97,508 | 135,477 | 200,819 | 331,714 | 380,757 | 401,902 |
| February | 75,168 | 95,094 | 107,276 | 119,217 | 182,869 | 331,963 | 372,276 | 357,204 |
| March | 85,899 | 128,701 | 120,660 | 136,125 | 240,475 | 406,404 | 493,864 | 440,320 |
| April | 103,512 | 148,607 | 129,447 | 148,984 | 246,418 | 461,703 | 526,188 | 484,249 |
| May | 122,810 | 137,757 | 130,130 | 174,410 | 277,213 | 512,625 | 563,771 | 540,573 |
| June | 130,760 | 103,913 | 137,832 | 186,798 | 295,402 | 562,722 | 546,685 | 589,946 |
| July | 136,726 | 110,864 | 147,125 | 204,357 | 320,154 | 569,875 | 543,541 | 562,381 |
| August | 146,813 | 121,554 | 154,026 | 219,661 | 332,014 | 624,479 | 611,838 | 571,175 |
| September | 147,573 | 120,690 | 151,562 | 217,256 | 315,895 | 611,962 | 609,756 | 554,115 |
| October | 141,306 | 124,054 | 153,315 | 230,403 | 339,687 | 557,486 | 578,889 | 542,976 |
| November | 106,618 | 108,779 | 142,507 | 208,483 | 314,704 | 468,875 | 435,083 | 459,490 |
| December | 103,352 | 93,456 | 134,731 | 196,986 | 296,805 | 508,148 | 441,231 | 458,001 |
| TOTAL | 1,369,585 | 1,398,043 | 1,606,119 | 2,178,207 | 3,362,455 | 5,947,956 | 6,103,879 | 5,963,332 |

*Figures do not include all airlines

### AIR CARRIER OPERATING EXPENSES

Domestic

**(Source: Air Transport Association)**

| | Aircraft Operating Expenses | % of Total | Ground and Indirect | % of Total | Total Operating Expense |
|---|---|---|---|---|---|
| 1938 | $ 24,987,651 | 57.0 | $ 18,876,986 | 43.0 | $ 43,864,637 |
| 1939 | 26,294,372 | 51.6 | 24,692,097 | 48.4 | 51,391,560 |
| 1940 | 35,178,395 | 50.1 | 35,028,420 | 49.9 | 70,896,615 |
| 1941 | 44,932,205 | 50.0 | 44,986,928 | 50.0 | 89,919,134 |
| 1942 | 36,392,090 | 43.1 | 47,974,400 | 56.9 | 84,366,489 |
| 1943 | 34,613,411 | 36.2 | 60,949,609 | 63.8 | 95,563,020 |
| 1944 | 45,150,125 | 36.3 | 79,371,967 | 63.7 | 124,522,092 |
| 1945 | 69,222,625 | 38.3 | 111,403,704 | 61.7 | 180,626,329 |
| 1946 | 129,249,600 | 40.1 | 192,969,583 | 59.9 | 322,219,183 |
| 1947 | 169,159,986 | 43.8 | 217,027,687 | 56.2 | 386,187,673 |
| 1948 | 199,990,706 | 46.3 | 231,643,571 | 53.6 | 431,634,277 |

**BREAKDOWN OF AIRCRAFT OPERATING EXPENSES**

| | Flying Operations | % of Total | Direct Maintenance Flight Equip. | % of Total | Depreciation Flight Equip. | % of Total |
|---|---|---|---|---|---|---|
| 1938 | $ 14,737,164 | 33.6 | $ 5,345,247 | 12.2 | $ 4,905,240 | 11.2 |
| 1939 | 15,809,055 | 31.0 | 5,651,202 | 11.1 | 4,834,126 | 9.5 |
| 1940 | 22,092,628 | 31.5 | 7,495,998 | 10.7 | 5,589,769 | 7.9 |
| 1941 | 27,391,837 | 30.5 | 9,789,797 | 10.9 | 7,750,571 | 8.6 |
| 1942 | 21,865,924 | 25.9 | 8,664,437 | 10.3 | 5,861,730 | 6.9 |
| 1943 | 20,739,121 | 21.7 | 9,132,260 | 9.5 | 4,742,030 | 5.0 |
| 1944 | 28,238,316 | 22.7 | 11,892,963 | 9.6 | 5,018,845 | 4.0 |
| 1945 | 43,421,033 | 24.0 | 16,392,654 | 9.1 | 9,408,938 | 5.2 |
| 1946 | 70,409,644 | 21.8 | 33,272,916 | 10.3 | 25,567,040 | 7.9 |
| 1947 | 88,835,181 | 23.0 | 42,902,710 | 11.1 | 37,422,095 | 9.7 |
| 1948 | 109,636,528 | 25.4 | 49,044,180 | 11.4 | 41,309,998 | 9.6 |

# PASSENGER-MILES, MAIL, EXPRESS AND FREIGHT TON-MILES

Domestic Airlines

(Source: Air Transport Association)

| | Total Passenger Miles (000) | Passenger Load Factor | Air Mail Ton-Miles | Express Ton-Miles |
|---|---|---|---|---|
| 1932 | 127,433 | 41.98 | 2,701,125 | 289,512 |
| 1933 | 174,820 | 46.77 | 2,567,924 | 422,860 |
| 1934 | 189,806 | 51.61 | 2,461,412 | 597,293 |
| 1935 | 316,336 | 54.76 | 4,132,708 | 1,097,602 |
| 1936 | 438,989 | 63.97 | 5,740,436 | 1,865,798 |
| 1937 | 481,116 | 57.54 | 6,698,230 | 2,162,488 |
| 1938 | 560,660 | 58.93 | 7,449,246 | 2,182,420 |
| 1939 | 755,118 | 62.14 | 8,610,726 | 2,713,099 |
| 1940 | 1,157,900 | 63.72 | 10,117,858 | 3,476,224 |
| 1941 | 1,506,303 | 64.32 | 13,118,015 | 5,258,551 |
| 1942 | 1,501,279 | 76.45 | 21,162,102 | 11,901,793 |
| 1943 | 1,670,935 | 89.98 | 36,061,868 | 15,139,359 |
| 1944 | 2,211,905 | 90.77 | 51,139,973 | 16,991,598 |
| 1945 | 3,408,290 | 89.33 | 65,092,921** | 21,793,432 |
| 1946 | 6,068,315 | 80.31 | 32,953,307** | 23,788,392 |
| 1947 | 6,307,690* | 65.12 | 33,086,175** | 28,766,659 |
| 1948 | 5,963,332* | 57.87 | 37,567,000 | 30,637,879 |

*This figure is revenue passengers only. All others include revenue and non-revenue passengers

**Does not include regular mail carried under special contract and foreign mail

Freight ton-miles were unrecorded until 1945. The figures:

1945— 1,403,420
1946—14,822,325
1947—35,911,554
1948—69,023,000

# U. S. AIR CARRIER OPERATING REVENUES

Domestic and International

(Source: Air Transport Association)

| Year | Passenger | % of Total | Mail | % of Total | Express & Freight | % of Total | Others | % of Total | Total |
|---|---|---|---|---|---|---|---|---|---|
| DOMESTIC: | | | | | | | | | |
| 1938 | $24,860,594 | 57.9 | $15,837,951 | 37.0 | $1,278,164 | 3.0 | $ 907,974 | 2.1 | $42,920,683 |
| 1939 | 34,843,711 | 62.3 | 18,482,476 | 33.0 | 1,619,132 | 2.9 | 1,002,447 | 1.8 | 55,947,766 |
| 1940 | 53,308,172 | 69.4 | 20,090,123 | 26.1 | 2,077,726 | 2.7 | 1,387,622 | 1.8 | 76,863,643 |
| 1941 | 69,791,338 | 71.7 | 22,696,351 | 23.3 | 2,919,003 | 3.0 | 1,904,442 | 2.0 | 97,311,134 |
| 1942 | 74,819,050 | 69.1 | 23,470,088 | 21.7 | 6,977,943 | 6.4 | 2,981,749 | 2.8 | 108,248,830 |
| 1943 | 87,481,456 | 71.0 | 24,212,580 | 19.7 | 8,381,539 | 6.8 | 3,029,390 | 2.5 | 123,104,965 |
| 1944 | 116,440,690 | 72.3 | 33,317,366 | 20.7 | 8,306,288 | 5.2 | 2,863,848 | 1.8 | 160,928,192 |
| 1945 | 166,519,922 | 77.5 | 33,693,467 | 15.7 | 10,835,138 | 5.0 | 3,694,563 | 1.8 | 214,743,090 |
| 1946 | 275,593,712 | 87.2 | 20,981,542 | 6.6 | 13,620,295 | 4.3 | 6,037,244 | 1.9 | 316,232,793 |
| 1947 | 308,575,954 | 84.6 | 29,444,746 | 8.1 | 19,377,860 | 5.3 | 7,433,388 | 2.0 | 364,831,948 |
| 1948 | 343,289,730 | 79.0 | 59,309,343 | 13.7 | 24,372,395 | 5.6 | 7,323,916 | 1.7 | 434,295,384 |
| INTERNATIONAL: | | | | | | | | | |
| 1946 | $91,416,814 | 62.4 | $35,443,612 | 24.1 | $11,318,501 | 7.8 | $8,457,609 | 3.7 | $146,636,536 |
| 1947 | 140,652,112 | 67.3 | 40,824,878 | 19.5 | 17,526,275 | 8.4 | 10,016,262 | 4.8 | 209,009,530 |
| 1948 | 140,806,000 | 60.0 | 54,691,000 | 23.3 | 19,778,000 | 8.4 | 19,562,000 | 8.3 | 234,837,000 |

# NUMBER OF PLANES, SEATS AND MILES

## Domestic Airlines

**(Source: Air Transport Association)**

| | Number of Planes | Average Available Seats | Total Passengers Carried (Duplicated) | Route Miles* | Revenue Miles |
|---|---|---|---|---|---|
| 1932 | 456 | 6.61 | 476,041 | .... | 45,893,522 |
| 1933 | 418 | 7.59 | 502,218 | .... | 49,256,320 |
| 1934 | 423 | 8.86 | 475,461 | .... | 41,525,667 |
| 1935 | 363 | 10.33 | 762,820 | .... | 55,918,151 |
| 1936 | 280 | 10.67 | 1,042,042 | .... | 64,307,480 |
| 1937 | 291 | 12.52 | 1,130,338 | .... | 66,791,079 |
| 1938 | 260 | 13.91 | 1,365,706 | 39,267 | 68,610,143 |
| 1939 | 276 | 14.66 | 1,895,793 | 39,782 | 82,924,922 |
| 1940 | 369 | 16.54 | 3,038,619 | 44,643 | 110,101,039 |
| 1941 | 370 | 17.54 | 4,141,748 | 46,453 | 134,405,836 |
| 1942 | 186 | 17.91 | 3,559,369 | 49,297 | 111,340,622 |
| 1943 | 204 | 18.34 | 3,484,203 | 54,502 | 105,354,810 |
| 1944 | 288 | 19.05 | 4,761,313 | 62,937 | 138,732,219 |
| 1945 | 421 | 19.68 | 7,605,856 | 66,466 | 208,969,279 |
| 1946 | 674 | 25.25 | 13,705,360 | 84,358 | 309,888,684 |
| 1947 | 810 | 29.93 | 12,890,208*** | 110,716 | 325,054,389 |
| 1948 | 862** | 32.10 | 13,168,105 | 139,030 | 338,216,783 |

*Includes duplication of routes.

**Includes 293 planes listed on both domestic and foreign certificates.

***Beginning, 1947, only revenue passengers; before 1947, figures include revenue and non-revenue passengers. Percent non-duplicated in 1944 was 85; 1945, 86.5; 1947, 89.1.

# PASSENGER FATALITIES

## Scheduled Airline Passenger Fatalities

**(Source: Air Transport Association)**

| | Number of Domestic Fatalities | Fatalities Per 100 Million Passenger Miles | Number of International Fatalities | Fatalities Per 100 Million Passenger Miles | Total Number of Fatalities |
|---|---|---|---|---|---|
| 1932 | 19 | 14.96 | 6 | 28.9 | 25 |
| 1933 | 8 | 4.61 | 0 | 0 | 8 |
| 1934 | 17 | 9.05 | 4 | 10.9 | 21 |
| 1935 | 15 | 4.78 | 0 | 0 | 15 |
| 1936 | 44 | 10.10 | 2 | 4.8 | 46 |
| 1937 | 40 | 8.39 | 11 | 13.9 | 51 |
| 1938 | 25 | 4.48 | 7 | 13.2 | 32 |
| 1939 | 9 | 1.20 | 10 | 12.8 | 19 |
| 1940 | 35 | 3.05 | 0 | 0 | 35 |
| 1941 | 35 | 2.35 | 2 | 1.2 | 37 |
| 1942 | 55 | 3.71 | 0 | 0 | 55 |
| 1943 | 22 | 1.34 | 10 | 3.9 | 32 |
| 1944 | 48 | 2.12 | 17 | 5.3 | 65 |
| 1945 | 76 | 2.23 | 17 | 3.7 | 93 |
| 1946 | 75 | 1.24 | 40 | 3.6 | 115 |
| 1947 | 199 | 3.21 | 20 | 1.08 | 219 |
| 1948 | 83 | 1.30 | 20 | 1.06 | 103 |

# *At the Tips of Our Fingers . . .*

DAY AFTER DAY, hour after hour, AIR TRANSPORTATION'S Reader Service Department is busy answering 'phone, mail, and wire communications from shippers in every part of the United States, as well as from such far-off places as Calcutta, Shanghai, Manila, Johannesburg, Brussels, Rome, Copenhagen, Paris, London, Rio, and scores of other places dotting the world map. It is our business to know the answers—answers to such questions as these. . . .

"I want to charter a DC-4 to fly a load of engines to Guatemala City. Where can I get one?"

"I am interested in appointing a New York agent for our London firm.

"Can you recommend several reputable IATA-approved foreign freight forwarders?"

"What scheduled transatlantic air carriers serve Switzerland?"

"Are any of the irregular air carriers transporting cargoes destined to the Balkan countries?"

"What type of airfreighter does X Airlines operate, and does that company have experience in shipping cattle over long distances?"

"Is it true that Z Airlines has been grounded? I am anxious to know. They have my shipment."

"I recently read an article in your magazine on the packaging of perishables. Can you give me the address of the firm mentioned in that article?

"I expect to fly a load of furs into New York from Alaska. Would you please recommend some shippers or forwarders who might assure me a return load?"

"What is the rate on a 150-pound air shipment from Chicago to Oslo?"

Yes, it is the business of AIR TRANSPORTATION to know the answers. To acquire its know-how, it scours the shipping world of both hemisphere and is in direct contact with thousands of air shippers and air carriers. This monthly magazine is not only pleasurable reading, it is — and this is our selling point—*profitable* reading.

Keep posted on *all* the changes as they occur. Adopt the habit of thousands of air shippers and air cargo executives who make certain never to miss a single issue of AIR TRANSPORTATION.

As an advertising medium, you'll be hitting the bull's eye with the best-circulated magazine in its particular field.

**HOW THE ISSUES OF AIR TRANSPORTATION HELP THE SHIPPER-BY-AIR**

- Air Cargo and Air Mail Rates
- Air Parcel Post Rates
- Lists of Scheduled Airlines
- Lists of Irregular Air Carriers
- Lists of Foreign Airlines
- Lists of IATA-Approved Air Cargo Agents
- World-Wide Air Cargo Directory
- Documentary Requirements for Air Shipping
- Feature Articles
- Air Cargo Editorials
- Special Departments
- New Regulations
- Helpful Hints

# AIR TRANSPORTATION

**THE WORLD'S FIRST AND ONLY AIR CARGO MAGAZINE**

**10 BRIDGE STREET • NEW YORK 4, N. Y.**

# COMPARATIVE TRANSPORTATION SAFETY RECORD

Passenger Fatalities and Rate of Passenger Fatalities per 100,000,000 passenger miles

**(Source: Air Transport Association)**

| | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|---|---|---|
| Domestic Scheduled | | | | | | | | |
| Air Transport Planes | 35 | 55 | 22 | 48 | 76 | 75 | 199 | 83 |
| Rate | 2.32 | 3.66 | 1.32 | 2.09 | 2.14 | 1.20 | 3.21 | 1.3 |
| Buses | .... | .... | .... | .... | 120 | 140 | 140 | .... |
| Rate | .24 | .23 | .22 | .22 | .17 | .19 | .21 | .... |
| Railroad passenger | | | | | | | | |
| trains | 39 | 110 | 262 | 249 | 145 | 115 | 75 | .... |
| Rate | .14 | .17 | .31 | .26 | .16 | .18 | .16 | .... |
| Passenger Automobiles | | | | | | | | |
| and taxicabs | .... | .... | .... | .... | 12,900 | 15,400 | 15,300 | .... |
| Rate | 4.0 | 2.7 | 2.7 | 2.9 | 2.9 | 2.5 | 2.3 | .... |

# ASSETS AND LIABILITIES

Domestic Trunk Airlines—Selected Years

**(Source: Air Transport Association)**

| | 1941 | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|---|
| Current assets | $48,378,162 | $139,685,990 | $148,083,458 | $152,381,834 | $132,484,511 | $171,859,726 |
| Flight Equipment (net) | 25,816,357 | 13,895,946 | 41,162,511 | 117,884,329 | 173,886,500 | 188,351,172 |
| Other Op. property | 5,832,000 | 11,531,413 | 24,085,302 | 47,408,722 | 70,741,538 | 67,942,313 |
| Non-Operating property | 903,134 | 1,292,305 | 642,872 | 2,832,701 | 2,789,790 | 5,779,353 |
| Other assets | 5,726,255 | 21,313,663 | 34,729,196 | 66,592,900 | 54,676,717 | 50,308,050 |
| TOTAL ASSETS | $86,655,908 | $187,719,317 | $248,703,339 | $387,100,486 | $434,577,556 | $484,240,614 |
| Current liabilities | $21,932,456 | $53,431,795 | $73,412,182 | $105,659,559 | $81,829,236 | $99,836,921 |
| Long term debt | 1,561,727 | 147,126 | 24,421,800 | 90,097,738 | 161,170,650 | 172,624,519 |
| Capital stock | 32,043,968 | 48,751,442 | 52,245,472 | 92,896,915 | 112,621,702 | 121,312,622 |
| Capital surplus | 22,402,837 | 27,631,474 | 32,919,664 | 46,989,868 | 41,929,868 | 53,428,648 |
| Earned surplus | 5,823,247 | 43,833,022 | 58,614,766 | 41,018,688 | 10,302,299 | 13,944,396 |
| Operating reserves | 1,006,165 | 687,501 | 505,977 | 1,139,235 | 1,591,145 | 2,387,158 |
| Other liabilities | 1,886,508 | 13,236,957 | 6,583,478 | 9,298,483 | 25,114,656 | 20,707,582 |
| Net worth and liabilities | 86,655,908 | 187,719,317 | 248,703,339 | 387,100,486 | 434,577,556 | 484,240,614 |
| Net worth | $60,299,650 | $126,767,395 | $143,779,903 | $180,905,570 | $178,871,869 | $195,830,082 |

## AVERAGE PASSENGER FARES AND TRIPS

Domestic and International

(Source: Air Transport Association)

| | Average Passenger Fare Per Mile | | Average Trip Per Passenger | | Ratio of Domestic Air Pass. Miles to Pullman Pass. Miles |
|---|---|---|---|---|---|
| | Domestic | International | Domestic | International | |
| 1932 | 6.1 cts. | .... | 268 | 289 | 1.9% |
| 1933 | 6.1 cts. | .... | 348 | 315 | 2.8 |
| 1934 | 5.9 cts. | .... | 399 | 351 | 2.8 |
| 1935 | 5.7 cts. | .... | 415 | 381 | 4.4 |
| 1936 | 5.7 cts. | .... | 421 | 414 | 5.3 |
| 1937 | 5.6 cts. | .... | 418 | 416 | 5.2 |
| 1938 | 5.2 cts. | .... | 401 | 487 | 6.8 |
| 1939 | 5.1 cts. | .... | 394 | 557 | 8.9 |
| 1940 | 5.1 cts. | .... | 375 | 614 | 14.1 |
| 1941 | 5.0 cts. | .... | 360 | 713 | 15.0 |
| 1942 | 5.3 cts. | .... | 452 | 880 | 7.9 |
| 1943 | 5.3 cts. | 7.9 cts. | 541 | 874 | 6.5 |
| 1944 | 5.4 cts. | 7.9 cts. | 538 | 910 | 7.8 |
| 1945 | 4.5 cts. | 8.7 cts. | 511 | 942 | 12.5 |
| 1946 | 4.5 cts. | 7.8 cts. | 487 | 1,057 | 29.4 |
| 1947 | 5.0 cts. | 7.7 cts. | 474 | 1,331 | 48.5 |
| 1948 | 5.8 cts. | .... | 473 | 1,376 | 54.1 |

## NUMBER OF PLANES, PASSENGERS AND MILES

International Airlines

(Source: Air Transport Association)

| | Number of Planes | Passengers Carried | Route Miles | Revenue Miles | Ton Mi. (D) Express, Frt. & Mail (000) |
|---|---|---|---|---|---|
| 1932 | 108 | 71,519 | 19,574 | 5,278,365 | .... |
| 1933 | 86 | 74,394 | 19,404 | 5,857,163 | .... |
| 1934 | 99 | 96,804 | 22,192 | 7,539,106 | .... |
| 1935 | 101 | 111,296 | 31,261 | 7,949,547 | .... |
| 1936 | 94 | 87,723 | 31,990 | 6,904,246 | .... |
| 1937 | 92 | 112,324 | 31,979 | 7,909,158 | .... |
| 1938 | 73 | 109,265** | 34,968 | 7,042,503 | .... |
| 1939 | 84 | 136,090 | 43,455 | 7,607,474 | .... |
| 1940 | 68 | 170,179 | 53,322 | 9,651,733 | .... |
| 1941 | 83 | 235,802 | .... | 14,410,358 | .... |
| 1942 | 68 | 276,200 | .... | 18,681,059 | .... |
| 1943 | 70 | 292,888 | 27,211 | 18,457,864 | 7,079 |
| 1944 | 70 | 356,662 | 29,708 | 22,272,638 | 8,255 |
| 1945 | 97 | 493,498 | 38,885 | 32,608,704 | 12,117 |
| 1946 | 147 | 1,066,414 | 66,419 | 59,375,572 | 21,232 |
| 1947 | 154 | 1,359,410 | 95,503 | 86,471,982 | 45,458 |
| 1948 | 203* | 1,372,749** | 172,177 | 98,053,441 | 65,993 |

*203 planes listed for exclusive foreign service. In addition, 293 planes listed for domestic and international service.

**Revenue passengers only. All other figures include revenue and non-revenue passengers.

# PLANES IN USE

## Domestic Airlines

**(Source: Air Transport Association)**

| | | 1939 | | 1940 | | 1941 | | 1942 | | 1943 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. of Motors | No. Planes | Av. Mi. Per Day | No. Planes | Av. Mi. Per Day | No. Planes | Av. Mi. Per Day | No. Planes | Av. Mi. Per Day | No. Planes | Av. Mi. Per Day |
| **Beechcraft** | 2 | ........ | ........ | ........ | ........ | ........ | ........ | 1.0 | 325 | 2.0 | 437 |
| **Boeing** | | | | | | | | | | | |
| 247-D | 2 | 39.1 | 579 | 34.9 | 468 | 29.3 | 458 | 11.3 | 521 | 1.0 | 248 |
| SA-307B | 4 | ........ | ........ | 3.1 | 1,354 | 5.0 | 1,596 | 0.8 | 1,230 | ........ | ........ |
| **Consolidated-** | | | | | | | | | | | |
| Vultee Convair | 2 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| **Douglas** | | | | | | | | | | | |
| DC-2 | 2 | 45.2 | 785 | 42.2 | 715 | 16.9 | 650 | 5.6 | 668 | ........ | ........ |
| DC-3 | 2 | 86.2 | 1,125 | 145.2 | 1,198 | 214.6 | 1,174 | 179.6 | 1,424 | 161.8 | 1,671 |
| DST | 2 | 30.5 | 1,512 | 38.6 | 1,569 | 44.8 | 1,526 | 16.5 | 1,584 | ........ | ........ |
| DC-4 | 4 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| DC-6 | 4 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| **Lockheed** | | | | | | | | | | | |
| Electra | 2 | 41.8 | 748 | 33.8 | 583 | 21.5 | 527 | 6.6 | 559 | ........ | ........ |
| Lodestar | 2 | ........ | ........ | 4.4 | 661 | 13.7 | 829 | 10.9 | 1,152 | 11.5 | 1,392 |
| Constellation | 4 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| **Sikorsky** | 2 | 5.8 | 195 | 6.0 | 203 | 5.8 | 281 | 4.0 | 151 | 3.0 | 210 |
| **Stinson** | | | | | | | | | | | |
| Single Motor | 1 | ........ | ........ | ........ | ........ | 8.8 | 262 | 7.5 | 326 | 9.3 | 379 |
| Tri-motor | 3 | 3.2 | 133 | 2.0 | 109 | ........ | ........ | 1.8 | ........ | 4.4 | 151 |
| **Waco** | 1 | ........ | ........ | ........ | ........ | ........ | ........ | 0.4 | 228 | 0.3 | 337 |
| **Martin 202** | 2 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |

| | | 1944 | | 1945 | | 1946* | | 1947* | | 1948* | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Beechcraft** | 2 | 1.2 | 323 | 0.8 | 66 | 0.4 | 502 | 5.3 | 564 | 6.5 | 219 |
| **Boeing** | | | | | | | | | | | |
| 247-D | 2 | ........ | ........ | ........ | ........ | 1.0 | 607 | 3.8 | 661 | 0.8 | 800 |
| SA-307B | 4 | ........ | ........ | 3.6 | 2,094 | 5.0 | 1,695 | 5.0 | 1,315 | 5.0 | 1,326 |
| **Consolidated-** | | | | | | | | | | | |
| Vultee Convair | 2 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | 9.3 | 907 |
| **Douglas** | | | | | | | | | | | |
| DC-2 | 2 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| DC-3 | 2 | 205.8 | 1,814 | 314.4 | 1,756 | 426.6 | 1,638 | 438.2 | 1,275 | 429.2 | 1,194 |
| DST | 2 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| DC-4 | 4 | ........ | ........ | ........ | ........ | 85.8 | 1,758 | 148.3 | 1,511 | 155.0 | 1,317 |
| DC-6 | 4 | ........ | ........ | ........ | ........ | ........ | ........ | 21.1 | 1,388 | 46.3 | 1,825 |
| **Lockheed** | | | | | | | | | | | |
| Electra | 2 | ........ | ........ | 1.3 | 727 | 3.0 | 587 | ........ | ........ | ........ | ........ |
| Lodestar | 2 | 14.3 | 1,719 | 17.7 | 1,545 | 16.7 | 1,265 | 11.4 | 1,056 | 12.0 | 258 |
| Constellation | 4 | ........ | ........ | ........ | ........ | 6.6 | 1,190 | 21.4 | 1,659 | 30.9 | 1,828 |
| **Sikorsky** | 2 | 2.8 | 240 | 2.0 | 184 | 0.1 | 100 | ........ | ........ | ........ | ........ |
| **Stinson** | | | | | | | | | | | |
| Single Motor | 1 | 10.6 | 377 | 10.9 | 404 | 11.0 | 445 | 7.6 | 412 | 7.0 | 439 |
| Tri-motor | 3 | 4.0 | 148 | 4.0 | 61 | ........ | ........ | ........ | ........ | ........ | ........ |
| **Waco** | 1 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| **Martin 202** | 2 | ........ | ........ | ........ | ........ | ........ | ........ | 2.0 | 572 | 15.4 | 843 |

*Includes feeder and territorial lines

*. . . spokesman*




**Henry Publishing Co.**

# *for the air world*

SKYWAYS made its test flight as magazine spokesman for the aviation world in November, 1942. It, like the aviation industry itself, has had to weather the change from a wartime outlook to a post-war point of view. Both have emerged from this precarious period with flying colors.

SKYWAYS was designed to meet both the needs of the aviation industry and its public. To meet this objective, SKYWAYS drew on its resources unstintingly in order to conduct important research surveys in the field of aviation. Its efforts were well-rewarded. Its objectives were achieved.

Future plans? SKYWAYS has no intention of resting on its laurels; it will constantly seek new avenues of approach to the problems ahead, and, as always, continue to champion the interests of the aviation world in whatever direction public interest might lie.

•

**444 Madison Ave., New York 22, New York**

# AIRLINE PERSONNEL

Domestic and International
(Source: Air Transport Association)

DOMESTIC

| Year | Pilots & Copilots | Pursers Stewards Stewdsses | Other Flight Personnel | Meteorologists and Dispatcher | Mechanics | Other Hangar and Field Personnel | Ticket Agts. & Reservationists Off. Employees | All Others | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1937 | 1,064 | 339 | 0 | 0 | 2,228 | 658 | 3,297 | 0 | 7,586 |
| 1938 | 1,135 | 358 | 0 | 186 | 2,436 | 712 | 3,715 | 472 | 9,008 |
| 1939 | 1,412 | 536 | 0 | 181 | 2,822 | 877 | 4,583 | 228 | 10,639 |
| 1940 | 1,934 | 914 | 18 | 193 | 4,054 | 1,880 | 5,855 | 1,131 | 15,984 |
| 1941 | 2,217 | 1,028 | 19 | 220 | 4,423 | 2,224 | 7,807 | 1,285 | 19,223 |
| 1942 | 2,194 | 753 | 112 | 1,581 | 9,348 | 2,969 | 7,717 | 2,236 | 26,910 |
| 1943 | 2,125 | 845 | 8 | 1,685 | 8,271 | 3,356 | 10,973 | 2,391 | 29,654 |
| 1944 | 2,879 | 1,322 | 11 | 1,870 | 7,136 | 3,509 | 12,201 | 2,270 | 31,198 |
| 1945 | 4,967 | 2,075 | 108 | 2,613 | 10,844 | 7,012 | 19,241 | 3,453 | 50,313 |
| 1946 | 5,712 | 3,342 | 98 | 3,577 | 16,107 | 10,307 | 24,626 | 5,413 | 69,182 |
| 1947 | 5,030 | 3,061 | 181 | 2,619 | 15,372 | 8,407 | 21,980 | 2,348 | 58,998 |
| 1948 | 5,134 | 3,285 | 752 | 2,857 | 14,882 | 9,950 | 17,378 | 7,453 | 59,266 |
| | | | | INTERNATIONAL | | | | | |
| 1937 | 291 | 81 | 0 | 0 | 1,050 | 1,698 | 880 | 0 | 4,000 |
| 1938 | 278 | 93 | 0 | 0 | 977 | 1,923 | 995 | 0 | 4,266 |
| 1939 | 287 | 103 | 7 | 0 | 1,181 | 2,138 | 1,559 | 0 | 5,275 |
| 1940 | 340 | 122 | 15 | 0 | 1,359 | 2,397 | 1,834 | 0 | 6,067 |
| 1941 | 447 | 182 | 30 | 0 | 1,966 | 2,707 | 1,903 | 0 | 7,235 |
| 1942 | 452 | 378 | 129 | 29 | 3,534 | 4,415 | 3,366 | 0 | 12,803 |
| 1943 | 207 | 147 | 322 | 511 | 2,140 | 1,835 | 1,859 | 2,604 | 9,625 |
| 1944 | 466 | 194 | 266 | 631 | 2,827 | 2,239 | 3,033 | 1,753 | 11,409 |
| 1945 | 930 | 411 | 938 | 864 | 5,099 | 2,435 | 4,663 | 2,628 | 17,968 |
| 1946 | 1,508 | 1,079 | 1,405 | 1,454 | 7,269 | 2,463 | 6,961 | 5,233 | 27,372 |
| 1947 | 1,603 | 1,016 | 1,152 | 1,211 | 5,774 | 3,201 | 10,679 | 1,518 | 26,154 |
| 1948 | 1,532 | 1,199 | 1,036 | 886 | 4,414 | 3,039 | 3,610 | 5,592 | 20,673 |

# AIR MAIL, MILES AND PAYMENTS

Domestic and International
(Source: Air Transport Association)

| | Domestic | | | | | | International | |
|---|---|---|---|---|---|---|---|---|
| Fiscal Year Ending June 30 | Payments Per Plane Mile | Load Per Mile Flown, Pounds | Pound Miles Per Route Mile | Revenue Miles Flown | Route Miles Air Mail Service | Thousands of Pound Miles Performed | Plane Miles Flown | Payments Per Plane Mile |
| 1937 | .329 | 319 | 429,834 | 39,958,771 | 29,622 | 12,732,530 | 4,448,608 | 1.77 |
| 1938 | .319 | 306 | 420,067 | 46,166,162 | 33,655 | 14,137,360 | 4,994,558 | 1.72 |
| 1939 | .326 | 303 | 426,608 | 52,141,758 | 37,080 | 15,818,617 | 5,357,405 | 1.74 |
| 1940 | .328 | 315 | 492,090 | 59,236,453 | 37,943 | 18,671,367 | 5,907,124 | 2.10 |
| 1941 | .273 | 295 | 513,579 | 75,689,839 | 43,411 | 22,294,962 | 8,238,349 | 1.90 |
| 1942 | .263 | 352 | 703,768 | 89,307,567 | 44,623 | 31,404,257 | 8,858,294 | 1.61 |
| 1943 | .262 | 634 | 1,251,401 | 88,963,296 | 45,304 | 56,492,340 | 15,633,483 | .36 |
| 1944 | .264 | 786 | 1,734,022 | 107,650,804 | 49,482 | 84,579,690 | 19,485,789 | .17 |
| 1945 | .213 | 723 | 2,162,025 | 166,576,371 | 56,849 | 122,908,961 | 24,275,760 | .25 |
| 1946 | .121 | 395 | 1,772,013 | 221,724,860* | 57,377 | 101,672,777* | 40,659,256 | .25 |
| 1947 | .069 | 203 | 658,592 | 314,505,965* | 102,454 | 67,475,414* | 61,213,887* | .25 |
| 1948 | .143* | .... | 520,562 | 321,661,655* | 130,093 | 67,716,848* | 91,439,534 | .44 |

*Subject to adjustment